DOE/CS/60521-T1

ENERGY

DOE/ERA/HQ

THE WEATHERIZATION PROGRAM

A Study of Progress

November 1979

Work Performed Under Contract No. AC01-79CS60521

Syracuse Research Corporation
Energy Research Center
Syracuse, New York

U. S. DEPARTMENT OF ENERGY

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Price: Paper Copy $8.00
Microfiche $3.50

DOE/CS/60521-T1
Distribution Category UC-95d

THE WEATHERIZATION PROGRAM

A STUDY OF PROGRESS

November 1979

Prepared for

U. S. Department of Energy
Assistant Secretary for Conservation and Solar Energy
Office of State and Local Programs
Office of Weatherization Assistance

Prepared by

Energy Research Center
Syracuse Research Corporation
Merrill Lane
Syracuse, NY 13210
SRC TR 79-590

This Document was Prepared Under
Contract DE-AC01-79CS 60521
from the Office of the Weatherization Assistance Program
of the Department of Energy

TABLE OF CONTENTS

PREFACE

This study is the Department of Energy's report on the progress of the Weatherization Assistance Program (WAP) and other weatherization activities toward national energy conservation goals. It comprises the President's weatherization study mandated by Section 254 of the National Energy Conservation Policy Act (NECPA). The time during which the Department was able to collect data and gather opinion and wisdom from the people at policy, administration, and operating levels was too short to permit assembly of the sorts of statistics we would have liked to have included. Time constraints forced us to rely on the information which busy Federal, Regional, State, and local program people had at hand when they were contacted. Many times the sort of information the Department wished to include in this study simply did not exist in the form it desired.

One of the principal conclusions the Department has drawn from this progress report is that if future reports are to be more accurate than this one, better information must be collected at the local level in ways which are consistent both with helping local project operators do their work well and with giving administrators and policy makers the accurate information they need to make informed decisions.

In order to give the reader as clear an idea as possible of the extent to which weatherization activities are working and saving energy, the Department has organized the report in the following way:

- The weatherization activities of the Federal agencies the Department contacted are described.
- The study addresses the question of the adequacy and cost of the materials used in weatherization.

- The series of policy and regulation change questions introduced in the agency-specific section is discussed from a broader perspective.

- Last, the conclusions the Department has drawn from this study are presented.

The appendices present a legislative history of the Program, sketch what goes on at the operational level (subgrantee) of the Program, and describe a cost-benefit analysis of the Weatherization Program.

INTRODUCTION

The decreasing supply of easily obtained fuels is one of the most serious problems Americans face today. Indeed, some claim the problems of inflation, unemployment, and disruptive shifts of population are consequences of the energy crisis. As with many social problems, low-income people are among the first to feel the pinch of rising fuel prices, particularly for home heating fuel. The Department of Energy's Weatherization Assistance Program (WAP) installs insulation, storm windows and doors, and other energy efficiency improvements to reduce heat loss in the homes of low-income people, especially the elderly and handicapped. Typical operations of the program are explained in detail in Appendix B.

The Energy Crisis

Between 1938 and 1960, the people of the Earth used an amount of energy equal to the total used previously in the history of civilization. Between 1960 and 1977, this amount was used again. Currently accepted trend extrapolations suggest this amount may be used again before the end of the 1980s. This dramatic increase in energy use has been brought about by a complex system of social and economic forces, not the least of which are population growth, rising expectations, little or no economic and social incentive to conserve, and a civilization which equates energy use with progress.

Unfortunately, the rise in energy use has been accompanied by a leveling of the production curve of fossil fuels, particularly the fuel oil and natural gas used to heat the homes of many Americans. The leveling of this curve has been accompanied by a rise in fuel prices and a decline in availability.

To make matters worse, altogether too much of the energy produced by burning fossil fuels for home heating is lost because most homes in the United States have not been built to conserve energy. Many homes leak heat to the outside through uninsulated ceilings and walls, unplugged cracks, and around badly-fitting windows and doors. Not surprisingly, the homes of the people least able to absorb the rising cost (the poor) are the homes which lose the most energy through the sorts of heat leaks mentioned above.

These two energy-related pressures, then, are felt particularly strongly by poor people who can ill-afford rising prices and who live in houses which do not adequately retain precious heat.

The Government's Response

In April 1977, the President addressed the Nation on the subject of energy. He outlined a series of steps designed to reduce the Nation's dependence on foreign energy sources, to increase the use of energy from coal and other sources, and to promote conservation. As part of the conservation element of the plan, he set a goal to insulate 90 percent of American homes by 1985, and he noted that the Government had a responsibility to protect low-income people from the most severe effects of the energy crisis. The Weatherization Program, he further stated, would protect the poor by insulating their homes, thereby protecting them from the cold and from rising fuel prices.

The National Energy Plan was the formal description of the energy related activities described in the President's speech. The Plan stated three energy objectives for the

United States:

- reduce dependence on foreign oil and vulnerability to supply interruptions;

- keep U.S. imports sufficiently low to weather the period when world oil production approaches its capacity limitation; and

- increase the use of renewable and essentially inexhaustible sources of energy for sustained economic growth.*

The Plan stated that "conservation and fuel efficiency are the cornerstone of the proposed National Energy Plan II."** An increase in funding for the Weatherization Program was proposed as part of the conservation program. The Plan also noted that "the Secretary of Labor has been directed to take all appropriate steps to ensure that recipients of funds under the Comprehensive Employment and Training Act (CETA) will supply labor for the [low-income] weatherization effort. The CETA program's employment levels, as proposed by the Administration, would meet the labor requirements of the low-income weatherization program."***

The legislation which came to be known as the National Energy Conservation Policy Act (NECPA), (Public Law 95-619) was signed into law on November 9, 1978. Section 102 described the findings of the Congress:

> *Section 102. Findings and Statement of Purposes.*
>
> *(a) Findings--The Congress finds that--*
>
> *(1) the United States faces an energy shortage arising from increasing demand for energy, particularly for oil and natural gas, and insufficient domestic supplies of oil and natural gas to satisfy that demand;*

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* The National Energy Plan II, Executive Office of the President. Washington, D.C.: Government Printing Office, 1977, p. IX.

** Ibid, p. X.

*** Ibid, p. 41.

(2) unless effective measures are promptly taken by the Federal Government and other users of energy to reduce the rate of growth of demand for energy, the United States will become increasingly dependent on the world oil market, increasingly vulnerable to interruptions of foreign oil supplies and unable to provide the energy to meet future needs; and

(3) all sectors of our Nation's economy must begin to significantly reduce the demand for nonrenewable energy resources such as oil and natural gas by implementing and maintaining effective conservation measures for the efficient use of these and other energy sources.

The NECPA expanded the scope of the Weatherization Program and directed agencies other than the Department of Energy to conduct weatherization-related programs on behalf of low-income people. The Farmer's Home Administration (FmHA), the the Department of Housing and Urban Development (HUD), and the Department of Labor (DOL) were charged with conducting weatherization activities on behalf of low-income Americans.

In May, 1979, The National Energy Plan II re-emphasized the need for conservation as well as the necessity of making all energy sources, particularly petroleum energy, as available as possible. Specifically, weatherization grants for low-income people were identified as crucial since the poor usually cannot afford those conservation measures which reduce the use of home heating fuel.

The Weatherization Assistance Program* and associated weatherization activities are clearly, then, responsive to these national energy conservation goals. This study details the progress of the Weatherization Program and other weatherization activities.

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*In the course of this study, the phrase "Weatherization Assistance Program (WAP)" will refer to the program operated only by the Department of Energy (DOE). The phrase "Weatherization Program" will refer to the parallel programs operated by DOE and the Community Services Administration (CSA). "Weatherization activities" will refer to weatherization activities funded by other agencies.

Progress Toward the Achievement of the National Energy Conservation Goals

The policy statements and legislation reviewed earlier state that the weatherization of the homes of low-income people is an important element of the national energy conservation goals. It would seem easy to present the number of homes weatherized, calculate the amount of energy saved, and point to how far we have traveled to the goal of making the homes of the poor as energy efficient as possible.

Unfortunately, the data needed to make these judgments is simply not available. When some numbers do exist, the reality they represent is often questionable. This is not to say that the lack of information is the result of fraud and abuse. Rather, systems for collecting management information needed to make comparative analyses have not been developed at the same pace as the mechanics of actually weatherizing homes. It is expected that as the programs evolve out of their growing pains, this sort of information will begin to be systematically collected.

The Department of Energy (DOE)

DOE was directed under Title IV, Part A, of the Energy Conservation and Production Act (Public Law 94-385) (EPCA) to establish a Federally financed and operated weatherization program that would assist low-income people in meeting high energy costs and conserve energy. DOE was particularly directed to service the elderly and handicapped in this program. DOE can make grants to the States, the District of Columbia, and certain Native American tribal organizations. There are 74 grantees: 49 states (excluding Hawaii), The District of Columbia, and 24 Indian tribes. DOE's low-income Weatherization Assistance Program (WAP) awarded its first grant in August 1977 and is now preparing for the fourth round of funding (FY 80). As of June 30, 1979, 184,255 homes had been weatherized with DOE money.

Total Grant Funds Appropriated for Weatherization:

FY 77: $27,000,000
FY 78: $64,066,000
FY 79: $198,750,000

Authorized:

FY 77: $55,000,000
FY 78: $65,000,000
FY 79: $200,000,000
FY 80: $200,000,000

DOE is funded for materials and administrative money, but until very recently, it was almost wholly dependent on the Department of Labor's CETA program for labor to work on the conservation measures taken in client dwellings. (Approximately 80% of weatherization workers are funded by CETA. The remainder are other paid workers and volunteers.) Some additional limited support money is available to local

weatherization programs through grants made by the various States.

In FY 79, DOE became the sole federal sponsor of the WAP. The two previous years, parallel programs were run by DOE and CSA using the same delivery system, Community Action Agencies (CAAs)*. When DOE became the sole funding source for the Weatherization Assistance Program it used (by legislative mandate) this local delivery system which had both the advantages and the problems of a system already in place.

Many of these problems were dealt with in DOE's Inspector General's Report of June 12, 1977, and have resulted in a series of corrective actions. These actions have been or are now being implemented at the grantee level. With the help of the regional staff, the Inspector General identified five areas of particular concern:

- The adequacy of labor to carry out weatherization functions;
- Proper and adequate record keeping at the State and local levels;
- Information transfer;
- Monitoring and evaluation of the Program; and
- Increasing funding levels which the Program may not be able to absorb.

Labor

DOE feels that an adequate supply of labor matched to funds available for weatherization materials is the most critical and pressing need facing the WAP. The present

*Community Action Agencies are the local service delivery agencies of the Community Services Administration. They administer a wide range of programs for low-income people.

system's reliance on CETA-funded labor leaves serious programmatic gaps and hampers the ability of local weatherization projects in their efforts to carry out the work of weatherization.

In order to alleviate labor shortages, DOE has negotiated a series of DOE/CETA linkages. The Department of Labor (DOL) issued a field memorandum to its Regional Offices and a CETA policy letter to local prime sponsors announcing the DOL intention to work with each prime sponsor to come up with a functional match between the DOE weatherization funds and CETA subsidized labor. In response to these problems DOL has pledged national-level assistance in attempting to overcome obstacles in developing a functional DOE/CETA labor match. In addition to strongly urging prime sponsors to work out problems locally so that sufficient labor can be committed to local projects, DOL will require prime sponsors to meet in negotiations with each local weatherization program receiving DOE funds to review program proposals for weatherization project labor through CETA.

DOL, in coordination with DOE, has established a system whereby situations where local weatherization grantees have reached an impasse in negotiating for CETA labor are identified. The cause of the blockage is investigated and recommendations are made whether or not DOE should grant a special waiver to allow its materials funds to be spent for labor contracts with private firms.

In addition, DOE now allows for the funding of contractor-weatherization services and/or increasing the ratio of on-site supervisors to crew members with its funds. The use of outside contractors to do weatherization along with these other measures will begin to alleviate the backlog of

unexpended WAP funds at the local level. Increasing allowable funding for additional supervisory personnel will help increase the efficiency, quality, and quantity of work.

In order to better promote greater spending levels by DOE's grantees and thereby have a greater number of dwellings weatherized, DOE has provided authority to the States to contract for weatherization services or to grant waivers to program operators in such local areas where the absence of CETA workers can be documented for the use of DOE funds to supplement the project's labor force.*

As the supply of labor becomes more readily available through CETA or through the use of WAP funds, spending can be expected to increase from current rates. As local programs are better able to complete homes, their demand for funds will become that much greater. The various grantees can, therefore, make these funds available with greater assurance that they will be used in an efficient way to service the Program's clientele.

Proper and Adequate Record Keeping

In order that DOE may receive better information about the weatherization activities carried out at State and local levels, it has instituted a series of operational improvements that require proper accounting procedures, proper documentation to support client eligibility, and improvement of State and local agency control of DOE funds.

