

## Chapter VIII

# FEDERAL GOVERNMENT AND ENERGY CONSERVATION

## Chapter VIII.—FEDERAL GOVERNMENT AND ENERGY CONSERVATION

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# FEDERAL GOVERNMENT AND ENERGY CONSERVATION

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## INTRODUCTION

The Federal Government exerts substantial influence on the character of the Nation's existing housing and on the location, type, and level of new construction activity. It would be logical to conclude that Washington is thus a leader in the drive for energy conservation in residential housing. But the Federal record is a mixed one. The Federal Government has not developed a coordinated or standardized policy to encourage residential energy conservation. The level of interest in promoting conservation varies by agency and program. Although there is evidence of greater concern and sensitivity about conservation by Federal agencies and important additional legislative authority was enacted in 1978, there are opportunities for accelerating conservation and for developing more systematic agencywide approaches.

This section of the report examines the major Federal agencies involved in housing and energy conservation and reviews what they are doing or could do to promote conservation. The important conservation-related programs are described in terms of their key features, authorization, and program activity. How these programs and activities affect lending institutions, the building industry, State and local governments, and property owners—and how they influence the knowledge and awareness of all of these sectors about energy conservation — is explained.

The Federal Government has been actively involved in promoting the objective of “a decent home and a suitable living environment” for all Americans through a variety of housing programs and regulatory activities. The Department of Housing and Urban Development (HUD), the Farmers Home Administration (FmHA) of the Department of Agriculture (USDA), the Veterans Administration (VA), and the agencies that regulate lending institutions are the major Federal agencies bearing on the housing industry. Federal activities are directed to lenders, property owners, developers, and lower income tenants and homeowners. Types of activity and assistance include:

- loan insurance for private lenders;
- subsidies to lower income families and owners of lower income housing projects;
- direct Government loans to property owners;
- establishment of construction standards;
- grants to local Government for housing infrastructure;

- demonstration projects to pioneer new approaches;
- research related to residential buildings;
- regulation of housing, financing, and market support activities; and
- direct construction and ownership of housing (by the Department of Defense (DOD)).

Federal assistance involves a number of Federal agencies and programs, private lenders, and State and local governments. Table 66 illustrates the fragmented nature of the delivery system. The types of lenders and agencies differ depending on the type of construction and the housing occupants.

For all of its regulations and standards—which do affect general housing activities — the direct Federal role in housing development is relatively small in relation to nonfederally assisted housing. (The exceptions are low-income housing development and providing mortgage insurance or guarantees for the

**Table 66.—Federal Housing Programs  
Delivery Systems**

Type of institution	Number of field offices/ participating institution:
<b>1. Federal agencies</b>	
HUD	
Area/insuring offices . . . . .	76
Regional offices . . . . .	10
FmHA	
County offices . . . . .	1,760
FNMA regional offices . . . . .	5
VA	
Regional offices . . . . .	49
Federal Home Loan Bank Board	
Regional banks . . . . .	12
<b>2. State and local government agencies</b>	
States	
State housing agencies . . . . .	39
Local government agencies	
CDBG recipients . . . . .	3,200
CDBG recipients proposing housing/ rehab type programs . . . . .	1,470
Section 312 agencies . . . . .	200-250
<b>3. Private institutions (categories overlap)</b>	
Lenders	
Commercial banks . . . . .	14,697
Savings and loan associations . . . . .	4,858
Mutual savings banks . . . . .	473
Credit unions . . . . .	22,421
Title I lenders	
Approved . . . . .	10,000
Active . . . . .	4,600
FHA mortgages	
Approved . . . . .	11,700
Active . . . . .	7,500
FNMA originators	
Approved . . . . .	3,000
Active . . . . .	1,500
Very active . . . . .	400-500
FHLMC originators	
Federally supervised savings & loans....	2,048
Active . . . . .	1,400
GNMA originators	
Approved (all are FNMA approved originators) . . . . .	1,000
VA mortgages	
No approval system . . . . .	NA

SOURCE: Rupi, Federal incentives for Solar Homes, 1977, table IV.7. National Association of Mutual Savings Banks, 1977 *National Factbook of Mutual Savings Banks*, 1977, p. 12.

lower end of the market.) Publicly owned housing is a small fraction of new construction starts as table 67 shows.

Most housing is built and financed without Federal assistance. [In 1977 only one in six privately owned housing starts were insured by HUD's Federal Housing Administration (FHA) or guaranteed by VA (table 68). FmHA financed an additional 126,000 units. Federally assisted housing totaled 435,000 units or 22 percent of all starts in 1977.

Even though most housing is conventionally financed and developed without direct Federal assistance, the Federal Government's influence on housing is significant and its role in promoting energy conservation can be important. Whether or not energy conservation is made a priority concern, Federal housing programs and policies affect residential energy conservation. In assisting in the development, maintenance, and financing of housing, the Federal Government is in a position to influence directly and indirectly the thermal characteristics of a significant portion of the existing housing inventory and plans for new construction.

In terms of reducing energy consumption, the Federal Government has an opportunity not only to promote energy conservation through requiring high thermal standards for newly constructed federally assisted housing or by retrofitting existing structures in which HUD has an interest, but it can also promote the adoption of energy conservation standards in State building codes and encourage mortgage lenders and secondary market mortgage purchasers to consider energy costs and the energy conservation characteristics of residential properties they finance. These latter activities could have a larger impact on the housing sector than many more direct Federal housing support activities. But as the following examination of agencies and programs indicates, conservation may be given inadequate priority in Federal programs and in funding decisions.

**Table 67.—New Privately Owned and Publicly Owned Housing Units Started, Including Farm Housing, 1977 (in thousands)**

	Total	Type of structure				Inside SMSAS	Outside SMAS
		1 unit	2 units	3 to 4 units	5 units or more		
Total .....	1,990	1,452	61	61	415	1,378	612
Privately owned.	1,987	1,451	61	61	414	1,377	610
Publicly owned .	3	1	—	—	1	1	2

NOTE: Figures may not total due to rounding.  
SOURCE: HUD Office of Housing Statistics.

**Table 68.—New Privately Owned Housing Units Started by Type of Financing 1977 (in thousands)**

Number of housing units	Number	Percent of total starts	Percent
FHA		FHA .....	9
Homes .....	100	VA .....	7
Projects .....	78	Total FHA & VA .....	16
VA .....	131	Other .....	84
Total FHA & VA .....	309		
Other .....	1,678		
Total .....	1,987		

SOURCE: HUD Office of Housing Statistics.

## DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

The Housing and Urban Development Act of September 9, 1965, established HUD. It is the principal Federal agency responsible for programs concerned with housing needs and improving and developing the Nation's communities. It operates programs in all parts of the country except that for rural and small-town areas served by FmHA. HUD administers a variety of housing programs, including mortgage insurance programs for private lenders, rental and homeownership subsidy programs for lower income families, and programs to improve the availability of mortgage credit and policy research support programs. Local development activities are assisted by the community development block grant program. Through its promulgation of minimum property standards, HUD sets construction standards for all HUD-assisted, VA-guaranteed, and FmHA-assisted housing.

HUD operates through a field structure of 10 regional offices and 82 field offices including 39 area offices.

The Assistant Secretary for Neighborhoods, Voluntary Associations, and Consumer Protection is the Department's principal energy conservation officer. An Office of Energy Conservation has been established. Energy conserva-

tion does not appear to be a priority departmental concern and the role of the Energy Conservation Office is limited. Individual programs have established policies toward energy conservation but the Department has no overall policy or consistent priority for meeting conservation goals.

The Senate, Banking, Housing, and Urban Affairs Committee and the House Banking, Currency, and Housing Committee handle HUD's legislation.

The most important HUD programs are reviewed below. Housing programs designed to benefit low- and moderate-income families are discussed first. Subsequent sections discuss the principal mortgage insurance programs and other types of HUD programs with energy conservation potential. Each program's conservation policy is described, and its level of activity noted.

### Housing Programs Directed to Low- and Moderate-Income Families

#### LOW-RENT PUBLIC HOUSING

This program provides financial and technical assistance to local public housing agencies

(PHAs) to develop, own, and operate low-income housing projects. Projects are financed through the sale of tax-exempt local obligations that are guaranteed by the Federal Government. HUD provides annual contributions to pay the debt service of PHA obligations so as to assure low rents and maintain adequate services and reserve funds. Rents, based on the residents' ability to pay (25 percent of adjusted gross income), contribute to the cost of managing and operating the housing.