One area that has been difficult to document is that of energy savings for each individual dwelling unit weatherized with DOE funds. A number of pilot studies have been undertaken to attempt such documentation. It is difficult, if not impossible, to calculate savings for each specific dwelling

*The changes cited here are discussed in more detail in Section IV.

unit at the present time. However, the very nature of weatherization work done with DOE funds saves energy. In interviewing various grantees and using a small sized sample, the WAP office has documented savings of between 14% and 28% of fuel consumption after weatherization has taken place.

The Department believes that part of the documentation problem results from the inability of the grantees to collect reliable data from local program operators. In order to resolve this problem, DOE has funded a State program manual which is in the developmental stage. It will give guidance to grantees in developing methods to collect reasonable data pertaining to the Program. The grantees will require local program operators to initiate such data collection. When this data becomes available, it will enable DOE to document more precisely the fuel savings for each dwelling unit weatherized.

Information Transfer

DOE feels that the steady growth of the WAP creates a pressing need to develop an ongoing information flow. In its efforts to improve information flow and further develop administrative capabilities of the various grantees and subgrantees, DOE established a weatherization newsletter that disseminates information on administrative, legislative, technical, and management issues on a systematic basis. In addition to developing this newsletter and funding the aforementioned program manual for state program managers (presently planned for distribution in late February 1980), DOE has awarded a contract to the State of Arkansas to develop a comprehensive training program for grantees and subgrantees.

Monitoring and Evaluation

The rapid growth of the Program has intensified the need for close monitoring and evaluation of the Program at all levels.

DOE is responsible for the monitoring and evaluation of weatherization grantees (the States), and participates in the on-site review of subgrantee activity. The monitoring process of local weatherization projects is carried out by headquarters and regional staff, in most cases with the staff of the State administering agency.

Monitoring of local weatherization projects was initiated by DOE in all participating States in FY 77 and is continuing. On-site monitoring has been carried out by DOE headquarters and regional staff as well as state staff. On-site monitoring constitutes a review of the operation of the Program at the local level, including inspection of client files, weatherized homes, accounting records, and review of the utilization of CETA workers.

Weatherized homes are inspected for quality of workmanship and are compared to client files to verify materials shown as installed. Client files are examined for accuracy of recordkeeping and documentation of client eligibility. Accounting records are examined to determine allowability of costs charged against the program.

Funding Levels

DOE has issued a directive requiring that States obligate all available FY 78 and FY 79 funds pursuant to already negotiated agreements among state agencies and local weatherization projects. DOE has taken steps to solve the

operational and functional problems identified by the Inspector General. These steps include:

- a request that grantees provide target dates for submitting FY 80 plans to the regional offices.

- plans to request semi-monthly status reports and to issue guidance to simplify the grants application process as much as is possible.

- meetings of the national offices of DOE, DOL, and CSA on a semi-monthly basis to review the incoming reports.

The Community Services Administration (CSA)

The Community Services Administration (CSA) occupies an important place in the history of the Weatherization Program. It was under the direction of this agency that the Weatherization Program was developed and made operational in 1975.

Although CSA is no longer funding the Weatherization Program (CSA records indicate that 405,211 homes were completed with these funds as of September 30, 1978), it is still heavily involved in low-income energy programs. Particular among those energy programs supported by CSA are energy advocacy, emergency assistance, and appropriate and alternative technology systems, all of which complement the low-income weatherization projects funded by DOE.

Even though CSA no longer funds the Weatherization Program directly, most local weatherization projects continue to operate through Community Action Agencies (CAAs) which often supply support services.

Other Federal Agency Weatherization Activities

The purpose of the analysis of the following Federal agencies--Department of Health, Education and Welfare (HEW); Department of Housing and Urban Development (HUD); Department of Labor (DOL); Department of Agriculture (Farmer's Home Administration (FmHA); and Department of Commerce (Economic Development Administration) (EDA)--is to ascertain what role these various agencies play in the Federal weatherization activities and the degree of their involvement.

While their ties to the WAP are not always mandated (with the DOL and FmHA), these agencies can and do supplement DOE funding and help local program operators better implement their weatherization projects. At the local level such agencies can supply funding for weatherization staff, the administration of the program, transportation needs, outreach, and recruitment of clients, and to some extent, monies that can be used directly for weatherization of individual client homes.

Department of Labor

At present, the Department of Labor (DOL) provides most of the labor for the WAP through the Comprehensive Employment and Training Act (CETA). The majority of these slots come from public service employment (PSE) section, Title VI, of the CETA program; however, Native Americans receive funding also under Titles III, and IId, and migrant programs are funded under Title III.

DOL is also currently funding a series of training programs in energy production, such as coal mining, oil rigging, and the like. In addition, special programs in appropriate technology such as the Solar Utilization Economic

Development and Employment program (SUEDE), are also supported by DOL. Such programs are in response to the continuing rise in the cost of fossil fuels. Such specialized training activities are an indirect benefit to the WAP and other weatherization activities as well as a direct benefit to DOL.

At the time that this report was being written, data was being collected and prepared for analysis which will provide specific documentation of how well or how poorly the labor provided by DOL and the materials and supervision provided by DOE are being matched in the field. Without hard data to present, it is possible here only to relate that local conditions like the political situation, the unemployment rate, and the relationships between the CETA prime sponsor and the weatherization project have a lot to do with whether there is a match or a mismatch.

Farmer's Home Administration

The Farmer's Home Administration (FmHA) is not directly involved in the WAP. FmHA is, however, the largest direct housing government lender and ranks in the first five of all housing lenders in the country. Of their $14.7 billion in Fiscal Year 1979 budget, $4.3 billion was used for rural housing programs.

Within this housing program FmHA has a series of loan and grant programs administered through their State directors that can be used for energy conservation measures by rural homeowners. FmHA's Loan Program (502) is designed to bring homes up to minimum property standards. Their Loan and Grants Program (504) is designed to bring rural housing up to minimum health, hazard, and safety standards. The 502 program has a rural housing weatherization loan provision

and this program is run through utilities that service rural homeowners. The health and safety provisions can be interpreted as allowing various energy conservation measures to take place and in fact, the National Office encourages state directors to work closely with weatherization projects to see that such steps are taken.

In FY 79, the 502 loan program, available to persons who are or will become rural homeowners, was funded for $2.867 billion and, in the same period, the 504 loan and grant program for established rural homeowners was funded for $24 million and $19 million respectively. The magnitude of both programs does indicate that FmHA can have a significant impact on the WAP.

It is, however, difficult, if not impossible, to ascertain precisely how many homes have been "weatherized" under these programs. However, one of the benefits that can accrue to weatherization projects is that because these funds are available at the local level, they can and often do result in both weatherization and other home repair measures being taken in rural areas. This is another example of one of the options available for alternative funding at the local level. As a lender of last resort, FmHA is serving those homeowners who are unable to secure money from commercial sources; these people are most in need of help with the high cost of energy.

Department of Housing and Urban Development

The Department of Housing and Urban Development (HUD) has many programs that have an impact on energy conservation and weatherization. There are several opportunities for local weatherization projects to link up with HUD programs.

All HUD grants require the cooperation of local governments.

The Office of Community Planning and Development at HUD merges the following programs which affect weatherization:

Community Development Block Grants - focuses on low- and moderate-income people; have been made to over 3,000 cities;

Urban Development Action Grants - deal with distressed cities and pockets of poverty in non-distressed cities;

Section 312 Rehabilitation Loans - have covered over 100,000 units and are made only when the rehabilitation work conforms to HUD's energy conservation standards;

The Homesteading Program - may include weatherization activities;

Title I Home Improvement Loans - the Federal Housing Administration has over 20 programs which provide insurance for loans on single and multi-family dwellings; monies can be used for weatherization retrofits.

We will take one example to show how such programs have a direct impact on local weatherization programs. Section 312 loan and grant authority money can be used in designated urban renewal areas, community development block grant areas, and code enforcement areas. These grants and loans can be used to weatherize homes. The amount available under the direct loan system is $27,000 over a 20-year period in loans, and up to $5,000 in grants for low-income people. It can be used in connection with local weatherization programs as part of an overall attack on blighted urban areas.

Coordination of HUD and WAP activities is a function of local initiative.

Department of Health, Education and Welfare

State agencies on aging have authority to use some of their formula grant funds made available through the Older Americans Act of 1965 as amended, which is administered by the Administration on Aging in the Department of Health, Education and Welfare (HEW), for minor home repair and renovation. Funds are not earmarked specifically for home repair and renovation, but these services may be provided through service programs administered by local Area Agencies on Aging (AAAs) based on a determination of priority needs of older persons.

Because records are kept by local AAAs documenting the broader renovation program, not specific weatherization work, it is difficult to estimate how many houses have been weatherized using AAA money. Where these programs and their associated funds are available, benefits that accrue to weatherization programs (the availability of trained personnel through the WIN program, block grant money to pay for some administrative costs at the local level, home repair money for those programs involved with both weatherization and home repair, and the like) make it easier for many local projects to meet their State contractual obligations.

Economic Development Administration (EDA) of the Department of Commerce

The EDA sponsored a $10 million program in FY 1978 that weatherized a number of public buildings. In FY 1980, EDA plans an expanded $50 million program to weatherize local government buildings and long-term care facilities such as nursing homes and day care centers.

Characteristics of Federal Weatherization Activities

	Weatherization Activities	Eligibility	Delivery System	Grant Mechanism for Local Funding	Geography	Impact on DOE	Federal Agency and Enabling Legislation
Department of Energy	All activities are eligible.	125% of Office of Management and Budget (OMB) poverty guidelines, or eligible for cash assistance under Titles IV and XVI of the Social Security Act.	Local Community Action Agencies (CAAs). Local Community-Based Organizations (CBOs). Local governments or Native American tribal organizations.	State office, designated by governors of the various States.	Service areas of local Project agency.	N/A	Agency: Office of Weatherization Assistance 1) Energy Conservation and Production Act (Public Law 94-385), Title IV, part A. 2) Department of Energy Organization Act (Public Law 95-91); 3) Title II, Part 2 of the National Energy Conservation Policy Act (Public Law 95-619).
Community Services Administration	All activities are eligible.	125% of OMB poverty guidelines.	Local CAAs and Regional CSA offices.	Local CAA and Regional CSA offices.	Usually a city, county, or multi-county area, as designated by local boards or CSAs.	Administrative assistance, outreach, emergency services, training and technical assistance at the Regional and local levels; some weatherization activities carried out with rural farmworkers.	Economic Opportunity Act (1964) as amended, Section 222 (a) (12)
Department of Agriculture	All activities are eligible.	Own and occupy a home in a rural area. Some income restrictions.	Through State directors.	State directors through county agents.	Rural: less than 20,000 population.	Indirect impact: Can supplement material costs at a local level.	Agency: Farmers' Home Administration 1) Public Housing Act (1949) as amended; Sections 502 and 504.
Department of Commerce	None directly related to client housing; may provide training and technical assistance.	No individual requirements.	Through States or subdivisions.	Regional offices through State representatives.	Any eligible area.	Indirect impact: Possibility of some training for supervisory/worker staff at a local level.	Agency: Economic Development Administration 1) Public Works and Economic Development Act (1965) as amended.
Department of Health, Education and Welfare	All activities are eligible.	Some income and age criteria.	Through county Area Offices on the Aging (AOA) and local Welfare offices -- State Welfare departments.	Local AOA and Welfare offices.	N/A	Can supply money, materials, labor and salaries; some administrative funds at local level. Can supply training at local level.	Agency: Office of Human Development Services; Social Security Administration; Public Health Services 1) Vocational Education Act (1963) amended Title II, 1976. (Public Law 94-482) Also Title I; 2) Community Services Act (1974), Title VIII; 3) Social Security Act amended 1965 (Public Law 89-97); 4) Older Americans Act (1965), Title III (parts a and b) [also Title IV - Training]; 5) Public Law 95-171, Title XX, part a (Social Security Act); 6) Social Security Amendments (1967), WIN; 7) Social Security Amendments (1972), Title XVI.
Department of Housing and Urban Development	All activities are eligible.	Some income criteria and geographic location.	Local housing authorities, municipal housing and community development offices, eligible subcontractors.	Units of local government, urban counties, States, local housing authorities.	N/A	Can supply money, materials, staff and labor, warehousing, vehicles training, code enforcement.	Agency: Federal Housing Administration; Community Planning and Development 1) National Housing Act, amended 1968 (Public Law 90-448); 2) National Housing Act, Section 203K; 3) Housing and Urban Development Act (1968), Section 106b; 4) Housing Act of 1937 as amended (Public Law 75-412); 5) Housing and Development Act of 1965 (Public Law 89-117) [Low-income assistance: Section VIII]; 6) Title I of the Housing and Community Development Act of 1974. Community block grants (entitlement grants to large cities) (grants to small cities); 7) Section 312 of 1964 Housing Act (Rehabilitation Loans); 8) Title I of the Housing and Community Development Act of 1974 (Urban Development Action Grants); section 8-10 Urban Homesteading.
Department of Labor	All activities are eligible.	Income and unemployment criteria as set by OMB.	Through local prime CETA sponsers and State labor offices.	Local prime sponsors and State Departments of Labor for balance-of-State money and governors' 4% funds	N/A	Can supply labor, administrative money, training, testing, job development services transportation, outreach, equipment.	Agency: Employment and Training Administration 1) CETA (1973) Title IV (Job Corps), Title III, Section 303 (Migrant Worker Program); Title III (Native Americans); 2) Older Americans Act, Title V (Senior Community Services Employment Program); 3) CETA Title IV (Youth Employment and Training, Youth Community Conservation Improvement Project, Summer Youth Employment Program); 4) YIEPP-CETA, Title IV, part A, subpart I. (Youth Incentive Pilot Projects); 5) CETA, Title III, Section 301; Special Programs and Activities for the Disadvantaged.