Additional public housing can be developed by PHAs acting as the developer, by private developers under the "turn key" program, or through acquisition and rehabilitation of existing housing.

Two related programs—modernization and operating subsidies—provide financial support to the existing public housing inventory.

Under the modernization program, HUD finances capital improvements in public housing projects to upgrade living conditions, correct physical deficiencies, and achieve operating efficiencies and economies. The development cost is amortized through annual Federal contributions toward the debt service. In addition, the National Energy Act authorized a special program to finance the cost of energy-conserving improvements for public housing.

HUD also provides operating subsidies to help PHAs maintain and operate their projects, retain minimum operating reserves, and offset certain operating deficits. The operating subsidies are based on the Performance Funding System, a formula designed to calculate operating subsidies based on what it costs a well-managed PHA to operate its units.

**Program Activity.**—As of December 1977, more than 4,000 localities had public housing programs; 1,187,693 units were available for occupancy, of which about 25 percent were designated for the elderly. In 1977, an additional 6,229 units were made available for occupancy, and 6,321 were placed under construction or rehabilitation.

In FY 1978, some 800 PHAs were expected to participate in the modernization program, \$42.6 million in contract authority was allocated to finance capital costs of \$475 million.

In FY 1978, \$685 million was appropriated for operating subsidies.

**Authorization.**—U.S. Housing Act of 1937 (Public Law 75-412) as amended.

## SECTION 8 LOW-INCOME RENTAL ASSISTANCE

This program, which is HUD's main assisted-housing program, makes rental subsidies available to help lower income families rent standard privately owned housing. Eligible families must earn less than 80 percent of the median income for the area. Thirty percent of the families assisted must earn less than so percent of the median income for the area.

The program makes up the difference between what a lower income household can afford (no more than 25 percent of adjusted gross income) and the fair market rent for an adequate housing unit. Housing thus subsidized must meet certain standards of safety and sanitation, and rents for these units must fall within the range of fair market rents as determined by HUD. This form of rental assistance may be used in existing housing or newly constructed or substantially rehabilitated units. Project sponsors may be private owners, profit-motivated, nonprofit or cooperative organizations, public housing agencies, and State housing finance agencies.

Local PHAs administer the existing housing program. They certify eligible tenants, inspect the units proposed for subsidy, and contract for payment with landlords whose units have been approved. Proposals for new construction or substantial rehabilitation are submitted for approval to HUD or State housing finance agencies.

**Program Activity.**—Through December 1977, reservations had been established for 982,439 units. As of that time, 25,636 new units, 4,341 rehabilitated units, and 327,797 existing units were occupied. A significant portion of program funds were being used to assist families living in HUD-financed projects that have been reacquired or assigned to HUD or are in financial difficulty.

**Authorization.**—Section 8 of the U.S. Housing Act of 1937 (Public Law 73-379) as amended

by the Housing and Community Development Act of 1974 (Public Law 93-383).

#### **SECTION 236 RENTAL AND COOPERATIVE HOUSING ASSISTANCE FOR LOWER INCOME FAMILIES**

The section 236 program provides mortgage insurance and interest subsidies to lenders to reduce the rent that lower income households pay for housing. No additional commitments are now being made under the program. Under section 236, HUD insures mortgages and makes monthly payments to lenders on behalf of project owners to reduce mortgage interest costs to as low as 1 percent. The amount of subsidy provided is based on the income of the occupants. Projects are developed by nonprofit, limited-dividend, or cooperative organizations. In 1974 HUD began to pay additional subsidies to cover the differences between the tenants' contribution and the actual costs of operating the projects.

**Program Activity.**—In 1977, 561 units were insured. The program has financed more than 393,000 units since its inception.

**Authorization.**—Section 236 of the National Housing Act (1934) (Public Law 73-479) as amended by section 201 of the Housing and Urban Development Act of 1968 (Public Law 90-448).

#### **SECTION 202 DIRECT LOANS FOR ELDERLY AND HANDICAPPED HOUSING**

The section 202 program for the elderly and handicapped provides long-term direct loans to eligible, private, nonprofit sponsors to finance rental or cooperative housing facilities for elderly and handicapped persons. The interest rate is based on the average rate paid on Federal obligations during the preceding fiscal year. A minimum of 20 percent of the section 202 units must also be assisted by the section 8 program.

A household of one or more persons, the head of which is at least 62 years old or handicapped, is eligible to live in section 202 projects.

**Program Activities.**—In 1977, reservations for 32,801 units were made and projects involving 10,322 were started.

**Authorization.**—Section 202 of the Housing Act of 1959 (Public Law 86-372).

#### **SECTION 312 REHABILITATION LOANS**

The section 312 program provides rehabilitation loans in federally aided community development block grant, urban homesteading, and neighborhood strategy areas. The program makes available direct Federal loans to finance the rehabilitation of residential, mixed-use, and nonresidential properties. A loan may be used to insulate or weatherize properties. Loans may not exceed \$27,000 per dwelling unit or \$50,000 for nonresidential properties. The interest rate is 3 percent except for families whose income is above 80 percent of the median family income when the rate is tied to the Treasury borrowing rate. The loan term is for a period up to 20 years or three-fourths of the property's remaining useful life. The applicant must evidence the capacity to repay the loan and be unable to secure necessary financing from other sources on comparable terms and conditions. Preference is given to low- and moderate-income applicants.

**Program Activity.**—Through December 1977, \$430 million of rehabilitation loans involving 80,327 units had been approved. In 1977 alone, 5,787 loans were made, involving 7,942 units with a total loan amount of \$65.3 million.

**Authorization.**—Section 312 of the Housing and Urban Development Act of 1964 (Public Law 88-560).

#### **SECTION 235 HOMEOWNERSHIP ASSISTANCE FOR LOW- AND MODERATE-INCOME FAMILIES**

The section 235 program provides mortgage insurance and interest subsidies to lenders. HUD insures mortgages and makes monthly payments to lenders on behalf of low- and moderate-income homebuyers to reduce their mortgage interest costs to as low as 4 percent. The program originally enacted in 1968 was significantly revised in 1975.

The homeowner must contribute 20 percent of his adjusted gross income to the monthly mortgage payments and must make a downpayment of 3 percent of the cost of acquisition. The income limit for initial occupancy is 95 percent of the area median income. Mort-

gage limits are \$32,000 (\$38,000 for homes for five or more persons) and in high-cost areas \$38,000 (\$44,000 for homes for five or more persons).

**Program Activity.** — In 1977, 6,485 loans were insured for a total value of \$174 million. The program has financed nearly 485,000 units.

**Authorization.** — Section 235 of the National Housing Act (1934) (Public Law 73-479) as amended by section 101 of the Housing and Urban Development Act of 1968 (Public Law 90-448).

### Conservation Policies and Opportunities

Legislation enacted in 1978 and changes in program policies have made energy conservation a more important policy concern in assisted housing programs than it had been previously. Recent legislative changes and the conservation policies of the different programs are discussed below.

The 1978 National Energy Conservation Policy Act and the Housing and Community Development Amendments of 1978 enacted important new energy conservation authorities and funding. In the Housing and Community Development Amendments the Secretary of HUD is encouraged to promote cost-effective and economically feasible solar energy systems in housing assisted through sections 8, 312, and 202. The Secretary is also directed to promote cost-effective and economically feasible solar energy installations in residential housing in general, taking into account the interests of the low-income homeowners and renters. The Act requires that section 312 financed improvements and section 8 substantial rehabilitation projects meet cost-effective energy conservation standards. The National Energy Conservation Policy Act included several provisions that affect assisted housing. A \$10 million authorization of contract authority specifically for the purchase and installation of energy conservation improvements was authorized. A \$25 million grant program was authorized to finance conservation improvements for sections 236, 221(d)(3), and 202 projects that are in financial difficulty as a result of energy costs. The law requires that the sav-

ings resulting from the grants must either benefit tenants in the form of reduced rent or reduced Federal operating subsidies.

HUD has an opportunity to influence energy conservation in assisted housing in two general ways: as a part of the approval of the plans and specifications of new construction or substantial rehabilitation projects and, once the housing is built, in conjunction with the provision of annual subsidies that maintain the low- and moderate-income character of the housing. Because of the manner in which the program functions, the opportunities to promote conservation in the section 312 program are more limited and are explained below.

All assisted housing programs have similar policies governing the inclusion of energy-savings improvements in new construction or substantially rehabilitated projects with the exception of the section 312 loan programs. All newly developed assisted housing must conform to HUD's minimum property standards (MPS) Improvements financed by section 312 loans must conform to local building code requirements. The conservation requirements of the MPS have been raised periodically and will be made more stringent as a result of the future adoption of the building energy performance standards. The upgrading of the MPS may increase the capital costs of new projects, which will over the short-run increase the amount of Federal subsidies required. Over the long run, however, the energy savings that will result from improved thermal performance will decrease Federal subsidy requirements.