Adequacy and Cost of Materials

No weatherization projects have reported any difficulty in acquiring the various materials at reasonable costs needed to complete conservation measures in clients' homes. These projects include those funded by the Department of Energy (DOE), Community Services Administration (CSA), Department of Housing and Urban Development (HUD), Farmer's Home Administration (FmHA), and the Department of Commerce, Economic Development Administration (EDA).

Regional, State, and local weatherization programs were canvassed in order to more closely check these questions at a level nearer to the actual buying of such materials. At the regional level, inquiries were confined to the two major funding agencies of the Weatherization Program--DOE and CSA. (Local agencies are still spending CSA money.) In addition, selected state and local program operators were surveyed as to the actual cost of materials.

Information was sought from the regional offices as well as selected State offices and local weatherization programs on the following two issues concerning the cost and availability of materials:

1. abnormally high costs of the various weatherization materials such as insulation, windows, caulking, and so forth; and

2. the nonavailability of weatherization materials.

Cost of Materials

None of the agencies reporting at the regional, state, or local level reported any incidence of overcharging or

particularly high costs. (See Tables 1 and 2 for the spread of prices of aluminum storm windows and insulation.) Furthermore, all agencies reported they were able to meet standards for weatherization materials as published in the Federal Register, Vol. 44, No. 169, Wednesday, August 29, 1979, Rules and Regulations, pg. 50797.

With respect to the cost of weatherization materials, the actual prices of a standard triple-track aluminum storm window at 101 united inches, meeting Federal specifications, and found the prices range from a low of $17 to a high of $60 per unit, delivered. Costs at the high end of this range result largely from high prices in isolated areas, pressure to buy windows from small local distributors even though they cost more, and lack of experience in purchasing. (See Table 1.)

Also checked were prices on cellulose, rock wool, and fiberglass roll insulation. The price of cellulose per pound delivered runs from a low of 8¢ to a high of 20¢. Rock wool per pound runs from a low of 10¢ to a high of 30¢. Fiberglass insulation for a standard 15 1/2" width, R19, runs from a low of 9.6¢ per square foot to a high of 30¢ per square foot. (See Table 2.)

These prices were checked in 20 states, two states from each region. In five cases, the prices were quoted by local project operators. In fifteen cases, prices were quoted by DOE grantees at the state level. It should be noted that the range of prices varies according to, in some cases, the proximity to the plant. For example, delivery of cellulose for a 30 lb. bag was charged by the supplier at anywhere from 10¢ to 36¢ in addition to the actual cost of the

*United inches is a standard measure for windows and is the sum of the height and width.

cellulose itself. The accompanying table indicates the price range of the various materials by Region. (See Table 2.)

Availability

In the fall of 1977, there was a serious shortage of insulating products, particularly cellulose, and to a lesser extent, mineral wool. Throughout the country, for a period of about four months, many local weatherization projects had extreme difficulty obtaining a reliable supply of this important material.

The survey of the Regional Offices, States, and local projects indicated there is no shortage of insulating materials at this time. In fact, just the opposite is the case. The State and local programs surveyed reported that all materials (insulation, windows, and caulking) are in plentiful supply and they have an easy time acquiring these items.

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Table 1

WINDOWS – standard*

Region

	I	II	III	IV	V	VI	VII	VIII	IX	X
$20 and under	$17	$17 $20	$17 $17	$18		$18	$18			
$21 – $30	$21			$28	$25	$30	$30	$22 $30	$26 $28	
$30 and more					$30					$40 $60

*101 united inches aluminum triple track.

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Table 2
INSULATION

	Cellulose, class C per pound			Rock Wool per pound			Fiberglass, 15 1/2 in. wide, R 19 per square foot			
	6 – 10 ¢	11 – 15 ¢	16 – 20 ¢	10 – 20 ¢	21 – 25 ¢	26 – 30 ¢	11 – 15 ¢	16 – 20 ¢	21 – 25 ¢	26 – 30 ¢
Region I			X X						X X	
Region II			X X		X	X			X X	
Region III			X X					X	X	
Region IV		X	X					X	X	
Region V	X	X		X	X		X	X		
Region VI			X X					X X		
Region VII			X X	X	X				X	X
Region VIII			X X		X	X			X X	
Region IX		X	X							
Region X	X	X					X X			

Appendix A.—*Standards for Weatherization Materials*

Material or product	Standards
Insulation—Mineral fiber:	
Blanket/batt	Conformance to F.S.[1] HH-I-521E and ASTM C665-70.
Board	Conformance to F.S. HH-I-526C and ASTM C612-70 or C726-72.
Duct material	Conformance to F.S. HH-I-558B.
Loose fill	Conformance to F.S. HH-I-1030A and ASTM C764-73.
Insulation—Mineral cellular:	
Aggregate board	Conformance to F.S. HH-I-529B.
Cellular glass	Conformance to F.S. HH-I-551E and ASTM C552-73.
Perlite	Conformance to F.S. HH-I-574A and ASTM C549-73.
Vermiculite	Conformance to F.S. HH-I-585B and ASTM C516-67.
Insulation—Organic fiber:	
Cellulose—Type I	Conformance to F.S. HH-I-515C and ASTM C739-73 (loose fill).
Cellulose—Type II	Conformance to ASTM C739-73 (loose fill) and fire safety requirements.[2]
Vegetable	Conformance to F.S. HH-I-528B and fire safety requirements.
Board and block	Conformance to F.S. LLL-I-535A and ASTM C208-72 and fire safety requirements.
Insulation—Organic cellular:	
Polystyrene board	Conformance to F.S. HH-I-524B and ASTM C578-69 and fire safety requirements.
Urethane board	Conformance to F.S. HH-I-530A and ASTM C591-69 and fire safety requirements.
Flexible unicellular	Conformance to F.S. HH-I-573B and ASTM C534-70 and fire safety requirements.
Insulation—Air Spaces: Reflective	Conformance to F.S. HH-I-1252A.
Storm Windows:	
Aluminum frame	Equivalent to ANSI A134.3-1972.
Wood frame	Conformance to Sec. 3 of NWMA Industry Standard I.S.2-73.
Rigid vinyl frame	Conformance to NBS Product Standard PS26-70 and performance guarantee.
Frameless plastic glazing	Required minimum thickness 6 mil (0.006 in.).
Storm doors:	
Aluminum	Equivalent to ANSI A134.4-1972.
Wood:	
Pine	Conformance to Sec. 3 of NWMA I.S.5-73.
Fir, hemlock, spruce	Conformance to Sec. 3 of FHDA/5-75.
Hardwood veneered	Conformance to Sec. 3 of NWMA I.S.1-73.
Rigid vinyl	Conformance to NBS Product Standard PS 26-70 and performance guarantee.
Caulks and sealants	Commercial availability.
Weatherstripping	Commercial availability.
Vapor barriers	Commercial availability.
Clock thermostats	Commercial availability.
Skirting	Commercial availability.
Items to improve attic ventilation	Commercial availability.
Materials used as a patch to reduce infiltration through the building envelope.	Commercial availability.

[1] F.S. Means Federal specifications as cited, copies of which may be obtained from Specifications Sales, Building 197, Washington Naval Yard, General Services Administration, Washington, D. C. 20407.

[2] For fire safety requirements, see Sec. 2.1.3.1 of NBSIR 75-795 which may be obtained from DOE.

This section describes several WAP modifications and interagency cooperative efforts which are expected to produce higher rates of weatherization completions in areas where local conditions are creating mismatches of materials, labor, and need for weatherization work.

Coordinated Interagency Effort to Improve Implementation of the Federal Weatherization Program

The Weatherization Assistance Program for low-income persons administered by the Department of Energy (DOE) relies principally on local CETA prime sponsors for the provision of federally subsidized installation labor, through cooperative contractual arrangements to match DOE funds for materials and supervisory costs with subagreements between CETA prime sponsors and the Community Action Agencies (CAAs) operating local weatherization projects.

A significant backlog is developing in the movement of weatherization funds into operations which, where coupled with earlier problems and labor/material mismatches on the local level, will impede realization of the Administration's targets for energy conservation. Therefore, President Carter is asking that the Departments of Labor (DOL), Energy, and the Community Services Administration (CSA), which has a small amount of FY 78 weatherization funds in the field, take immediate steps to activate a plan of action on the National, Regional, and local levels to link all available unobligated Department of Energy funds with labor supplied through CETA prime sponsors, to ensure that the best possible match of funds and labor is developed by November 15, 1979. Specifically, this goal requires that the three agencies take immediate simultaneous steps to inform their program systems of the goal, to direct them to respond, and to review on the regional and national level

the response by local area, State and Region, and determine what assistance is necessary to overcome obstacles to a workable match of labor and materials. This plan sets forth actions to be taken individually by each of the three Federal agencies and actions to be taken jointly under the Inter-agency Agreement.

Actions Already Taken by DOE to Reduce Backlogs and Increase Production

On August 15, 1979, DOE advised its Regional Offices to grant, on a State-by-State basis, a waiver to exceed the $800 maximum expenditure per home to provide local projects with additional on-site/working supervisors and contractor-installed insulation. Weatherization Assistance Guide #79-25 directed the Regional Offices to approve revisions to State budgets increasing program support costs from 30 percent to 44 percent of available funds. States which require waivers to provide total weatherization services on a contract basis currently may obtain such waivers with national DOE concurrence. States have been advised that they may apply for a waiver accompanied by documentation of CETA labor shortages on a project-by-project basis. The Regional Offices are prepared to grant these waivers within two days of submission according to the following procedures described in the DOE Weatherization Assistance Guide #79-25:

- State Policy Advisory Committtees must request the waiver;
- Documentation supporting the waiver requests must be submitted;
- Revised plans must be submitted which include production schedules;
- National office must be notified within two days with respect to all waiver requests.

On August 28, 1979, DOE notified Regional Offices of FY 80 State allocations and were instructed to immediately notify the States of those amounts. By statute, the States have 90 days from that date to submit their applications, but they have been strongly encouraged to submit their plans by November 1, 1979.

Plan for DOE Action

1. Designation of a weatherization coordinator at the Deputy Assistant Secretary level.

2. DOE will provide authority to the States to contract for weatherization services or to grant waivers to program operators in such local areas where the absence of CETA workers can be documented. That authority will be contained in the directive discussed in item 6.

3. DOE Regional Offices will take action on waivers requested under the new policy within two working days of their submission by the States.

4. All FY 79 allocations to States will be obligated by DOE by September 20, 1979.

5. Issuance by September 14, 1979, of directive requiring that States obligate all available FY 78 and FY 79 funds into agreements between state SEOOs and local CAA weatherization projects.

6. Compilation of a comprehensive list of all current grants of DOE weatherization funds, on a local, State and national basis, so that DOL and CSA will be fully informed about the distribution of funds and relative needs for installation labor. The list will be furnished to DOL and CSA by September 14, 1979.

7. Immediate issuance (within two days of approval of this plan) of a directive to State grantees with copies to

all weatherization subgrantees, instructing local projects to contact local CETA prime sponsors and to negotiate CETA labor contracts by no later than November 15, 1979, based on a plan for the full utilization of DOE funds through the execution of the planned number of dwelling units. Also, this directive will establish clear communication channels from the subgrantee to the National Office.

8. The DOE Regional representative will meet with the DOL and CSA Regional officials on a bi-weekly basis, on Fridays, to review in detail the progress toward the solution of local and Regional problems. These meetings are to continue at least through December 15, 1979.

9. Bi-weekly reports on the results of these meetings will be forwarded to the National office by telecopier on the following Mondays.

10. The National offices of DOE, DOL, and CSA will meet to review the income reports on the following Wednesday and will coordinate on a status report to the Domestic Policy staff which will be submitted on the following Friday.

Plan for CSA Action

1. CSA will be given copies of all directives to the grantees and subgrantees.

2. Participation by the CSA Regional Director in the bi-weekly meetings with officials of DOE and DOL.

3. Submission of bi-weekly reports, from CSA Regional administrators to CSA Headquarters, consisting of a summary from the CSA perspective of significant problems within the Region in the DOE-CETA prime sponsor linkage, including problem sites and issues.

Plan for DOL Action

1. Upon receipt of information from DOE on September 14, 1979, on the levels of obligated funds by State, the DOL will issue a Field Memorandum to Regional offices and CETA policy letter to local prime sponsors by September 21, 1979, announcing DOL's intention to work with each prime sponsor to come up with a workable match between DOE weatherization funds and CETA subsidized installation labor, and listing the availability of funds by each prime sponsor area. In addition to strongly urging prime sponsors to work out problems locally so that sufficient labor can be committed to meet the December 15, 1979 goal, DOL will require prime sponsors to meet in negotiations before November 15, 1979, with each local CAA receiving DOE funds, to review CAA's proposals for projects and other weatherization activities through CETA. Finally, DOL will pledge National level assistance to the system in attempting to solve problems or overcome obstacles in developing a workable DOE-CETA labor match. Copies of all DOL issuance will be provided to DOE.

2. DOL, in coordination with DOE, will establish within four days of the approval of this plan, a reporting mechanism to identify situations where a CAA weatherization grantee has reached an impasse in negotiating for CETA labor, investigate the cause of the blockage and recommend whether DOE should grant a special waiver to allow its materials funds to be spent for labor contracts with private firms. This mechanism will work according to the following steps:

    a. CAA determines that it has reached an impasse in negotiating with CETA sponsor. CAA is to notify the SEOO in accordance with the DOE directive.

b. SEOO has one day to notify Regional DOE of the location and problem.

c. Regional DOE notifies Regional DOL weatherization coordinator and National DOE within one day.

d. Regional DOL has two days to investigate the problem and determine whether a local or Regional solution is possible, or whether it is advisable in the circumstances for DOE to issue a waiver authorizing labor contracts. Regional DOL notifies National DOL of incoming DOE problem reports by close of business each day and reports problems, solutions, and outstanding issue by close of business, two business days following. National DOE will review these reports and determine whether conditions warrant the granting of a waiver by National DOE.

e. By messenger, National DOL sends National DOE a daily listing of Regional DOL reports, indicating whether a solution has been found to problem situations or waivers are recommended to permit the weatherization activities to begin.

Information will be transmitted during the above steps by telephone to be followed up by written confirmation via TWX or FAX.

3. Participation by the DOL Regional administrator in the bi-weekly meetings with officials of the DOE and CSA.

4. Submission of special cumulative bi-weekly reports from

the DOL Regional administrator to the National office, including:

- number of participant slots committed to weatherization, by prime sponsor area;
- number of prime sponsor contracts approved;
- summary of significant problems with the Region, including problem sites and issues.

These reports will be required during the duration of DOL's special weatherization campaign, through December 15, 1979.

5. As necessary, DOL will issue policy memoranda providing interpretation or clarification of CETA requirements, particularly provisions of the CETA amendments of 1978 which may impact on weatherization programs.

Interagency Plan of Action

1. Bi-weekly interagency meetings on the Regional level are to be scheduled for Fridays. In reviewing progress by State and prime sponsor areas, these sessions are to focus on those jurisdictions where there have been difficulties in negotiating contractor with CETA to ensure a match or where there have been difficulties in obligating DOE funds between States and CAAs. The emphasis of meetings is to reach practical solutions at the Regional level, including establishing corrective action plans where the factors involved are within the control of the prime sponsor or the CAA. Legal issues only, or problems that cannot be solved at the Regional level, should be surfaced to National departmental offices for solution.

2. Each Federal agency is to set up an internal reporting system to generate timely and accurate detailed information on a bi-weekly basis for use in the Friday Regional meetings and for reporting to National components. Individual Regional reports to National departmental offices will be due by close of business of the Monday following the week reported.

3. National meetings of DOE, CSA, and DOL weatherization coordinators are to occur on the Wednesday following the week reported to review the status of efforts based on reports received and discuss issues requiring National attention.

4. Bi-weekly reports to the Domestic Policy staff are due by close of business on Friday following the week reported from the three agencies:

   - DOE to present a cumulative report on the obligation of weatherization funds to States and local grantees (to be updated monthly);

   - DOL to report the cumulative number of slots committed by CETA and the number of agreements reached by prime sponsors with CAA weatherization projects;

   - CSA, DOE, and DOL are to coordinate on a report any key problems or issues requiring the attention of the Domestic Policy staff.

Furnace Tune-ups, Flame Retention Head Burner Installation

While local projects are not authorized to perform furnace efficiency modifications until DOE promulgates standards for them, repair modifications may be made. General furnace tune-ups are considered repairs and are subject to the $100 limit on repair materials as specified in the regulations.

Flame retention head burners are allowed if an oil burner must be replaced in order to repair the furnace. This, of course, is also subject to the $100 limit.

Rental Unit Demonstration Project

The current WAP regulations state that when work is to be done on rental units, "the benefits of weatherization shall accrue primarily to low-income tenants."* While there have been several attempts at producing a more specific guideline, the fact remains that many eligible families live in multi-family dwellings where some of the units are occupied by households which are not eligible. This has created a problem in serving the eligible families who live in heterogenous buildings.

In order to begin solving the problem, DOE has funded a demonstration project in New York City. This project, which is being operated by Project Open City, has permission to weatherize buildings which can be shown to be occupied by households 75% of which are eligible for the WAP.

Although the demonstration project is too new to make any concrete conclusions, it is allowing for the weatherizaiton of dwelling units which were previously not considered under the current regulations.

*Federal Register, Vol. 44, Nol 169, Wednesday, August 29, 1979, p. 50789.

Progress Toward Achieving National Energy Goals

The weatherization activities the Federal Government is conducting in an attempt to reduce the amount of fuel needed to heat American homes, particularly the homes of low-income Americans, have been reviewed. While programs in other agencies are gearing up to emphasize weatherization, and the CSA program was productive when it ran, the activities currently weatherizing far and away the greatest number of houses is the Weatherization Assistance Program (WAP) conducted by DOE. Consequently, this study has focused primarily on the development, nature, and modifications of the Program conducted by the Office of Weatherization Assistance (OWA) in DOE.

The Weatherization Assistance Program is modifying the homes of low-income Americans such that energy is being conserved.

The WAP is conserving energy, helping to alleviate the consequences of scarce and expensive energy on the poor, and is giving training and employment to skilled and unskilled people in the energy field. As noted in this report and others, these goals are not always consistent. Competition for attention among conservation, social service work, and employment adds levels of complexity to the WAP which sometimes confound the efforts of program planners, administrators, and operators.

The Weatherization Program Saves Energy

In recent months, estimates of how much energy is saved by weatherizing homes have decreased as research efforts become more sophisticated. Early optimism has been tempered with scientific reality. A recent study by Princeton's Center for Energy and Environmental Studies found that heat

losses through insulated attics were substantially more than most estimates had predicted. Even so, a reduction of the estimated savings per house of thirty percent or more to the current 14% average used by the Department* still produces highly favorable cost-benefit ratios (see Appendix C). While it is difficult to say with anything like precision just how much energy is saved, the arguments are convincing that enough energy is conserved to warrant the continuation and expansion of the Program.

The WAP Helps the Poor

The WAP is creating warmer, more healthful environments for the poor. Homes which were virtually unlivable have been converted to places which can be kept comfortable for less money than was spent for mere survival. The benefits, personal and social, to people who live in warmer homes are harder to calculate than energy savings, but it is difficult to deny they exist.

The Weatherization Program Trains the Unskilled

Trainees working in the CETA program currently comprise the bulk of the labor force in the Program. People working in the WAP Program learn job and interpersonal skills less easily obtainable in other, less ambitious CETA activities.

A case is made for the benefits of the WAP. However, it is important to understand the limitations associated with measuring energy saved. The weatherization process involves making determinations about what to do to a house, doing the work, and making an evaluation of the activities. The results of the process are reported to the National Office in terms of the number of houses completed. Modifications

*This is an estimate developed by DOE based on studies conducted by the Oak Ridge National Laboratory.

of the method used to determine the amount of work done on each house and changes in the reporting system are producing better data, but it will probably be impossible to be completely accurate about the amount of energy saved. Even if all completions were exactly the same, the activities of the people in the house would have a significant and virtually incalculable effect on how much energy is saved.

Barriers to Success

The Department has recognized four important barriers to the continued success of the WAP:

- difficulty in obtaining and maintaining a stable labor force;
- collecting adequate and accurate information;
- difficulty in maintaining adequate management control of Program activities; and
- the need for better interagency coordination.

While the results of a formal survey conducted by OWA are not yet available, reports from the field indicate that there are sometimes problems with maintaining a stable work force with reliance on CETA workers. These anecdotal reports, which may or may not be backed up by the analysis of the survey data, indicate that the unpredictability of the quality and supply of weatherization workers supplied by the CETA program hampers the production of weatherized houses.

Information concerning the rate of spending, the number of completions, and a breakdown of costs associated with Program activities is vitally necessary in identifying problems and maintaining control.

The WAP is growing in size and complexity, but the level of staff support allocated to it at all levels is not increasing at the same rate. Too many demands on too few people are resulting in oversights and other management difficulties. The turnover in some of the local agencies is such that staff people are often spending a considerable amount of time learning their job.

While there have been notable successes in inter-agency cooperation and coordination, turf battles and ignorance of what is going on down the street and around the corner create problems and exacerbate existing ones. Attention must be paid to coordinating the efforts of all agencies involved with weatherization.

Solutions

The activities currently underway, along with planned Program modifications, are expected to alleviate most of the difficulties identified in this study. In addition to the activities described earlier, this study indicates that the Program would benefit from:

- adequate funding of all elements of the Program;
- a program of training and technical assistance integrated at all levels of the Program;
- a management structure with adequate staff to do the job properly; and
- increased cooperation among all agencies involved with weatherization.

Action is being taken which addresses each of the aforementioned concerns. Funding patterns and levels are being reviewed, a comprehensive program of training and technical assistance is being supplemented and expanded, management

structures are being refined, and interagency cooperation is being enhanced.

The WAP and the other weatherization activities described in this report are important parts of the comprehensive and integrated program of energy services for low-income people which is being developed and refined at the highest levels of government.

LEGISLATIVE HISTORY OF FEDERAL WEATHERIZATION PROGRAMS

Introduction

To better clarify how weatherization programs work, we will detail the history of two low-income programs that together have grown rapidly over a few short years through several legislative acts. The low-income Weatherization Program run by the anti-poverty agency, the Community Services Administration (CSA), is the oldest, first begun in 1975 as an experimental program and not limited to weatherization, including a host of activities such as crisis intervention and research and development. The CSA Weatherization Program has been locally determined and managed.

The second program, administered by the Department of Energy (DOE) and begun by its predecessor, the FEA, is strictly a weatherization program. Grants are distributed through the states. For a period of three years, both programs were funded. However, weatherization funds were appropriated only to the DOE program starting in FY 79. Even though two programs have been administered by two different federal agencies, both programs have always funded the same group of local recipients--Community Action Agencies.

The Beginnings of Weatherization Grants to the Poor

The program for weatherization of low-income families' dwellings began not with legislation, but with emergency responses by Community Action Agencies across the country to the 1973 Oil Embargo's impact on the poor. In the two winters of 1973-74 and 1974-75, the Office of Economic Opportunity (OEO) [now the Community Services Administration, CSA] and the local Community Action Agencies devoted more than $20 million in funds to energy-related activities,

largely on an ad hoc basis and in response to need. Besides insulating poor people's housing, these locally-derived programs provided emergency fuel supplies, assistance to prevent utility shut-offs, and gasoline hot lines and crisis centers. One such program receiving broad visibility was Maine's Project F.U.E.L., funded by OEO in December 1973, which insulated 2,878 houses in Maine in a period of four months.

These early demonstrations encountered many obstacles to the workability of the idea of insulating the homes of the poor. Many potential recipients, especially the rural elderly poor, initially were afraid of participating because of such fears as the Federal government obtaining a lien on their homes. Local CAAs countered such fears by creating local project advisory committees whose members were low-income people from the communities served.

These early demonstrations generated grass roots support and the beginnings of a service delivery system before there was any national legislative recognition and support for the Weatherization Program. In many communities the Weatherization Program began as an adjunct to other housing programs. Few local programs spent much on either equipment or vehicles because there were no assurances of ongoing Federal support. Instead, many of the earliest weatherization programs looked to resources in the community to provide much of the support services.

It soon became apparent that the need for and interest in weatherization of dwellings for the poor could not be satisfied by simply diverting funds already appropriated to the Community Action Agencies' other programs. Formal legislation and appropriations for CAA energy programs,

including weatherization, were first sought for FY 1975. The success and popularity of these early demonstration projects convinced Congress of the merits of such a program on a national scale.

CSA Legislative Authority

The legislative authority for CSA's Emergency Energy Conservation Services (EECS) is found in the Economic Opportunity Act, as amended, Sec 222(a) (Public Law 93-644), passed January 4, 1975.