The opportunities for improving conservation activities and saving energy in existing housing are significant. HUD policies related to conservation are in the process of being upgraded. Some of the specific policies and issues are reviewed on a program by program basis.

### PUBLIC HOUSING

Concern for energy conservation in the management of public housing projects has been a distinct and often stated HUD policy. Conservation improvements for existing projects can be financed through the modernization program, and conservation has been identified as



one of five areas for priority funding. The extent to which modernization funds are used for conservation is not known but it appears that significant numbers of projects involve some conservation activities. Some PHAs have funded conservation projects out of their own surplus funds without looking to HUD for special funding but few PHAs have significant surplus reserves and most must rely on HUD for funds to make conservation improvements. The energy efficiency of the public housing inventory is not known but because of historic construction cost limitations and the age of the housing stock it can be assumed that a large portion of public housing is not energy efficient. Recently HUD has encouraged PHAs to install individual utility meters in projects if it was judged cost effective.

HUD has proposed new regulations that would expand and extend energy conservation efforts in public housing and involve PHAs in systematic conservation programs. All PHAs would be required to conduct energy audits of their projects within 3 years. Based on the audits, PHAs would have to establish a list of conservation improvements ranked by their degree of cost effectiveness and to make improvement decisions based on the priority ranking. The scope of the audits would have to cover an assessment of certain specialized types of improvements. The regulations would require PHAs to buy appliances with the highest energy efficiency, thermostats would have to be set at no more than 750 F, water heaters would have to be set at 1200 F, and individual utility check meters would have to be installed unless other actions were considered more cost effective.

Adoption of these requirements could result in significant energy savings. PHAs currently spend \$400 million for utilities and the increase in the cost of utilities has been a major factor in the large operating losses sustained in public housing.

Prior to the development of these regulations, HUD and PHAs had not established energy conservation standards and goals. PHAs had been encouraged to include conservation projects in their modernization activities but there was no HUD review of conservation

practices. Increased utility expenses were simply funded by the operating subsidies program. Operating subsidy funding decisions were not reviewed in order to determine how outlays could be reduced by making cost effective conservation improvements to projects.

The conservation potential in public housing is large for a number of reasons. Many projects are not now energy efficient. The information chain between HUD and PHAs is relatively short. Information can be easily distributed through established communication channels. Financing is a relatively modest problem. The modernization program could become primarily an energy conservation program through administrative action.

The operating subsidies program could be reoriented to give greater consideration to energy conservation. The performance funding system, the formula used to allocate operating subsidies, could be revised to provide incentives for conservation. Operating data could be reviewed to provide a clearer picture of the energy conservation potential of particular projects. Incentives could be created for PHAs to encourage them to give energy conservation more attention and priority.

#### SECTION 8, SECTION 202, AND SECTION 236 PROJECTS

These projects are largely owned by private nonprofit or limited dividend-for-profit corporations. Because of debt service payments and operating cost requirements owners have very limited cash flow or reserve funds available to finance energy conservation improvements. Most sponsors are unwilling to increase their equity in projects even if the investment will result in reducing operating costs. Although the relationship between HUD and these private housing owners is not as direct as with public housing agencies, owners should be sensitized and encouraged to make conservation improvements.

Motivating owners to retrofit their projects may be difficult. Project owners may not have an incentive to make conservation improvements because many have little investment or personal interest in the projects. Because util-

ities in many projects are paid by the tenants, owners have no financial incentive to invest in conservation improvements.

HUD might use its authority to approve rent increases to get owners to make conservation improvements. The extent to which proposed increases in rent represent utility cost increases could be ascertained and, in situations where improvements would be cost effective, such improvements could be required as a condition of the rent increase. A similar requirement might be made as a condition of receiving section 236 operating subsidies. In granting operating subsidies HUD does not evaluate the energy efficiency of projects nor determine the impact of energy costs on operating costs. Prior to 1978 there was no funding available to finance such improvements but the National Energy Conservation Policy Act authorized a grant program to assist section 236 and section 202 projects, and loans for conservation improvements, solar energy systems, and installation of individual utility meters can be insured under section 241 of the National Housing Act.

Although HUD requires reserves for capital improvements in properties with HUD income mortgages, and those reserve funds might, in some cases, represent a source to cover conservation capital expenditures, that resource has limited potential. Many projects are in financial difficulty and many do not have adequate reserves. Applying stringent policies about making conservation improvements could increase the cash flow problems of projects and could bring about increased mortgage defaults and foreclosures.

In the section 8 existing housing program, HUD does not evaluate the energy efficiency of the units occupied by program beneficiaries. Assistance is calculated based on prototype utility costs and fair market rent determinations. As a result, actual energy costs are not considered in approving units and determining subsidy payments in the program. Although it would pose many administrative problems, the section 8 housing standard could be modified to require consideration of the energy characteristics of units eligible for assistance or consideration of the actual costs of utilities.

Recently proposed regulations would encourage PHAs to provide technical assistance, work writeups, and cost estimates to landlords participating in the section 8 existing program to help them determine what energy savings improvements would be cost effective.

Proposed regulations for the section 8 moderate rehabilitation program would allow owners to make conservation improvements such as installing storm windows and storm doors as long as the improvements are judged cost effective over the 15-year term of the subsidy contract.

Because virtually all section 202 elderly projects are on a sound financial footing and owned by experienced church and union sponsors, retrofitting existing projects offers an excellent opportunity for saving energy. The area of prime potential for unrealized conservation measures in this program relates to projects built before 1973 when thermal standards were lower. Separate financing might be required to enable sponsors to make conservation improvements, but given the nature of the tenant group and the financial sources of these projects, such financing, especially if backed by a Government guarantee, should be readily available.

#### SECTION 312 REHABILITATION LOANS

Borrowers can make conservation improvements with proceeds from section 312 rehabilitation loans. The program has not specifically promoted conservation but consideration is being given to establishing energy conservation guidelines. Since properties assisted through section 312 must be brought up to local code standards, the effectiveness of the program in terms of saving energy could be improved by the upgrading of local energy conservation codes. Since most loans go to low- and moderate-income property owners there are tradeoffs that have to be made in establishing standards between additional energy saving and the ability of property owners to afford the extra costs.

#### SECTION 235 HOMES

No special conservation policies or opportunities have been identified for the section 235

homeownership program beyond those relating to acquired property disposition and those which would result from changes to the MPS.

### Mortgage and Home Improvement Insurance Programs

#### SECTION 203(b) AND (i) ONE- TO FOUR-FAMILY HOME MORTGAGE INSURANCE

The section 203(b) and (i) program provides mortgage insurance to lenders for loans to finance the purchase, construction, or rehabilitation of one- to four-family properties — up to 97 percent of the property value up to \$25,000 and 95 percent for the value in excess of \$25,000—for terms up to 30 years. The loans may finance homes in both urban and rural areas (except farms). The maximum mortgage loan on a single-family home is \$60,000.

**Program Activity.**— In 1977, 42,760 new construction and 241,504 existing home loans were insured for a total value of \$7.7 billion.

**Authorization.**— Section 203(b) and (i) of the National Housing Act (1934) (Public Law 73-479).

#### SECTION 221(d)(2) HOMEOWNERSHIP ASSISTANCE FOR LOW- AND MODERATE-INCOME FAMILIES

The section 221 (d)(2) program provides mortgage insurance to lenders for loans to finance the purchase, construction, or rehabilitation of low-cost, one- to four-family housing. The maximum insurable loan for an owner occupant is \$31,000 for a single-family home (up to \$36,000 in a high-cost area). For a large-family home \$36,000 (or up to \$42,000 in a high-cost area) is the maximum insurable loan. Higher mortgage limits apply to two- to four-family housing. A downpayment of 3 percent is required, and mortgage terms are for up to 30 years.

**Program Activity.**— In 1977, 1,039 new construction and 33,594 existing units were insured for a total value of \$736.2 million.

**Authorization.**— National Housing Act (1934) (Public Law 73-479) as amended by section 123 and section 221(d)(2) of the Housing Act of 1954 (Public Law 83-560).