> "...A Program to be known as Emergency Energy Conservation Services to enable low-income individuals and families, including the elderly and the near poor, to participate in energy conservation programs designed to lessen the impact of the high cost of energy on such individuals and families and to reduce individual and family energy consumption."

The weatherization of low-income housing units by making home repairs and retrofitting dwellings to minimize heat loss and improve thermal efficiency is the centerpiece of the EECS.

Section 222(a) (12) includes broad authority for the CSA Director to:

> "take, where appropriate, action necessary to insure that the effects of the energy crisis on low-income persons, the elderly, and the near poor are taken into account in the formulation and administration of programs relating to the energy crisis."

Weatherization activities were seen only as one means, although the most central one, for achieving both immediate relief and long-term energy conservation among those most hard pressed by energy scarcity and price. The Statute

also authorizes means including but not limited to:

1) an energy conservation and education program;
2) emergency loans, grants, and revolving funds to install energy conservation technologies and to deal with increased expenses relating to the energy crisis;
3) alternative fuel supplies, special fuel voucher or stamp programs;
4) alternative transportation activities designed to save fuel and assure continued access to training, education, and employment;
5) appropriate outreach efforts furnishing personnel to act as coordinators;
6) providing legal or technical assistance; and
7) nutrition, health, and other supportive services in emergency cases.

Legislative Authority for the DOE Weatherization Program

The authority for the Department of Energy Weatherization Program is Title IV, Part A, of the Energy Conservation and Production Act of 1976 (Public Law 94-385, as amended). The legislation's primary purposes were to extend the term of the Federal Energy Administration Act from June 30, 1976, to September 30, 1979, and to authorize appropriations for the FEA and its successor agencies through fiscal year 1977.* Low-income home weatherization is only one of a number of new responsibilities assigned to FEA by the Act.

The ECPA, Public Law 94-385, greatly increased the total Federal commitment to low-income weatherization but did so through a parallel program situated in FEA

*U.S. Code Congressional and Administrative News, 1976. Volume 3, St. Paul, Minnesota: West Publishing Co., Inc., p. 2005.

(now DOE). The Act charges that the DOE Weatherization Program be "designed and administered to supplement, and not to supplant" any ongoing efforts.

Unlike the CSA legislation which contained only a general statutory authorization, the ECPA is very detailed as to Congressional intent on both the goals and the conduct of the DOE program.

Congress found that the poor, especially the elderly and handicapped, are least able to afford to reduce their energy use. Weatherization is seen as one way to have a significant impact on the utility bills of the poor, while saving thousands of barrels of needed fuel per day. The ECPA prescribes who will be eligible for assistance--those families at or below the poverty level as set by OMB; with the elderly (60 years and older) and handicapped low-income persons given priority. The ECPA also prescribes the amount which can be spent to weatherize each unit; a $400 maximum for material costs and a maximum limit of $50 per dwelling on mechanical equipment.

The Act clearly spells out procedures for program administration. Grants are to be made to the States and, in certain circumstances, to Indian tribal organizations. Local governments and Community Action Agencies may submit applications in lieu of any State which fails to submit an application within 90 days after the promulgation of final regulations.

In allocating funds among the States, DOE is given considerable discretion, although the number of dwelling units to be weatherized, climate conditions, and types of weatherization work to be done in various settings are

specifically cited as factors to be considered. Allocating funds within each State is to be done in accordance with a published State or area plan, adopted after notice and a public hearing, which takes into account appropriate climatic and energy conservation factors. State priority is given to Community Action Agencies already conducting CSA-sponsored emergency energy conservation programs under Section 222(a)(12) of the Economic Opportunity Act, unless such an agency's existing program is judged to be either ineffective or clearly not of sufficient size to support the scope of the DOE weatherization project for its area.

No State may receive funds without first establishing a state policy advisory council with set priorities governing the distribution of weatherization funds. By contrast, the CSA program requires local policy advisory councils that rule on a project-by-project basis. In addition, each grantee may spend no more than ten percent of funds on administrative costs, with no waiver provisions as in the CSA program. Direct labor costs are only covered for administration and project supervision within this ten percent limit. The DOE weatherization program is charged to rely on the services of volunteers and training participants and public service employment workers, pursuant to the Comprehensive Employment and Training Act (CETA) of 1973 (29 U.S.C. 801).

The statute also delineates responsibilites for the Federal agency administering the program. Within 90 days of enactment, the FEA was directed to prescribe standards for weatherization materials and energy conservation techniques, designed to achieve a balance of a healthful dwelling environment and maximum practical energy conservation (Section 413 (b)(2)(A)). The FEA was also directed to nsure, through

regulation, that the benefits of weatherization assistance for leased dwelling units accrue primarily to low-income tenants, and result neither in rent increases nor excessive enhancement of rental property value.

1977 Legislative Proposals on Weatherization

During 1977, both the Administration and Congress put forth proposals to greatly expand the Weatherization Program.

On April 20, 1977, President Carter announced his National Energy Plan. On May 5, 1977, Senator Jackson introduced S.1469, The National Energy Act, at the Administration's request. The bill contained a comprehensive program for achieving a set of national energy goals for 1985, including the insulation of 90 percent of all homes and new buildings. The bill also called for $385 million of additional authorizations for the low-income Weatherization Program for FY 78 to FY 80, bringing the total authorization level to $585 million over three years. Total program responsibility would have been given to the FEA-DOE program.*

On June 20, 1977, Representative Ashley introduced H.R. 7893, the National Weatherization Act. A major part of this bill was Title II which called for amending the Energy Conservation in Existing Buildings Act of 1976 (42 U.S.C. 6851 (Title IV of the Energy Conservation and Production Act)), to raise the eligible income level for weatherization grants to low-income families to 125% of the federally established poverty level. The definition of the term "weatherization materials" under this bill would have been expanded to provide for the inclusion of additional devices and technologies. H.R. 7893 also proposed amending the

*Digest of Public General Bills and Resolutions, 95th Congress, 1st Session, 1977, Part 1. S. 1469, A-162.

Housing Act of 1949 to require the Secretary of Agriculture to conduct a separate weatherization grant program for farm residences occupied by low-income people.*

Soon thereafter, Representative Ashley submitted H.R. 8444, The National Energy Act, the House counterpart of S.1469. Many of the weatherization provisions from H.R. 7893 were incorporated into the larger, more comprehensive energy bill H.R. 8444. These provisions would have amended the DOE Weatherization Program to make it more like the CSA Program with respect to income eligibility criteria (up to 125% of the poverty level) and per house expenditure limits ($800 per unit, up from $400 per unit in the 1976 ECPA). Tools, transportation of labor and materials to job sites, on-site supervisory personnnel costs, and incidental repairs up to $100 would all be allowed under the $800 per unit "materials" limit. In addition, the House bill directed the FEA Administrator to develop regulations designed to include use of optimum cost-effective energy conservation measures. Authorized appropriation levels were increased to $130 million for FY 78 and $200 million for each of FY 79 and FY 80 (slightly lower than the Senate and Administration version).

On June 14, 16, 21, and 27, 1977, a task force of the House Committee of the Budget held hearings on the distributive impacts of proposed changes in national energy policies. Testimony was presented on the following questions regarding the Weatherization Program:

1) What has the impact of the energy crisis been on the poor?

2) What is the extent of the need for low-income weatherization?

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*Ibid., H.R. 8444, E-606.

3) What can the weatherization program realistically be expected to accomplish?

4) What amount of effort is needed on individual dwellings to both save energy and provide financial relief for the poor?

1. The Energy Crisis' Impact on the Poor

These hearings were the first time that concrete figures were available to Congress on the severity of the impact of rising energy prices on poor Americans. According to a study by the Washington Center for Metropolitan Studies, many low-income households in 1975 were already spending more than twice the percentage of their household incomes for energy bills as those with incomes of $25,000 or more--despite their much lower rate of consumption. In 1975, low-income households were spending at least 20 percent of their income on natural gas, electricity, and gasoline. In earlier testimony before the Senate Committee on Aging, Administrator O'Leary of FEA testified that during the severe winter of 1976-77, some of the elderly poor spent as much as 50 percent of their disposable income on energy.

An analysis prepared for the Joint Economic Committee by Professor Lester C. Thurcow of Massachusetts Institute of Technology showed that, as a proportion of before-tax incomes, energy consumption falls dramatically as incomes rise. Home energy consumption accounts for 20.2 percent of the budget of the poorest 10 percent of Americans, but only 2.0 percent of the budgets for the richest 10 percent of Americans. The figures present a picture of the poor being subjected to an ever-rising energy cost burden, even though their energy use goes mainly for essentials and is highly inelastic.

2. The Need for Low-Income Weatherization

The Committee testimony also dealt with the impact of various proposed measures--the equalization tax rebate, the tax credit for insulation and alternative energy, etc.--on the poor. Many were found to be less beneficial to the poor than to other Americans. One measure which did promise to directly aid the poor where need was greatest was home weatherization assistance.

Fully 70 percent of the 14.1 million low-income households (defined as up to 125 percent of the poverty level) or 9.9 million dwellings were estimated to need weatherization. Weather protection in these homes is far below average. Only about one-fourth are protected by storm windows or insulating glass; fewer have weatherstripping, and less than one-third have exterior storm doors. In a research and demonstration project sponsored by CSA, the National Bureau of Standards made a preliminary estimate that energy use savings of approximately 50% were possible through optimum weatherization. Optimum weatherization refers to the installation of those weatherization measures for which the marginal cost-benefit ratio is equal to or less than one.

The National Energy Conservation Policy Act of 1978 (P.L. 95-619)

None of the weatherization provisions in the 1977 bills were passed into law until November 9, 1978. Public Law 95-619, the National Energy Conservation Policy Act (NECPA) contains the compromise of many of the conservation measures debated in 1977, including the utility program, energy efficiency standards for products, secondary financing and loan insurance for energy conserving improvements and solar energy systems, and weatherization grants for the low-income.

As reported by the Conference Committee, the more liberal House provisions for both the DOE weatherization grant program and a FmHA weatherization grant program for rural low-income families were accepted.*

Not only is the income eligibility criterion set at up to 125 percent of the poverty level, but DOE may also establish a higher level after consultation with the Secretary of Agriculture and the Director of CSA if:

> "...such a higher level is necessary to carry out the purposes of this part and is consistent with the eligibility criteria established for the Weatherization Program under Section 222(a)(12) of the Economic Opportunity Act of 1964. (Section 231(a)(1)(B).)

DOE is directed to issue final regulations within 120 days that detail standards for all the federal weatherization programs (DOE, CSA, FmHA) that give procedures to apply to each dwelling to "determine the optimum set of cost-effective measures within the cost guidelines set for the program, to be installed in such dwelling units."

The NECPA also expands the definition of weatherization materials to specifically include furnace efficiency modifications, clock thermostats, water heater insulation, multi-glazed windows and doors, and heat-absorbing or heat-reflective windows and door materials. Up to $800 may be spent on "materials" per dwelling, and this may include such program support costs as tools and equipment, transportation, on-site supervisory personnel, and incidental repairs. State Policy Advisory Councils may apply for higher maximums with respect to specific categories of units or materials in the States. The NECPA authorizes appropriation levels of

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*U.S. Code Congressional and Administrative News, 1978, St. Paul, Minnesota: West Publishing Co., Inc., p. 8146.

$130 million in FY 78, and $200 million each for FY 79 and FY 80.

Section 232 of the NECPA also establishes a weatherization grant program in FmHA for low-income rural households, with $25 million authorized for FY 79 only. (No funds were appropriated for FY 79 since ongoing FmHA programs (504 Loans and Grants) were deemed adequate to meet the need.)

The NECPA, in Section 233, also addresses a problem which has plagued the Weatherization Program--the availability of labor. During the 1977 Hearings on the National Energy Act, a spokesman for the DOL assured the Subcommittee on Energy and Power of the House Committee on Interstate and Foreign Commerce that CETA labor availability for local weatherization programs would not be a problem. By the end of 1979, the number of public service jobs under Title VI of CETA was expected to grow from 240,000 to 640,000. DOL was readying guidelines to encourage local prime sponsors to give weatherization projects priority attention. According to Robert McConnon, Deputy Assistant Secretary for Employment and Training:

> "We (DOL) believe that our CETA legislation has the flexibility to fit in with the proposed provisions of the energy legislation, especially in the energy conservation areas."

Appropriations History

For FY 75-79, the CSA Weatherization Program has been allocated $160 million of the $229 million appropriated for CSA Emergency Energy Conservation Program. From FY 77 to 79, $291.4 million has been appropriated for the DOE Weatherization Program. Thus, a total of $450 million has been appropriated to these weatherization programs through FY 79.

Even though the CSA program was authorized in early 1975, no funds were appropriated until a $16.5 million appropriation in the second Supplemental Appropriation for FY 75. Due to the lateness in the fiscal year, CSA was authorized to carry over these funds into FY 76. Added to the FY 76 General Appropriation of $27.5 million, a total of $44 million was available to CSA for FY 76.