#### SECTION 233 EXPERIMENTAL HOUSING PROGRAM

The section 233 program provides insurance for experimental single-family and multifamily projects involving unconventional housing systems or subsystems without the requirements that they adhere to normal HUD-FHA processing and MPS requirements. The program is intended to assist in lowering housing costs and improving housing standards, quality, livability, or durability of neighborhood design through the use of experimental technology or experimental property standards. The rationale for the program is to develop experience with a concept before the concept is written into the MPS. Occasionally, cases being considered by FmHA or VA that cannot be approved under their procedures are referred to the section 233 program for final action. No example of this procedure being used to facilitate processing of energy-conservation-oriented loans has been identified.

**Program Activity.**—Through September 1977, \$8 million in insurance on single-family housing had been issued, and \$97 million in insurance on multifamily projects had been issued. In 1977, 14 single-family loans were insured at a total value of \$399,300. No multifamily projects were insured in 1977.

#### SECTION 207 MULTIFAMILY RENTAL HOUSING

The section 207 program provides mortgage insurance to lenders for loans to finance the construction or rehabilitation of multifamily rental housing (eight or more units) by private or public developers. The housing project must be located in an area approved by HUD for rental housing and in which market conditions show a need for such housing. The mortgage cannot exceed the lesser of 90 percent of value or unit-size cost limitations. The mortgage term is limited to 40 years.

**Program Activity.**— In 1977, 2,884 units were insured at a value of \$49 million.

**Authorization.**— Section 207 of the National Housing Act (1934) (Public Law 73-479).

### **SECTION 221(d)(3) AND (4) MULTIFAMILY RENTAL HOUSING FOR LOW- AND MODERATE-INCOME FAMILIES**

This program provides mortgage insurance to lenders for loans to finance the construction or rehabilitation of multifamily (5 or more units) rental or cooperative housing for low- and moderate-income or displaced families. The insured mortgage amounts are controlled by statutory dollar limits per unit, which are intended to insure moderate construction costs. Section 221(d)(3) mortgages may be obtained by public agencies, nonprofit, limited-dividend, or cooperative organizations. Section 221(d)(4) mortgages are limited to profit-motivated sponsors. Under section 221(d)(3), HUD may insure 100 percent of total project cost for cooperative and nonprofit mortgages, but it may insure only 90 percent under section 221(d)(4) irrespective of the type of mortgage.

The National Energy Conservation Policy Act authorizes a grant program to finance the cost of energy-conserving improvements in section 221(d)(3) projects.

**Program Activity.**— In 1977, 70,809 units were insured for a total value of \$1.57 billion.

**Authorization.** — Section 221(d)(3) and (4) of the National Housing Act (1934) (Public Law 73-479) as amended by the Housing Act of 1954 (Public Law 83-560).

### **SECTION 223(e) HOUSING IN DECLINING NEIGHBORHOODS**

The section 223(e) program provides mortgage insurance to lenders for loans to finance the purchase, construction, or rehabilitation of housing in older, declining, but still viable urban areas where conditions are such that normal requirements for mortgage insurance cannot be met. The terms of the loans vary according to the HUD/FHA program under which the mortgage is insured, but the loan must be an acceptable risk.

**Program Activity.**— In 1977, 8,511 loans were insured under this authority.

**Authorization.** —Section 223(e) of the National Housing Act (1934) (Public Law 73-479) as amended by section 103(a) of the Housing

and Urban Development Act of 1968 (Public Law 90-448).

### **TITLE I HOME IMPROVEMENT AND MOBILE HOME LOAN PROGRAM**

The title I home improvement and mobile home loan program provides co-insurance to lenders for loans to finance major and minor improvements, alterations, and repairs of individual homes, nonresidential structures, and mobile homes.

Title I loans may be made in amounts up to \$15,000 for a term of up to 15 years at an interest rate not to exceed 12 percent. Loans of less than \$7,500 are generally unsecured personal loans. Under the program HUD reimburses lenders for 90 percent of any loss under the program.

Under title 1, mobile home loans may be made in amounts up to \$16,000 and 12 years on single-module units and up to \$24,000 and 15 years for double-module units at any interest rate up to 12 percent.

**Program Activity.**— More than 32 million loans, of which more than 60,000 are mobile home loans, for a value of over \$26 billion, have been insured under the program since its inception. Program activity in 1977 was 345,579 loans with a value of \$1,341 million.

**Authorization.** — Section 2, title I of the National Housing Act (1934) (Public Law 73-479) as amended by the Housing Act of 1956 (Public Law 84-1020).

### **Conservation Policies and Opportunities**

Conservation efforts in HUD mortgage insurance programs occur primarily through the requirements imposed by HUD's MPS (in the case of new construction) and standards of accepted practice (in the case of existing buildings). These standards are implemented through the relationships among area office staff, lenders, and applicants for mortgage insurance. Field staff are sensitized to conservation measures through formalized training of technical personnel (architects and engineers) who interact with the field representatives and applicants. An applicant who wants to incorporate a novel or first-cost intensive system in

new construction can generally secure a full hearing for his case before local office personnel. If his costs are higher than those generally accepted for the kind of structure in that particular area, he will be persuaded to modify his approach to conform to accepted costs. [f his approach involves a system or a technique not provided for in the MPS, he may elect preferential processing under the experimental program (section 233 described above).

It is difficult to evaluate the impact the title I home improvement loan program has on energy conservation since this activity is administered primarily by lending institutions with HUD-FHA carrying out postaudits of insurance claims. Although the written instructions to the lending institutions are broad enough to allow practically any kind of conservation loan, no specific attempt is made to generate loans for conservation purposes. Further, there appears to be no effort to determine whether such loans are being made, and if so, what problems might exist. The 1974 Housing and Urban Development Act specifically authorized title I to insure loans for energy conservation improvements. The MPS do not apply to title I loans but HUD has specified standards for solar energy installations. The National Energy Conservation Policy Act authorizes Federal secondary market institutions to buy and sell title I loans that financed energy conservation improvements.

The National Energy Conservation Policy Act has increased the opportunity for insuring homes and multifamily projects with solar energy systems. Section 248 of the act authorizes HUD to increase the size of insured loans under sections 203 and 207 by up to 20 percent due to increased costs for the installation of solar energy systems.

The dissemination of conservation information by HUD to the portion of the housing market that relies on HUD mortgage insurance appears potentially effective, despite the number of participants involved, because of the large number of HUD area offices, the regular contacts that owners and the housing industry have with HUD staff and the variety of HUD publications going to the different parts of the housing industry. These channels, however, do

not seem to be used as aggressively as they might be for transmitting information on conservation techniques and opportunities.

## Other HUD Programs

### COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM

The community development block grant program (CDBG) makes available block grants to local governments to fund a wide range of community development activities. Metropolitan areas—generally cities over 50,000 population—and qualified urban counties—those with populations in excess of 200,000—are guaranteed an annual grant or “entitlement” based on needs. Smaller communities compete for the remaining “discretionary” funds. Spending priorities are determined at the local level, but the law enumerates general objectives that the block grants are designed to fulfill, including the provision of adequate housing, a suitable living environment, and expanded economic opportunities for lower income groups. Grant recipients are required to estimate their lower income housing needs and address them in the overall community development plan they submit.

Funds may be used to finance or subsidize housing improvement and rehabilitation. CDBG rehabilitation assistance is provided in a variety of forms, including direct loans, loan guarantees to private lenders, interest subsidies, and loan writedowns to reduce the size of privately made loans.

**Program Activity.**—Under the program \$10.95 billion was authorized for FY 1978-80. The FY 1978 appropriation was \$3.6 billion, and some 3,200 local governments received grants, of which 1,300 received entitlement grants. The amount of funds earmarked for rehabilitation was estimated at \$418 million in FY 1977, and about 1,500 communities expected to have rehabilitation programs.

**Authorization.**—Title 1 of the Housing and Urban Development Act of 1974 (Public Law 93-383) as amended by the Housing and Urban Development Act of 1977 (Public Law 95-128).

## ACQUIRED PROPERTY MANAGEMENT AND DISPOSITION

In the course of its activities, HUD acquires title to many properties it insured or assisted because of mortgage defaults by property owners. HUD's policy is to liquidate properties in such a manner as to assure the maximum return to the mortgage insurance funds existent with the need to preserve and maintain residential areas and communities.

**Program Activities.**—At the end of FY 1978 it is estimated that HUD will own 63,119 properties of which 25,701 would be houses and 37,418 multifamily units. Total acquisitions for 1978 are estimated at 50,575.