In Fy 77, only $27.5 million was appropriated for the first six months, representing a compromise between Congress' desire to appropriate more funds and the threat of a Presidential veto should more funds be added to the general appropriation exceeding the predetermined budget ceiling. Later, $82.5 million was appropriated, bringing the CSA weatherization FY 77 appropriation to $110 million. Beginning in FY 78, the Administration requested zero funds for CSA's Weatherization Program which it believed should be administered by DOE. Late in FY 77, the DOE program (authorized by ECPA, Public Law 94-385) was implemented with an appropriation of $27.5 million.

In FY 78, CSA and DOE were each appropriated $65 million. For FY 79, DOE received the entire FY 79 appropriation of $198.9 million for weatherization activities. However, the agency appropriation for CSA was not acted upon. A continuing resolution authorized CSA to expend funds based upon the rate of expenditures in FY 78. OMB disagreed with CSA plans to thus obligate a full $65 million in weatherization activities for FY 79 as CSA had done in FY 78. The President and Congress finally agreed to fund the entire weatherization effort through the Department of Energy.

APPENDIX B

WEATHERIZATION OPERATIONS*

Introduction

Many local weatherization coordinators convey the impression that the world is divided between people who have seen a weatherization project in operation and those who write guidelines for them.

No report, however descriptive, can adequately substitute for "seeing." Nevertheless, we believe some purpose can be served by describing weatherization operations in such a way that those who have not visited a local project may gain an overview of the operational aspects of the program.

Unlike other parts of this study, this section contains a series of photographs. These are included as the most efficient means of acquainting our audience with examples of dwellings worked on and examples of techniques employed. However, we include the photographs with some misgivings, for pictures have a peculiar way of inviting generalization. But as preceeding sections of this study manifest quite clearly, generalizing about operations of the weatherization program is risky business.

Preconditions

It takes knowledgeable people and functional vehicles to move tools and materials from where they are stored to a client's home. Local projects must be understood in terms of such factors as labor, materials, transportation, tools and equipment, storage facilities, and, of course, clients. Obvious as this sounds, in the early days of weatherization, several of these important factors were virtually ignored by federal guidelines. Yet program evaluators usually find that deficiencies in production can be traced to problems

*This appendix is an adaptation of a section of The Weatherization Program: A Policy Perspective, by the Syracuse Research Corporation, SRC TR 77-717, April 1977.

with one or more of these essential elements. Although each is discussed from various perspectives throughout this study, we mention them from the "operational" point of view in the paragraphs below.

Labor. A skilled crew chief who knows the nuts and bolts of weatherizing different kinds of houses and who can coordinate the work of other crew members is perhaps the most important single factor in a productive program. Variations in crew size and skill levels of its members frequently determine the practical limits of what can be accomplished. For example, a project director with seven CETA slots may want two crews, but he can have only one crew if he happens to have only one skilled supervisor. Conversely, a project which includes several Project Green Thumb men on its labor force can count on these workers only 24 hours a week. It thus may have to collapse two crews into one. Finally, the aim of CETA job training programs is to place trainees into jobs in the private sector. Since the most productive trainees are likely to be hired first, some project directors see a conflict between training program goals and those of weatherization.

Transportation. Transportation is a key element in program success. Large vans or, at the least, covered pick-up trucks are needed. The van allows transporting men, tools, and lots of insulation in one trip. Not all local projects can afford to buy transportation equipment outright and must solicit contributions, but donated trucks are often in very poor condition. Most projects report significant amounts of down time either because vehicles are unsuited for their needs or simply out of commission. Finally, many CAAs find they must use administrative budgets to pay

workers 12 to 15 cents a mile to drive their own vehicles to the job.

Storage Facilities. Insulation is bulky, and unprotected equipment may be stolen. Some projects have central warehousing facilities of varying degrees of adequacy, but others must order small quantities of material at a time. The latter must make frequent trips which waste time and, since they cannot buy in bulk, waste money as well. Occasionally a project's insulation supplier will sell material in large quantities but allow pick-up on an as-needed basis. If a project happens to have a large van, this arrangement is satisfactory. However, since the supplier is effectively the storage facility, the efficiency of a pick-up truck operation varies as the inverse of the distance from the supplier.

Client Identification. From the operational standpoint, it is important for reasons of crew planning and logistics to have as many potential clients identified as possible. Some projects have used extensive publicity to advertise the weatherization program; others find they have adequate referrals through traditional CAA channels and believe additional publicity would raise expectations unduly. As a program goes on, a greater percentage of clients find out about weatherization through the sight of a crew in the neighborhood or by simple word of mouth.

On rare occasions clients who meet all administrative criteria for being qualified will not be served because their homes are judged in such poor condition that the costs of weatherization would far outweigh the benefits which might accrue. Those CAAs which also do extensive carpentry work under a home repair project are least likely to pass over these cases.

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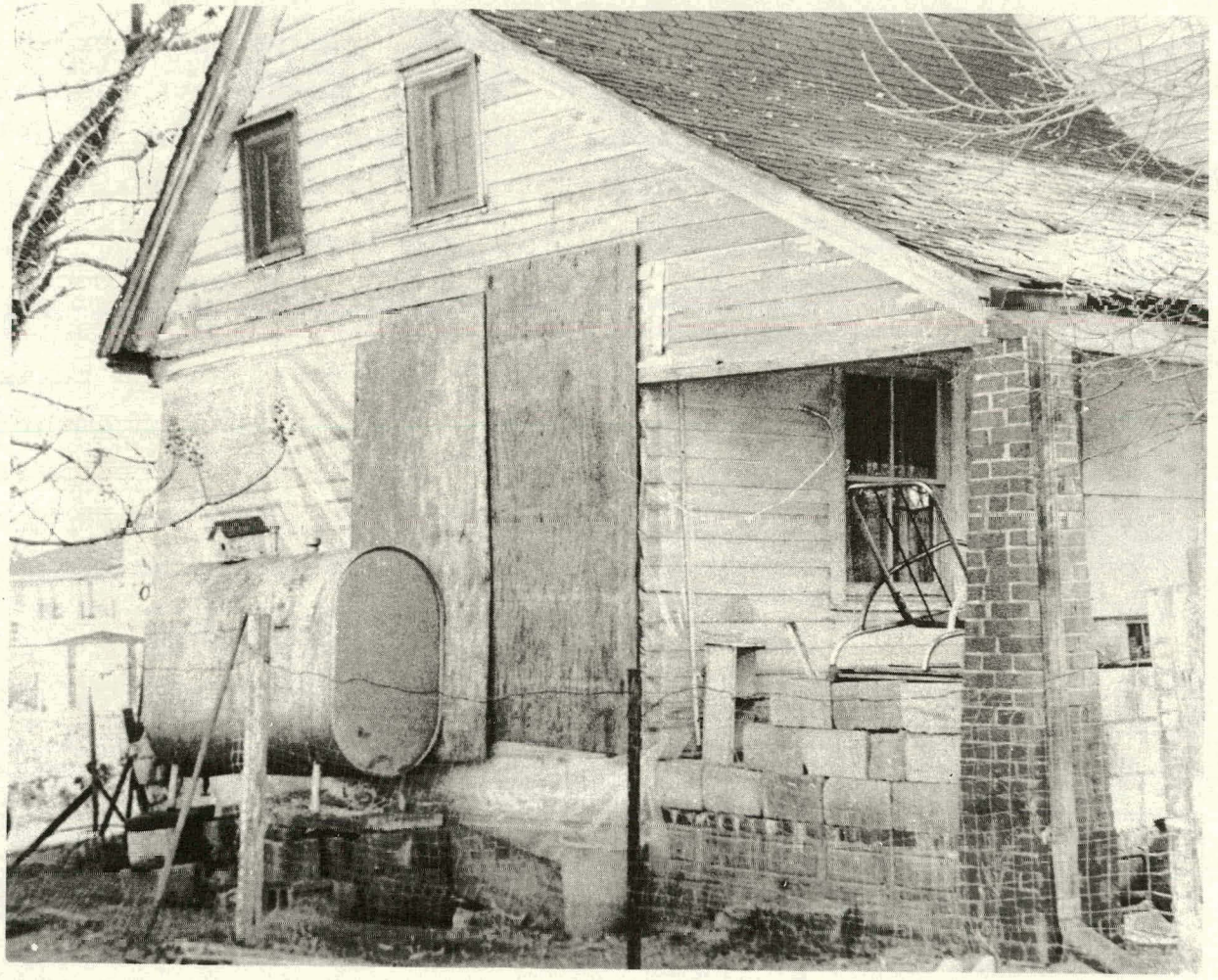

Figure 1

Figure 1 shows a house which appears to be typical of many dwellings that are routinely weatherized. In fact, it is a borderline case because the roof is partially rotten, the roofing needs replacing, there are cracks in the siding, and the windows are in barely repairable condition.

B27563-U

Figure 2

Many project directors reason that since wet insulation in the attic does little good in saving energy, there is no sense in weatherizing a home with a leaky roof. But if a whole new roof is required in order to stop the leaks, the crew would be better advised to invest its time and materials weatherizing other clients' homes. Figure 2 shows a roof that can be repaired by semi-skilled crew members.

B27564-U

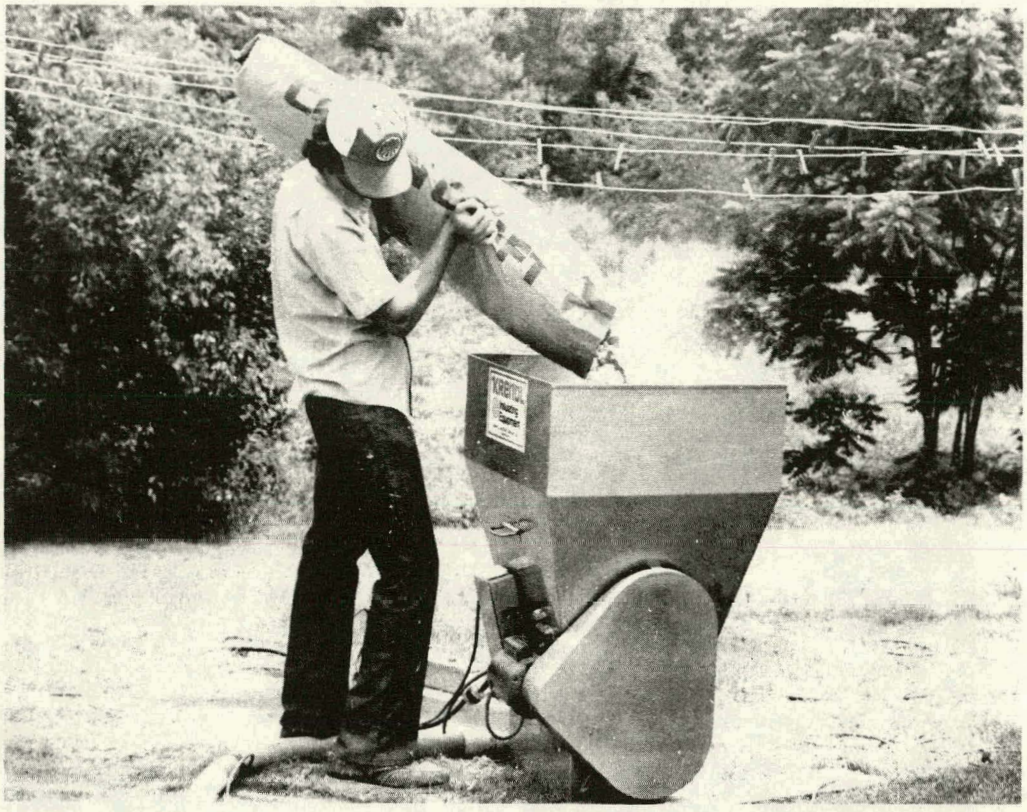

Figure 3

Tools and Materials. Ordinary carpenters' hand tools and a heavy duty drill are essential tools. A heavy duty sabre saw for cutting holes for attic vents saves time and trouble. The largest investment by far for weatherization projects (after a truck) is an insulation blower. These come in various sizes, prices, and qualities. The machine pictured in Figure 3 is representative of many used and costs around $1,500. All insulating machines of its style use two motors; an upper motor to agitate the material poured in the hopper and a blower motor to propel the material through a long flexible hose to where it is needed.

A27565-U

Figure 4

Fiberglass is also used in weatherization projects. Batts are used in projects which have no blower and as supplements for those that do for insulating areas (such as underneath a floor) for which cellulose is not well suited. Blown fiberglass is used in some areas because it can be applied at very high speeds by means of a special blower and because it has been found to be cost-effective, but it has the disadvantage of requiring special equipment.

In addition to insulation, weatherization projects make use of door sweeps, caulking compound, several kinds of weatherstripping, wood for underpinning and small repairs, glass, storm windows, storm doors, and vents.