**Authorization.**— Not applicable.

## GNMA GUARANTEED MORTGAGE-BACKED SECURITIES AND SPECIAL ASSISTANCE MORTGAGE PURCHASES

The Government National Mortgage Association (GNMA), a corporate entity within HUD, was originally established to provide a secondary market for federally insured residential mortgages not readily salable in the private market. These mortgages generally financed housing for special groups or in areas of special needs. Prior to September 1, 1968, GNMA's functions were carried out by the Federal National Mortgage Association (FNMA).

More recently GNMA was authorized to purchase both federally insured and conventional mortgages at below-market interest rates to stimulate lagging housing production. These mortgages are then resold at current market prices, with the Government absorbing the loss as a subsidy under the "tandem" plan. HUD-, FNMA-, or Federal Home Loan Mortgage Corporation (FHLMC)-approved lenders may apply to sell mortgages to GNMA.

Twenty-five special assistance programs have been implemented since 1954. Between January 1974 and September 1977 GNMA issued \$20.5 billion in commitments to purchase below-market interest rate mortgages.

GNMA also guarantees the timely payment of principal and interest to holders of securities issued by private lenders and backed by pools of HUD-insured and VA-guaranteed

mortgages. The guarantee is backed by the full faith and credit of the U.S. Government. Applicants must be FHA-approved mortgagees in good standing and generally have a net worth in excess of \$100,000.

**Program Activity.**—GNMA guaranteed more than \$152 billion in mortgage-backed, pass-through securities in FY 1978. In FY 1978 it made tandem commitments of \$2.1 billion.

**Authorization.**— Tandem plan activities were authorized by the Housing and Urban Development Act of 1968 and 1969 (Public Law 90-488 and 91-1 52), the Housing and Community Development Act of 1974 (Public Law 93-838), the Emergency Home Purchase Act of 1974 (Public Law 93-449), the Emergency Housing Act of 1975 (Public Law 94-50), and the Housing Authorization Act of 1977 (Public Law 95-1 28). GNMA's guarantee authority is authorized by the Housing and Urban Development Act of 1968 (Public Law 90-44).

## RESEARCH AND DEMONSTRATION PROJECTS

**Solar Heating and Cooling Demonstration.**—As part of the national solar energy program administered by the Department of Energy (DOE), HUD is responsible for a demonstration of the practical application of solar energy in residential heating and cooling. The program includes 1) residential demonstrations in which solar equipment is installed in both new and existing dwellings, 2) development of performance criteria and certification procedures for solar heating and cooling demonstrations, 3) market development to encourage acceptance of solar technologies by the housing industry, and 4) data gathering and dissemination of demonstrations and market development efforts.

**Program Activity.**—As of December 1977 the first four of five funding cycles have been completed. A total of 325 grants valued at \$13.5 million, involving 6,924 dwelling units, had been made.

**Authorization.**— Solar Heating and Cooling Act of 1974 (Public Law 93-409).

**Energy Performance Standards for New Buildings.**—The purpose of this research, managed

by HUD, is to develop energy performance standards for new buildings. It is divided into three phases: an assessment of how much energy buildings are designed to use; an assessment of how much less energy buildings could be designed to use; and the testing and evaluation of standards. For analysis purposes buildings were divided into two major groups — nonresidential buildings, including multifamily homes, and low-rise multifamily housing, and mobile homes.

The work is being carried out by the AIA Research Corporation and its subcontractors.

Data is being collected on 6,254 buildings, which were constructed in 1975 and 1976 in different metropolitan areas.

**Program Activity.**—The Phase I report has been completed. In November 1978, a draft set of standards and regulations and target numbers for different climatic regions were issued by DOE, and HUD issued draft implementation regulations for comment. After public review and comment, standards will be promulgated. Approximately \$10 million has been devoted to standards development.

**Authorization.**—Title III of the Energy Conservation Production Act of 1976 (EC PA) (Public Law 94-385).

#### MINIMUM PROPERTY HOUSING STANDARDS

HUD has established MPS for its programs, which prescribe minimum levels of design and construction. The preamble of the National Housing Act (1934), which established FHA, authorized the agency to promote the upgrading of housing standards. There are MPS for one- to two-family new construction, multifamily new construction, nursing homes, and rehabilitation. The rehabilitation standards are more in the form of guidelines than standards. The MPS are used not only by HUD but by VA and FmHA, except that the latter's standards for insulation differ somewhat from HUD's MPS. (See later section on Housing Standards.) The construction of all mobile homes is governed by HUD's Mobile Home Construction and Safety Standards.

Anyone may suggest modifications to the MPS; important changes are issued for comment through the Federal Register.

**Program Activity.**—Not applicable.

**Authorization.**—National Housing Act (1934) (Public Law 73-279).

#### Conservation Policies and Opportunities

##### COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM

Energy conservation activities are not specifically promoted nor precluded as one of the eligible activities under CDBG. Localities may choose to assist virtually any list of projects, provided there are community improvement activities and are primarily oriented toward helping low- and moderate-income families. Many approaches to energy conservation could be justified under these conditions; the most obvious would be an energy conservation CDBG-funded component tied into a housing rehabilitation or a public housing modernization program. Because individual communities select and design the projects they will undertake, HUD has no easy way of knowing to what extent energy conservation improvements are current] y encouraged.

The use of CDBG funds for conservation improvements in rehabilitation financing programs has been made explicit in draft regulations issued by HUD. The regulations would allow CDBG rehabilitation financing to be used for measures to increase the efficient use of energy in structures through such means as installation of storm windows and doors, siding, wall and attic insulation and conversion, modification or replacement of heating and cooling equipment, including the use of solar energy equipment. The regulations also propose that in considering discretionary grants for new communities, HUD will give some weight to proposals that demonstrate the potential of energy conservation.

The CDBG program could give greater attention to how its funds could be used to save energy. Better coordination of efforts between CDBG and the Community Services Administration's weatherization program could be an effective approach to promoting residential

conservation. The weatherization program could be administered to dovetail with HUD-financed rehabilitation projects, thus meeting particular needs.

Many jurisdictions, especially suburban and small communities, have had little involvement in HUD programs but may be eligible for discretionary CDBG grants. The situation surrounding the planning of an application or expenditure of CDBG funds in such communities may be fluid, and—with encouragement—they might find the promotion of energy conservation in housing worthwhile. In this context, energy conservation would appear to be an ideal activity for the CDBG program to foster.

In larger cities CDBG funds can and frequently do go to agencies or organizations that may be particularly interested in energy conservation. These agencies are frequently neighborhood-oriented, close to citizens, and may be willing to launch energy conservation activities. Such groups could be encouraged to promote conservation. Urban planning activities, now supported by the block grant program, could be directed toward articulating the need for and scope of energy conservation programs.

There appear to be few procedural roadblocks to encouraging conservation in CDBG rehabilitation programs. HUD and local government personnel do not seem to be opposed to an energy efficiency emphasis but need encouragement and greater awareness of the magnitude of the opportunity and potential to use the CDBG program to achieve energy conservation objectives.

#### ACQUIRED PROPERTY MANAGEMENT AND DISPOSITION

Although three Federal agencies (HUD, FmHA, and VA) administer housing acquired due to default on Government-financed mortgages, HUD has the largest inventory consisting of both single- and multi-family units.

HUD and VA closely coordinate their activities in administering and disposing of reacquired properties. Field offices determine whether properties are sold “as is” or rehabili-

tated and then marketed. For those properties that are fully repaired before resale, there are no statutory maximums placed on the dollar amount of improvements allowed per structure. A major goal of HUD, FmHA, and VA, insofar as their reacquired housing inventory is concerned, is to dispose of the units as quickly as possible with the highest dollar return.

In 1978, HUD modified its property disposition policies so that all single-family homes have to include certain energy conservation features, or the purchaser has to agree to add the features to the home as a condition of sale. The only exceptions to the policy are homes scheduled to be demolished, properties sold in conjunction with section 312 financing for rehabilitation by the purchaser, and properties transferred to local governments. Local governments, however, are required to agree that conservation measures will be included in their repair requirements for the homes. HUD required energy-savings features include weatherstripping and caulking as needed, replacement of warped or ill-fitting doors and windows, insulation of the attic, air ducts, and hot water heating pipes, and installation of storm doors and windows in certain climatic zones. If heating or air-conditioning equipment is replaced, proper sized equipment must be selected.

Multifamily properties are not required to conform to a specific conservation standard. Field offices have discretion in determining what should be done or in the case of “as is” sales whether the making of conservation improvements should be a condition of sale.