Operations

This subsection gives a pictorial sketch of what weatherization crews accomplish at clients' houses with their tools and materials.

All jobs should begin with a thorough estimation in order to ensure that when the crews arrive, they will be properly prepared to do the proper work in a hurry. Not infrequently, women are used to perform the estimating job, which also has the function of putting the homeowner at ease concerning what he or she can expect from the upcoming weatherization operation (Figure 4).

Many projects operate with the rule of thumb derived from federal guidelines: cure infiltration, insulate the attic, install storm windows, and do whatever else possible as resources permit.

But, to begin at the beginning, what counts as curing infiltration?

Figure 5 pictures a home which could be almost anywhere in rural America. It has two sources of infiltration which are obvious at a glance; the roof and the floor. Figure 6 shows the job complete save for storm windows. The roof has been repaired, the attic insulated (note the attic vent), and underpinning (skirting) placed around the foundation. The windows have also been repaired and weatherstripped, but this is difficult to ascertain from the photograph. In brief, surely a great percentage of infiltration has been stopped and a rather thorough job has been done on the house. Though it cannot be seen, two other operations have been performed on the house. The walls have been insulated (with blown cellulose) and the floor as well (with 3 1/2 inch fiberglass batts).

This illustrates a frustrating truth about many weatherization jobs: a lot of what saves energy cannot be seen.

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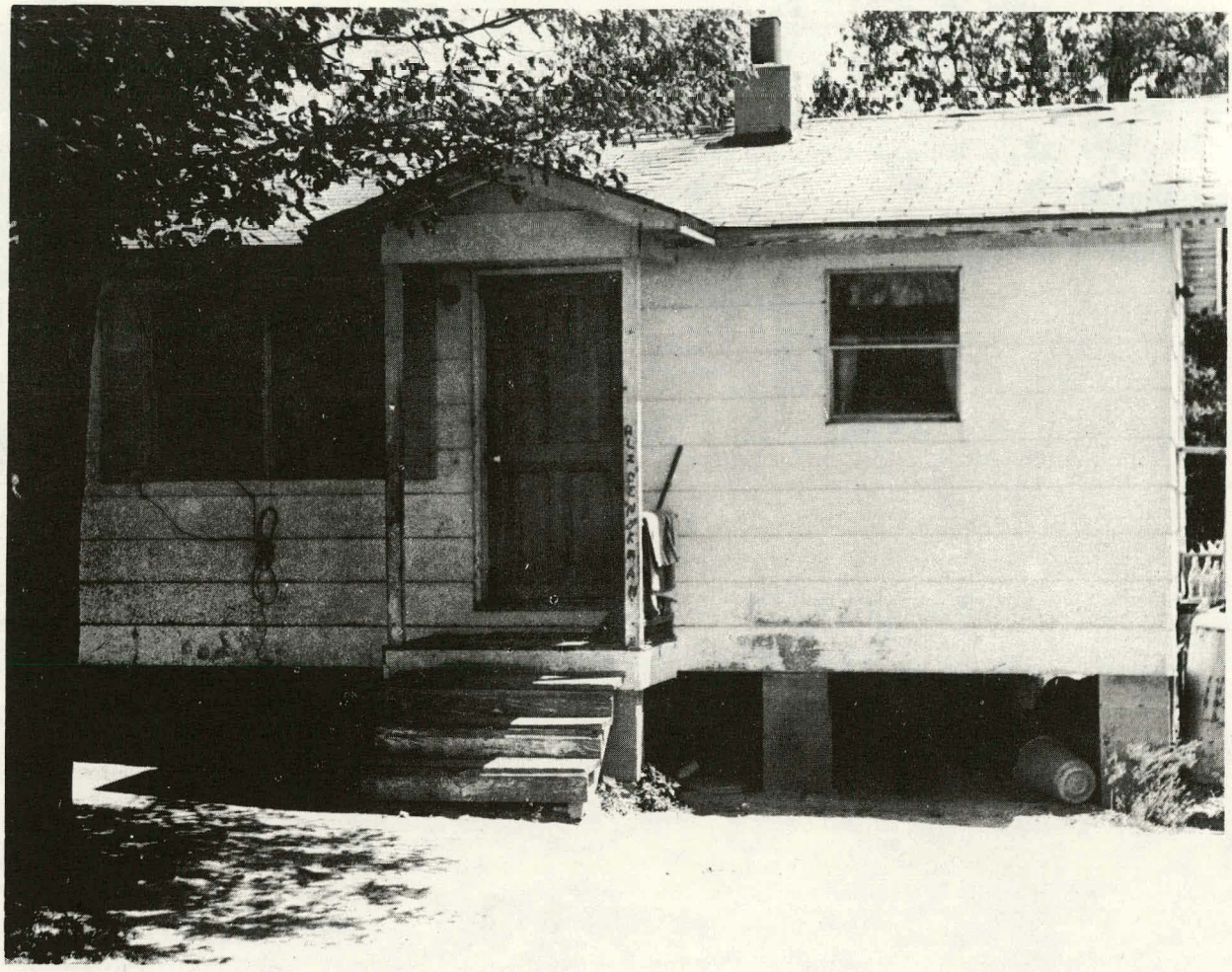

Figure 5

A24618-J

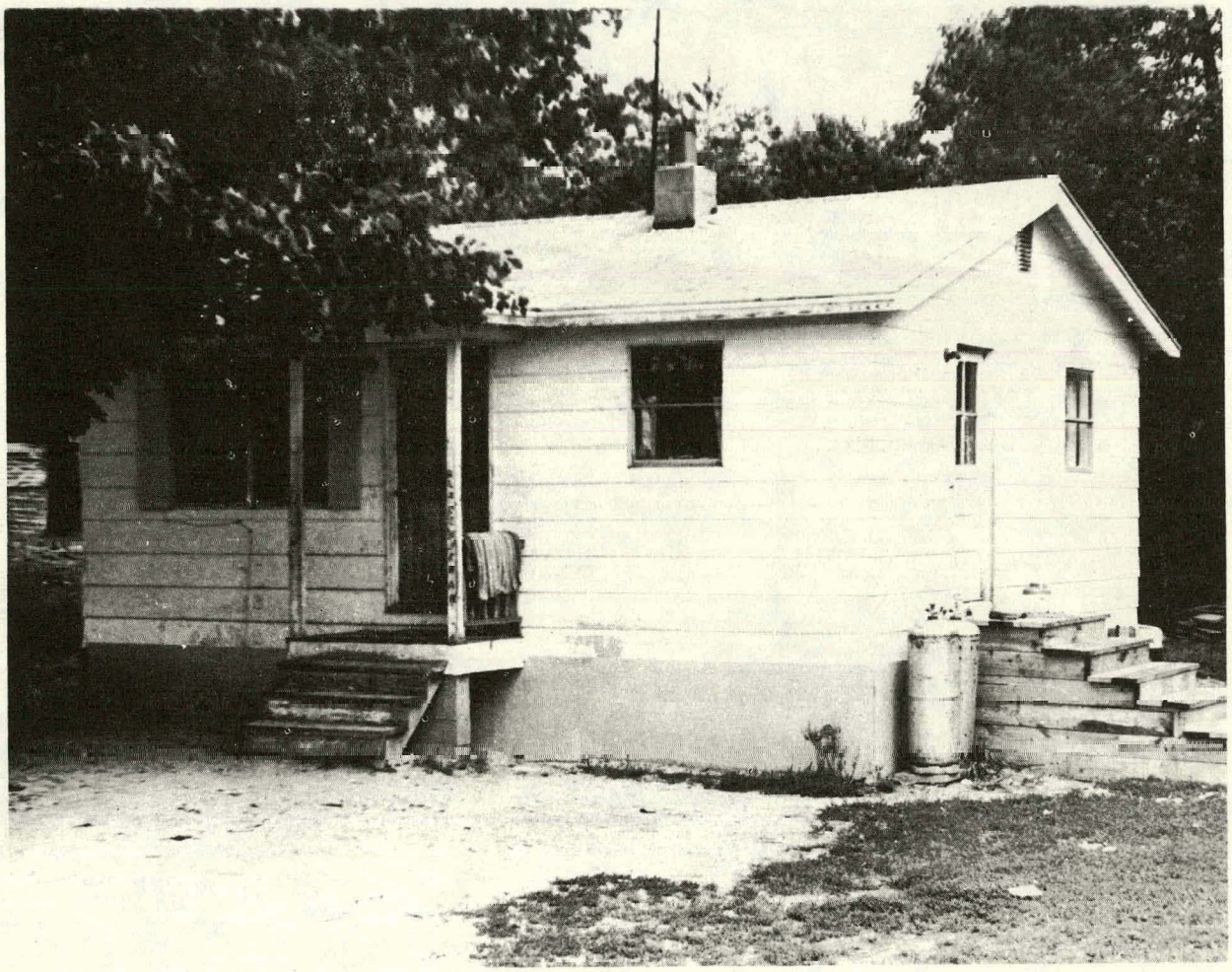

Figure 6

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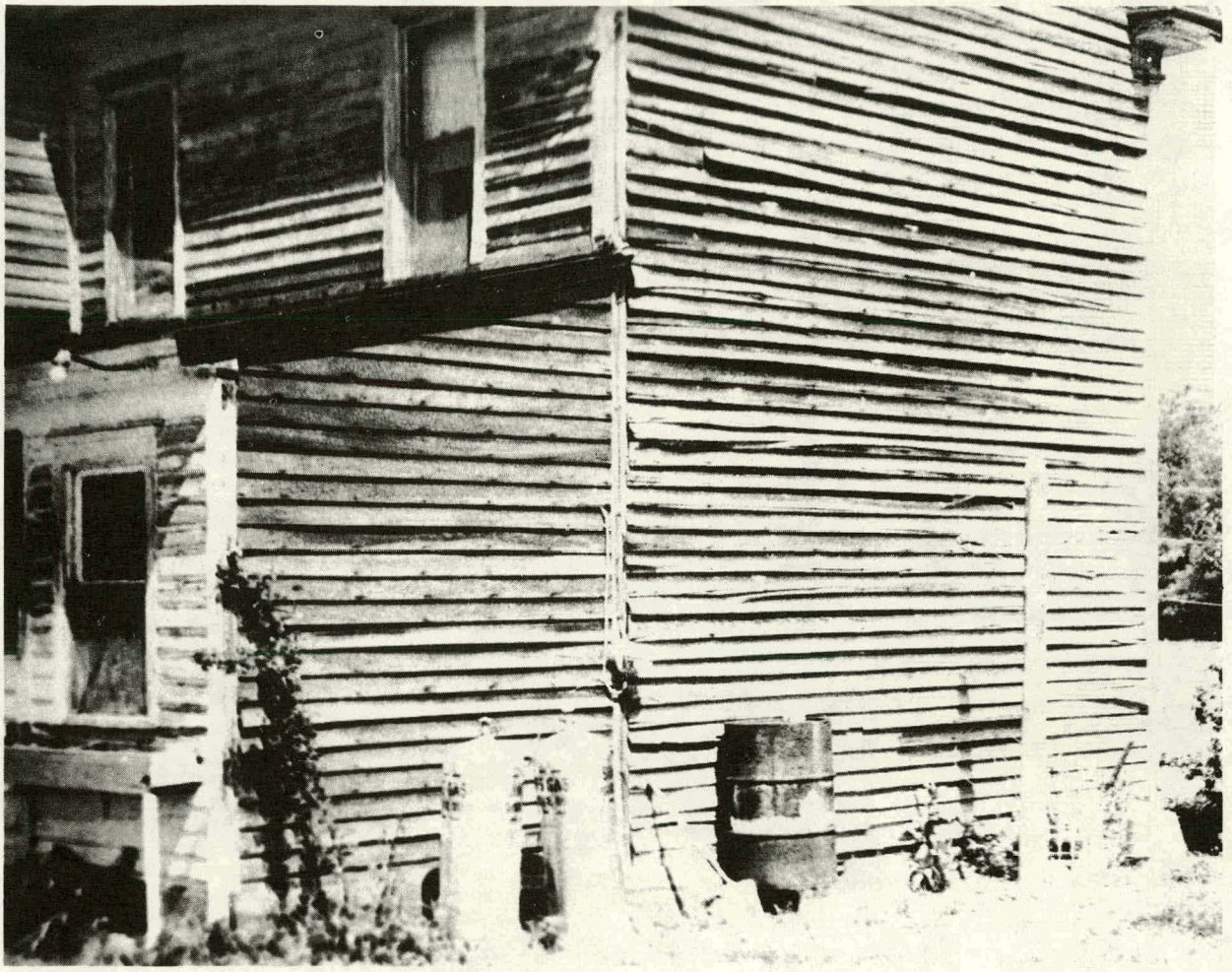

Figure 7

Figure 7 shows the side of a dwelling that looks almost impossible, but the roof lines are straight and the corners plumb. In this case the siding was in such dire condition that the crew leader decided that it must be replaced. In the project from which these photographs come, weatherization work is often combined with the housing rehabilitation work.