An energy conservation emphasis by HUD may, in fact, have greater utility in helping prevent mortgage default and housing reacquisition by the Government than in rescuing properties once defaulted. The major area of concern for HUD (and FmHA) revolves around multifamily projects that are heading for but have not yet defaulted and been acquired. A possible first step might be for the agency to review its lists of publicly financed low- and moderate-income housing, using annual reports submitted for the projects as well as audit reports to identify those projects approaching default. Those projects where



energy cost factors are the major financial problem could be identified and targeted for immediate action to improve the energy management situation. While it might or might not be possible to influence tenant attitudes toward saving energy, pinpointing such problem projects could encourage project managers to display a greater conservation consciousness. If escalating energy costs are the prime cause of the financial difficulty and major conservation expenditures are indicated, secondary financing could be made available and the financial problems that led to mortgage default might be lessened or eliminated. This approach may be particularly appropriate for projects using electric heat.

#### GOVERNMENT NATIONAL MORTGAGE CORPORATION

Because all its purchases are federally insured or guaranteed, HUD's MPS determine the energy efficiency of housing financed through GNMA. GNMA would presumably accept whatever increased standards and energy-savings priorities were established by HUD.

The National Energy Conservation Policy Act provides authority to GNMA to purchase title I insured loans made to low- and moderate-income families to finance the installation of solar energy systems. Such loans cannot ex-

ceed \$8,000 and total purchases and commitments cannot exceed \$100 million at any one time. The interest rate can range from a rate that is not less than the average yield on outstanding interest-bearing obligations of the U.S. Government of comparable maturities then forming a part of the public debt to the maximum rate authorized by title 1. The Act also provides standby authority to buy and sell title I or section 241 loans made for the purpose of installing energy-conserving improvements.

#### MINIMUM PROPERTY STANDARDS

Section 526 of the Housing and Community Development Act of 1974 required that—to the maximum extent feasible— HUD promote energy conservation through the MPS. The National Energy Conservation Policy Act required under the Energy Conservation Standards for New Buildings Act of 1976 becomes effective.” The MPS have been upgraded recently. (See section on standards.) HUD believes any upgrading of conservation standards requires a balancing of the need to keep down construction costs and the potential fuel savings that will result from energy conservation improvements, and tends to look with disfavor on additional requirements that might increase the net monthly housing costs of borrowers.

## FARMERS HOME ADMINISTRATION

The Farmers Home Administration of USDA provides housing assistance in open country and rural communities with populations up to 10,000. Its programs are also available in cities of 10,000 to 20,000 population that are outside standard metropolitan statistical area (SMSA) and have a serious lack of mortgage credit as determined by the Secretaries of HUD and USDA. The Federal Housing Act of 1949 gave FmHA authority to make housing loans to farmers; that authority has been broadened to serve other groups over the years.

The programs are administered by county agents through a system of 1,760 county of-

fices in rural areas (usually county seats) nationwide. Unlike HUD, most of FmHA's programs are not dependent on banks or other approved lending institutions. FmHA makes loans directly to families or sponsors using funds secured by issuing Certificates of Beneficial Ownership placed with the Federal Financing Bank. FmHA also has the authority to insure loans made by commercial lenders.

Housing developed under FmHA programs must be modest in size, design, and cost and must meet HUD's MPS.

The Senate Banking, Housing, and Urban Affairs Committee and the House Banking, Cur-

rency, and Housing Committee handle FmHA housing legislation.

#### Section 502 Homeownership Loan Program

The section 502 homeownership loan program provides loan guarantees to private lenders or direct loans to individuals to buy, build, or rehabilitate homes. FmHA guarantees 90 percent of the principal and interest on privately financed housing loans. The maximum repayment period is 33 years. New homes and homes older than 1 year may be financed with 100-percent loans. The interest rate depends on adjusted family income and can vary from 1 to 8 percent. Although there is no maximum amount that an applicant can borrow, the loan is limited by FmHA's requirement that the housing be modest in size, design, and cost and what an eligible family can afford for mortgage payments, taxes, and insurance within 20 percent of its adjusted income.

In addition to the use of "regular" section 502 loans for housing repair, families earning less than \$7,000 annually are eligible for another type of home improvement loan under section 502. Under the 1:2:4 program a family can borrow up to \$7,000 over a period of 25 years at an interest rate of 1 to 4 percent depending on family income for improvements that would bring its home up to standard conditions.

**Program Activity.**— In 1977, 121,614 loans were made with a total value of \$2,678 million.

**Authorization.**—Title V of the Housing Act of 1949 (Public Law 81-171) as amended.

#### Section 504 Home Repair Loan and Grant Programs

The section 504 home repair program provides loans and grants to low-income homeowners with grants restricted to the elderly to remove certain dangers to their health and safety. An applicant must lack the income necessary to repay a FmHA section 502 loan and must own and occupy a home that has conditions hazardous to health and safety. All loans are made at an interest rate of 1 percent. Loan terms vary from 10 to 20 years depending

on the amount. Loans cannot exceed \$5,000. Loans of less than \$2,500 need only be evidenced by a promissory note. A combination loan grant is made to applicants if they can repay only part of the cost; if the applicant cannot repay any of the cost a 100-percent grant is made.

**Program Activity.**—During 1977, 3,843 loans were made at a value of \$9.1 million.

**Authorization.**—Title V of the Housing Act of 1949 (Public Law 81-171) as amended.

#### Section 515 Rural Rent and Cooperative Housing Loans

The section 515 program provides loans to private, public, or nonprofit groups or individuals to provide rental or cooperative housing of economic design for low- and moderate-income families and the elderly. Funds may be used to construct new housing, purchase new or existing housing, or repair existing housing for rental purposes. The interest rate on loans varies from 1 percent to the FmHA market rate, depending on the housing sponsor and the incomes of the occupants. Loans up to 50 years are made to elderly projects; for all other projects the term is up to 40 years. Section 8 assistance provided by HUD can be used in conjunction with section 515 projects.

**Program Activity.**— In 1977, 1,509 loans were made with a value of \$647 million.

**Authorization.**—Title V of the Housing Act of 1949 (Public Law 81-171) as amended.

### Conservation Policies and Opportunities

The FmHA loan programs have no specific energy conservation goals. They rely on conservation measures that may be integrated into HUD's MPS. Innovative approaches are discouraged in the new construction programs. As with solar applications, any measure requiring capital costs out of the ordinary must be separately financed and requires special review and approval from Washington.

The National Energy Conservation Policy Act requires the Secretary of Agriculture to promote the use of energy saving techniques to the maximum extent feasible. Such standards should be consistent as far as practical with the HUD standards and be implemented as soon as possible.

The FmHA section 504 program (grants and low-interest loans for modifications to existing housing) has made an effort to promote the weatherizing of single-family homes generally wherever local community action agencies have been aware of FmHA's program.

Housing assistance of FmHA is very personalized. FmHA, unlike HUD, is decentralized down to the county level. Applicants always meet directly with the FmHA county agent and continue that relationship throughout the life of the loan. The county agent inspects construction in progress and manages the loan payment process. County agents have relatively complete authority, provided they deal with conventional building systems and techniques. On the other hand, the agents are not technically expert in housing, and agency resources are limited. FmHA usually has only one architect per State office. Several State offices, in fact, cover more than one State, further reducing the technical attention that can be given to individual projects.

Because of the rural nature of the program, there is heavy reliance on electric heat so that energy costs are an important concern. However, FmHA does not actively promote certain kinds of buildings or utility systems. FmHA reacts to what is proposed by builders, many of whom previously built single-family homes only.

Most FmHA financing is direct Government lending, sometimes at a subsidized interest rate. Conservation measures that exceed normal construction costs will therefore represent an additional cost to the Government in the latter case. FmHA rental projects typically have only one-third the number of units of a typical urban project, so larger apartment builders and architects are not attracted to the program and technical resources may be limited.

Several steps could be taken to make housing built through FmHA more energy-efficient. A much closer utility cost analysis could be required of every rental project applicant to assure that all feasible energy options are considered. Although FmHA has issued new insulation thermal efficiency standards, the Washington-level system for handling novel energy conservation questions and for simplified and sympathetic processing of such applications does not appear to have generally penetrated to the field level within the agency. Field staff could be encouraged to combine single-family loans and grants (section 504) with the weatherization grants administered by local poverty programs. The importance of energy conservation could be more actively promoted by FmHA. The county agents could be provided with more extensive information on conservation opportunities and given more extensive technical support.

The FmHA State and county personnel appear to be diligent and service-oriented and will respond to Government policy that encourages conservation if authority and direction are given. The message on energy conservation has so far been muted and very unclear, with the exception of the recently published thermal efficiency standards for insulation.

## VETERANS ADMINISTRATION

The Veterans Administration provides a variety of benefits to veterans and their dependents, including housing financing assistance on more liberal terms than is available to the non-veteran. The assistance is in the form of loan guarantees to private lenders. Where private capital is not available direct loans are made. The VA uses HUD's MPS in evaluating properties.

The VA operates through 49 regional offices.

In the Senate and House, the Veterans Affairs Committees handle VA housing legislation.

### VA Loan Guarantee and Direct Loan Programs

The Veterans Administration provides loan guarantees to private lenders and direct loans to veterans to finance the purchase, construction, or rehabilitation of homes, mobile homes, or condominiums. One- to four-unit owner-occupied properties are eligible for assistance. The maximum guarantee is \$17,500 or 60 percent of appraised value, whichever is less. There are no limits on the value of properties that can be guaranteed. No downpayment is required and loans up to 30 years are eligible under the guarantee.

**Program Activity.**— In 1977, 392,557 guarantee commitments were issued with a total value of \$13.9 billion. In addition 2,566 direct loans were made for a total amount of \$63.2 million. Of the total program activity 369,024 involved home purchases, 12,206 refinancing, 2,638 condominiums, 3,459 mobile homes, and 5,230 direct loans sold and guaranteed.

**Authorization.**— Servicemen's Readjustment Act of 1944 as amended, title 30 U.S.C. 1, chapter 37.

### Conservation Policies and Opportunities

The Veterans Administration has no formal system for promoting energy conservation in its home loan guarantee program. VA follows HUD's MPS in approving loans for new con-

struction. Existing properties are approved on the basis of "value." There is no statutory limit on the value of structures the agency will guarantee, but energy-conserving improvements will not be recognized if those costs exceed the appraiser's notion of the "value" of the structure. As the VA operates its program through "approved lenders," (commercial banks and mortgage lending institutions), the first consideration is the "approved lender's" policies. If the lender is liberally inclined toward financing a house that includes extra costs due to energy conservation equipment or materials not fully recognized in the appraisal, the lender must then be willing to seek VA approval of the particular case. The VA may then review the appraiser's statement of "value," and the questionable costs may be included with in the mortgage. However, this is relatively difficult because the VA housing program is too thinly staffed for the case-by-case personalized attention this approach requires.

As far as new construction is concerned, VA follows HUD's MPS; therefore, any initiative or the raising of energy efficiency requirements in this area is up to HUD.

In the existing home market, the determinations of value are largely made by fee appraisers — local real estate personnel who are not Government employees. Reaching such a large group concerning energy conservation and influencing their thinking may be best accomplished through the appraisal or professional organizations and through HUD channels, as these appraisers usually do FHA appraisal work, as well.

The Veterans Administration could also play an important role in educating VA lenders and originators about the importance of considering energy conservation in lending decisions. As VA does not guarantee the entire loan, but just a portion, many lenders may have a different and more conservative attitude toward VA loans than toward FHA loans. Moreover, VA is proud of its relatively low default rate and believes this is due to its conservative policies in analyzing risk and judging "value."

## OTHER FEDERAL DEPARTMENTS AND PROGRAMS

A number of other Federal departments play important roles in supporting residential energy conservation or housing production and can have a significant impact in promoting energy conservation. HEW's Community Services Administration (CSA) administers the emergency energy conservation program, which includes research and development activities and a program to weatherize the homes of low-income families. The DOE's Division of Buildings and Community Systems funds a wide variety of residential conservation research and demonstration activities. The Department also administers a weatherization assistance program for low-income families and is authorized to operate a loan guarantee program for energy conservation improvements. The Department of Defense is an important developer of residential housing for the military and is involved in energy conservation demonstrations. The Department of the Treasury affects energy conservation practices and housing production and maintenance through its formulation and administration of tax and fiscal policies.

### CSA Emergency Energy Conservation Program

The emergency energy conservation program of CSA includes a weatherization component, which provides grants to low-income families (up to 125 percent of the Office of Management and Budget's (OMB) poverty income guidelines) for housing repair and energy-savings improvements that will minimize heat loss and improve thermal efficiency. Renters as well as homeowners are eligible. Funds are allocated to States, which in turn allocate funds to community action agencies (CAAs) or CSA can fund CAAs directly. Funds may be used for insulation, storm doors and windows, repairs of sources of heat loss, and repair of heating systems. Of the funds granted, 80 percent must be used for materials. Expenditure limits per unit vary from region to region and, since November 1977, can range up to \$800. CAAs are encouraged to attempt to secure labor, supervision, and transportation costs from other sources; most frequently man-

power training funds provided under the Comprehensive Employment and Training Act (CETA) are used.

The emergency energy conservation program also funds a variety of research and demonstration activities related to energy conservation in various sectors of the economy.

**Program Activity.**—Approximately 800 CAAs participate in the weatherization program. About \$39 million was appropriated for weatherization grants in fiscal year 1978. As of December 31, 1977, 268,252 households had been assisted. The average grant was approximately \$233. The research and demonstration activities were funded at a level of \$24 million in FY 1978.

**Authorization.**—Section 222(a)(12) of the Economic Opportunity Act of 1964 (Public Law 88-452) as amended.

### DOE Weatherization Assistance Program

The DOE weatherization assistance program is intended to supplement other Federal weatherization efforts. Grants are provided to the States, based on climate and the extent of poverty. The States contract with community-based organizations, which in turn weatherize the homes of low-income families, particularly the homes of the elderly and handicapped. Priority is given to contracts with community action agencies. The income of recipients cannot exceed 125 percent of the OMB poverty income guideline. Normally, grants cannot exceed \$400 per household. Of the funds granted 90 percent must be used for program costs. Labor, supervision, and transportation are expected to come from other sources, particularly CAAs and manpower training funds provided under CETA.

**Program Activity.**—The program was initiated in the fall of 1977 and 501 homes were weatherized in 1977. About 1,000 organizations are participating. The FY 1978 appropriation was \$65 million; the FY 1979 appropriation \$199 million.

**Authorization.** – Title IV, part A, of the Energy Conservation and Production Act of 1976 (Public Law 94-385). (See chapter III for current information.)

#### DOE Division of Buildings and Community Systems

The Division of Buildings and Community Systems supports a variety of research projects and demonstrations designed to: 1) encourage and support the installation of energy-efficient technologies, 2) develop and commercialize systems to reduce the dependence on petroleum and natural gas, 3) develop and disseminate information about energy-efficient technologies, 4) promote the use of energy-conserving technologies and practices, 5) develop and implement energy-efficient standards for new buildings and appliances, and 6) implement the weatherization assistance program. Activities include such projects as the testing of heat pumps, energy feedback meters, and insulation; a nine-city demonstration to improve the availability of energy conservation improvement financing; distribution of an energy retrofit manual to homeowners and home improvement contractors; and the encouragement of State adoption of the National Conference of States on Building Codes and Standards (NCSBCS) Model Code (Model Code for Energy Conservation in New Building Construction).

**Program Activity.** —The 1979 appropriation was \$79.55 million. In 1978 it was \$52.3 million.

**Authorization.** —The Department was established by the Department of Energy Organization Act of 1977 (Public Law 95-91) pursuant to Executive Order 12009 of September 13, 1977. (See p. 194 for discussion of program.)

#### DOE Obligations Guarantee Program

This program would provide loan guarantees for a wide range of conservation or renewable resource activities for existing commercial, industrial, and multifamily buildings. While multifamily housing is specifically included as

one of the allowable uses of loan guarantees, the program appears to be only incidentally a housing program. To implement the housing portion a system to service the housing market would have to be established. Guarantees could be made if credit would not otherwise be available.

The program has never become operational. DOE has had second thoughts about whether it would be useful. Potential demand for the assistance is under study.

**Program Activity.** – None.

**Authorization.** – Section 451 of the Energy Conservation and Production Act of 1976 (Public Law 94-385).

#### Department of Defense

The Department of Defense owns and operates 385,000 units of family housing within the continental United States. DOD also leases some units off base, but these leases typically are short term to handle emergency situations.

Since 1976 DOD has operated a comprehensive energy conservation investment program (ECIP) designed to save energy in all types of DOD-owned buildings. Approximately \$13 million a year has been used for residential retrofit. The ECIP requirements for FY 1976-84 are estimated to be \$1.5 billion.

Initially retrofit projects had to show a 5-year payback period to be selected for implementation, but a Btu-saved formula is now being used. In FY 1979 all projects must average 58 million Btu saved per \$1,000 of investment, but a project designed to save as low as 23 million Btu will be considered. Translated into a payback formula, this approach results in consideration of projects with payback periods as long as 15 years.