A24624-U

Figure 8

Figure 8 shows new siding being installed by CETA carpenters and trainees. Note that the building had no tar paper, so that with the curled up siding, the wind blew straight through the cracked plaster into the interior.

This dwelling, it is important to emphasize, is larger than those which are routinely weatherized, but it is not in greatly worse shape. However, it is clear that in order to do the infiltration curing work at all, rather radical surgery is called for. The only alternative is to reject the house at the outset.

Insulation is installed in attics by laying batts between the rafters or by blowing in either cellulose or fiberglass.

Figure 9

Figure 9 shows insulation being blown into an attic under the floor boards. This is accomplished by removing the board running along the center of the attic and blowing each way (being careful to block off the eaves so as not to hinder ventilation).

Figure 10

A24623-U

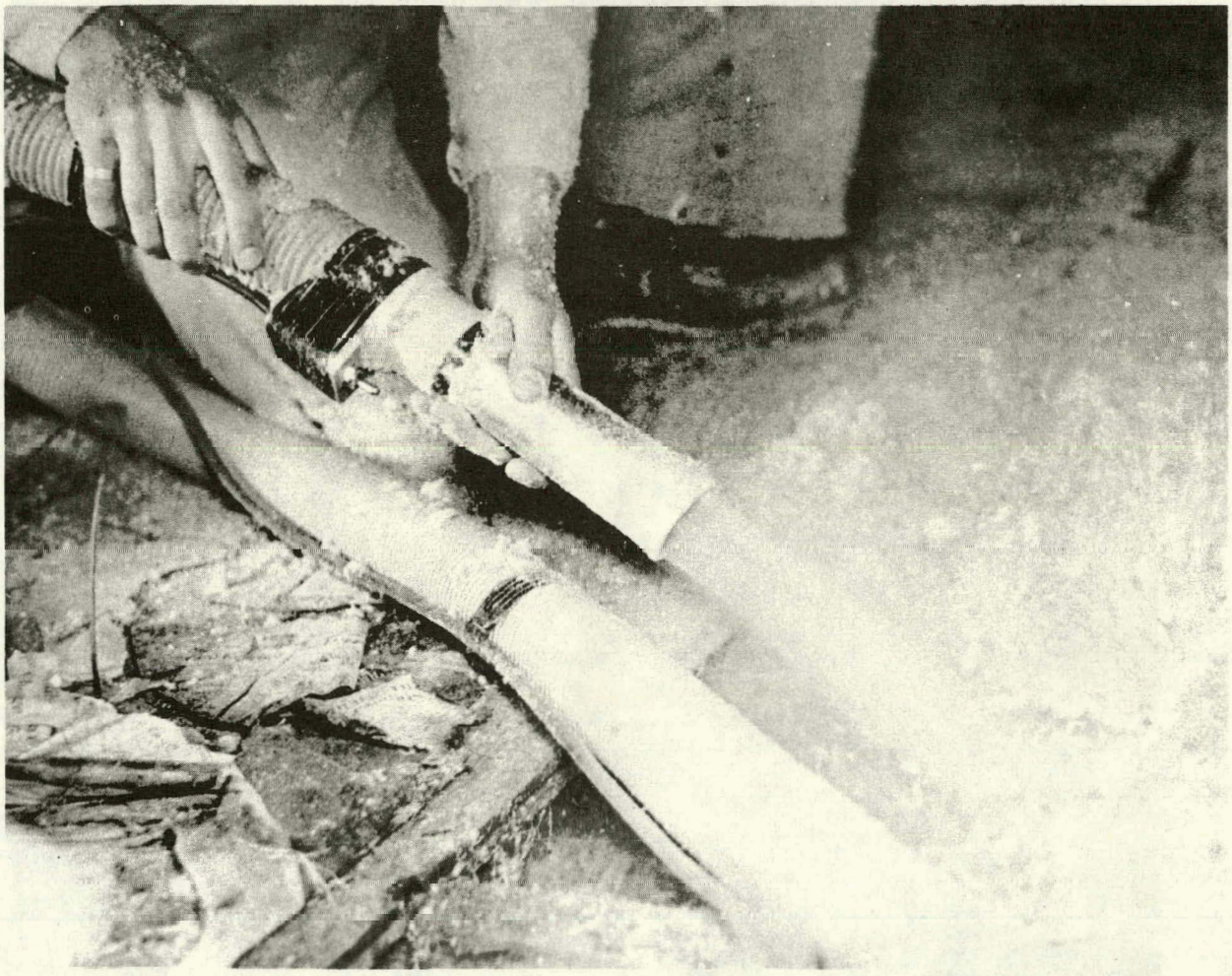

Figure 10 shows the nozzle in operation. The force of the output of the blowing machine increases with increased air (which is adjustable at the blower motor), but if too much air is used, the cellulose will settle, decreasing its insulating value. The switch taped on the nozzle is an add-on device the crew has found particularly handy. It allows the nozzle operator to control both the blower and hopper motor. Although this switch is not very important for insulating attics, it is especially useful for operations which insulate walls.

A24626-U

Figure 11

Figure 11 shows a wall being prepared for blowing while the CETA worker's colleague is insulating the attic. Since it has no fire stops and 16 foot 2 x 4s, it is especially well suited for an easy wall insulation job.

Figure 12

A24620-U

Figure 12 shows one half of a four man CETA crew drilling and blowing insulation. The crew is made up of a crew leader, a drill operator, a nozzle operator, and a hopper loader. The drill man goes to work first and is followed by the nozzle operator whose material is fed by the hopper loader. The crew leader "closes up" by force fitting either a plastic or wooden plug into the holes. This continues until the drill operator finishes drilling holes at which point he takes over the closing up chores. This gives the crew chief time to count the empty bags of insulation and take care of the paper work.

Figure 13

Some projects have their insulation blowers semi-permanently mounted near the back of their vans. This allows for very fast set-up time and eliminates having to unload bags of insulation from the truck. Such an arrangement permits blowing an attic in the midst of a rainstorm while protecting both workers and insulation from getting wet.

Figure 13 pictures what is possibly the most tedious job of all--replacing window panes, glazing and caulking. Although windows are more likely to be sources of infiltration than any other part of a house, it is especially time-consuming to replace glazing compound to secure a long-lasting result.

Figure 14 shows storm window installation and caulking during winter. Many weatherization operations continue even in the coldest months, but they have learned to take special precautions to protect their materials and equipment, as well as themselves.

That windows in old houses leak cold air in the winter-time is almost certainly the best reason for installing storm windows. Neglecting infiltration, the addition of a storm window merely raises the R-value of a window from R-1 to R-2--important, but hardly worth great time and expense vis-a-vis many other weatherization improvements. But if a storm window succeeds in stopping infiltration, it thereby contributes much more than the addition of an R of one.* If it does fit tightly enough to stop infiltration, however, it may lead to damage caused by trapped moisture between the prime window and the storm window.

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*R or thermal resistance is a measure of the ability of a material to retard heat flow. The higher the R, the higher the insulating value. Materials having the same R-value, regardless of their thickness, are of equal insulating value.

A27566-U

Figure 14

When the weatherization work is done, projects have three things yet to do.

1. Clean-Up. The job is not over until all the excess cellulose, other insulation, and materials are removed from the house. The best projects leave the home cleaner inside and out than they found it.

2. Explanation of the job. People whose homes have been weatherized need to have their questions answered and the modifications of their homes explained. Workers explain the operation of storm windows, explain why the vents in the attic need to be kept clear, and generally explain what was done.

3. Energy Education. There is no better time than during or just after the weatherization process to explain the range of other steps a family can take to conserve energy. Some projects take the household on an energy tour to explain the possibilities in each room. Booklets and other information, including a telephone number to call with questions or for more information, are left in the home.

APPENDIS C

COST-BENEFIT ANALYSIS

It is customary in drawing up a cost-benefit analysis to point out that there may be costs and benefits which cannot be measured in dollars and hence are not included in the usual cost-benefit ratio. It is particularly necessary to emphasize this in the case of the Weatherization Program. While estimates of fuel savings can be made, it is difficult to measure benefits of increased comfort and improved health. Nevertheless, it is useful to consider the likely range of cost-benefit ratios for the Program. The following tables give such ratios for likely ranges of initial weatherization cost, annual heating bill (1979), heating bill savings factors due to weatherization, and remaining structure life. It is worth noting that the Department assumes that the installed weatherization material has a useful lifetime without deterioration that is almost equal to the life of the structure. Future benefits in heating bill savings have, of course, been properly discounted. What is striking is the relatively small number of cases where the ratios go below the critical value of one, and how high the ratios can go in other cases (particularly as the number of years in the life of the structure increases.)

An important assumption is the forecast that fuel price increases will exceed that of the general rate of inflation. It is also important to keep in mind that in a program like the Weatherization Program where there are the dual goals of aiding the poor and of conserving energy, policy decisions may well not be best made solely on the basis of the most or least favorable cost-benefit ratios. That is, the worst housing sometimes produces the worst ratio (lifetimes of ten years), but it may produce the most human benefit.

As has been noted many times before, it is difficult to prepare cost-benefit analyses which make the Weatherization Program look anything but good. This is particularly true when compared to income-transfer programs which pay the cost

of increased fuel costs but do not encourage conservation.

The formula employed in constructing the following tables is given by:

$$\frac{\text{Benefits}}{\text{Costs}} = \sum_{i=0}^{N} \frac{S_o(1 - P_1)^i B_o (1 + P_2)^i}{(1 + r)^i} \Big/ C$$

where:

N = number of years of use of life remaining; 10, 15, 20 years

S_o = cost-saving factor, due to weatherization, in first year; 14%, 20%, 30%*

P_1 = rate of annual decline in efficiency of weatherization after installation; 3%

B_o = annual average pre-weatherization heating bill; $500, $750, $1000

P_2 = rate of annual average increase in heating fuel prices; .1025

r = discount (interest) rate; 8%

C = inital 1979 cost of weatherization (total); $1000, $1300, $1600**

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*S_o - These values range from the relatively conservative working estimates used by the Department to more optimistic ones.

**C - These costs reflect a division of elements in the following ratio: for every dollar spent on materials, $1.25 is spent for labor and $.40 is spent on local program support. These estimates derive from discussions with the Department of Labor and from a report (1977) by the Syracuse Research Corporation.

In a letter of October 18, 1979, to Carolyn Martin of the Office of Weatherization Assistance, Mr. Heinz R. Trechsel of the National Bureau of Standards' Environmental Design and Research said that an average 14% cost savings is quite modest particularly when viewed in the light of the substantially greater savings which would derive from optimum weatherization* and the expected rise in fuel prices.

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*See page A-11.

Cost-Benefit Ratios

Annual Pre-Weatherization Heating Bill of $500 (1979)

Remaining Life of Structure

10 years

Initial weatherization costs	% savings (annual) 14%	20%	30%
$1000	.6633	.9488	1.421
$1300	.5102	.729	1.093
$1600	.414	.610	.888

15 years

Initial weatherization costs	% savings (annual) 14%	20%	30%
$1000	.971	1.388	2.081
$1300	.747	1.067	1.601
$1600	.648	.867	1.301

Annual Pre-Weatherization Heating Bill of $500 (continued)

Remaining Life of Structure

20 years

Initial weatherization costs	% savings (annual) 14%	20%	30%
$1000	1.264	1.8064	2.710
$1300	.972	1.390	2.085
$1600	.790	1.129	1.693

Cost-Benefit Ratios

Annual Pre-Weatherization Heating Bill of $750

Remaining Life of Structure

10 years

Initial weatherization costs	% savings (annual) 14%	20%	30%
$1000	.995	1.421	2.108
$1300	.765	1.093	1.622
$1600	.621	.888	1.318

15 years

Initial weatherization costs	% savings (annual) 14%	20%	30%
$1000	1.457	2.058	3.087
$1300	1.121	1.583	2.375
$1600	.911	1.29	1.929

Remaining Life of Structure

20 years

Initial weatherization costs	% savings (annual) 14%	20%	30%
$1000	1.896	2.710	4.019
$1300	1.458	2.085	3.092
$1600	1.185	1.694	2.512

Cost-Benefit Ratios

Annual Pre-Weatherization Heating Bill of $1000

Remaining Life of Structure

10 years

Initial weatherization costs	% savings (annual) 14%	20%	30%
$1000	1.327	1.895	2.843
$1300	1.021	1.458	2.187
$1600	.830	1.184	1.777

15 years

Initial weatherization costs	% savings (annual) 14%	20%	30%
$1000	1.943	2.775	4.163
$1300	1.495	2.086	3.20
$1600	1.214	1.734	2.60

Remaining Life of Structure

20 years

Initial weatherization costs	% savings (annual) 14%	20%	30%
$1000	2.529	3.612	5.419
$1300	1.946	2.778	4.168
$1600	1.58	2.258	3.387

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☆U.S. GOVERNMENT PRINTING OFFICE: 1980-640-258/19