The DOD program is goal-oriented and implemented through the chain of command, and apparently the goals are being achieved. Information access is regular and there are no peculiar financing problems because all conservation is funded from line item appropriations.

Under a DOD solar demonstration project, DOD has retrofitted four houses.

Also, DOD appears to have a well-conceived and relatively thorough training program for upgrading housing managers and sensitizing tenants in day-to-day conservation measures.

**Program Activity.** — Retrofit activity has averaged approximately \$13 million a year during the FY 1977-79 period.

**Authorization.** — Not applicable.

#### Treasury Department: Tax Policy

The Treasury Department has a significant impact on the development and maintenance of the Nation's housing inventory and investment in conservation improvements through its administration and enforcement of internal revenue laws. These laws and their present and potential impact on energy conservation are discussed in detail at the end of this section.

### Conservation Policies and Opportunities

Both the CSA and DOE programs directly support energy conservation. Tax policies are discussed in another part of the report.

To expand its conservation activities, DOD might consider using the annual appropriations for debt service dollars instead of direct expenditure dollars. In that way, it could accelerate the conservation program and realize the per unit savings of volume contracting at today's costs rather than future costs, thus accelerating all the energy cost savings into 1 year rather than realizing them incrementally. These earlier realized energy cost savings, plus avoidance of contracting cost increases due to inflation in future years, might be cost effective. Such an approach, which commits Congress to appropriations in advance, would require specific legislative approval but would not require additional appropriations.

## HOUSING SECONDARY MORTGAGE MARKET AND REGULATORY AGENCIES

Nearly all of the capital for the housing industry is provided by a variety of private lending institutions. Savings and loan associations, banks, and mortgage companies are the primary loan originators as shown by table 69.

Lending practices are affected by the policies of lending regulatory agencies and the activities of secondary mortgage market institutions.

Table 69.—Originations of Long-Term Mortgage Loans 1977  
(dollars in billions)

Type	New homes 1-4 family	Existing homes 1-4 family	New multifamily	Existing multifamily
Savings and loan associations . . . . .	23.7	62.4	1.6	5.0
Mutual savings banks . . . . .	1.4	6.7	.2	1.3
Commercial banks . . . . .	8.8	26.4	.4	1.0
Life insurance companies . . . . .	.1	.4	.4	.5
Noninsured pension funds . . . . .	(a)	(a)	.1	(a)
State & local retirement funds . . . . .	a	.2	(a)	.1
State & local credit agencies . . . . .	.1	.6	.3	.6
Mortgage companies . . . . .	7.0	15.8	.8	.3
Federal credit agencies . . . . .	1.7	1.3	.9	.1
State chartered credit unions . . . . .	.4	.7	—	—
Mortgage investment trusts . . . . .	.1	(a)	.1	(a)
<b>Total . . . . .</b>	<b>43.3</b>	<b>114.5</b>	<b>4.8</b>	<b>9.0</b>

<sup>a</sup>Under \$50 million.

NOTE: Figures may not total due to rounding.

SOURCE: HUD Office of Housing Statistics.

## Regulatory Agencies

Most lenders are subject to Federal and/or State regulations. The two most important in terms of their impacts on the housing industry are the Federal Home Loan Bank Board (FHLBB) and the Federal Deposit Insurance Corporation (FDIC).

### FEDERAL HOME LOAN BANK BOARD

The Federal Home Loan Bank Board is an independent executive agency that supervises and regulates savings and loan associations, which are the country's major private source of funds for financing housing. The Board governs the Federal Savings and Loan Insurance Corporation, which provides deposit insurance to savings and loan institutions. The Board directs the Federal Home Loan Bank System, which provides reserve credit and ancillary services to member saving and loans. There are 12 regional Federal Home Loan Banks in the system.

### FEDERAL DEPOSIT INSURANCE CORPORATION

The Federal Deposit Insurance Corporation is an independent executive agency that supervises and regulates certain activities of National and State banks that are members of the Federal Reserve System and State banks that apply for deposit insurance. FDIC provides deposit insurance to banks. The management of the corporation is invested in a three-person Board of Directors, one of whom is the Comptroller of the Currency. There are 14 regional FDIC offices in the system.

### Conservation Policy and Opportunities

The Federal Home Loan Bank Board has no specific conservation policy. It is cooperating with DOE's attempt to sensitize all financial institutions to energy efficiency in their residential lending practices. These activities include structured group interviews, discussions about revision of loan appraisal procedures, and investigations of different financing incentives.

The Federal Deposit Insurance Corporation has no apparent energy conservation policy. It does not believe that it has the authority or

leverage to encourage its members to adopt an energy conservation policy as it regulates but does not provide liquidity to banks as does FHLBB.

## Secondary Mortgage Market

A number of Government-sponsored agencies have been established to provide liquidity to the mortgage market by purchasing loans originated by private lenders. As noted earlier, the Government National Mortgage Association (GNMA) purchases selected types of FHA and VA mortgages. The Federal Home Loan Mortgage Corporation provides a secondary market for conventional mortgages made by savings and loans and other lenders, and the Federal National Mortgage Association (FNMA) purchases mortgages originated by approved lenders. The important role of federally supported loan pools can be noted in table 70, which breaks down net acquisitions of long-term mortgage loans on residential properties for 1977. The pools acquired 15 percent of the one- to four-family loans made and 5.7 percent of the multifamily loans made. (Comparing this table to table 68 documents that mortgage companies particularly make use of the secondary market to sell off loans they originate.)

Table 70.—Net Acquisitions of Long-Term Mortgage Loans on Residential Properties by Lender Groups (dollars in billions)

Type	1-to 4-family homes	Multifamily projects
Savings and loan associations. . . . .	84.2	6.5
Mutual savings banks . . . . .	10.3	1.7
Commercial banks. . . . .	31.6	1.4
Life insurance companies. .	.6	.9
Non insured pension funds. .	.1	.1
State & local retirement funds. . . . .	.3	.2
State & local government credit agencies. . . . .	2.6	1.0
Credit unions . . . . .	.7	—
Mortgage investment trusts. . . . .	(a)	.1
Federal credit agencies. . .	4.5	1.1
Mortgage pools . . . . .	22.5	1.2
State chartered credit unions. . . . .	—	.3
<b>Total . . . . .</b>	<b>158.4</b>	<b>14.6</b>

<sup>a</sup>Under \$50 million.

NOTE Figures may not total due to rounding.

SOURCE: HUD Office of Housing Statistics.



These secondary market institutions are important to energy conservation not only in that they provide liquidity to lenders, but because they employ appraisal and mortgage credit standards, forms, and policies that are commonly used in the lending industry and have energy conservation implications. Generally, appraisal forms have not explicitly (with the exception of the HUD/FHA forms) required an estimate of energy costs. No forms require an appraisal of the energy efficiency of the property. Neither FNMA nor FHLMC requires energy costs to be considered to evaluating a borrower's credit.

#### FEDERAL NATIONAL MORTGAGE ASSOCIATION

The Federal National Mortgage Association is a Government-sponsored private corporation regulated by the Secretary of HUD. It provides supplementary assistance to the secondary market for home mortgages by supplying a degree of liquidity for mortgage investments, thereby improving the distribution of investment capital available for home mortgage financing. FNMA buys FHA-insured, VA-guaranteed, and conventional mortgages. FNMA makes mortgage funds available through periodic auctions of mortgage purchase commitments on home mortgages in which lending institutions, such as mortgage companies, banks, savings and loan associations, and insurance companies, make offers to FNMA, generally on a competitive basis. It also offers to issue standby commitments for both home and multifamily mortgages on proposed construction at approved prices based on its auction prices. The Secretary of HUD may require that a reasonable portion of the corporation's mortgage purchases support the national goal of providing adequate housing for low- and moderate-income families.

**Program Activity.**—In 1977, FNMA made commitments of \$10.92 billion and as of December 31, 1977, had a net mortgage and loan portfolio of \$33.2 billion.

**Authorization.**—Housing and Urban Development Act of 1954 (Public Law 83-560) as amended by the Housing and Urban Development Act of 1968 (Public Law 90-448).

#### FEDERAL HOME LOAN MORTGAGE CORPORATION

The Federal Home Loan Mortgage Corporation (the Mortgage Corporation) promotes the flow of capital into the housing market by establishing an active secondary market in mortgages for savings and loans and other lending institutions. It operates under the direction of FHLBB. The corporation's purchase programs cover conventional mortgage loans, participations in conventional mortgage loans, and FHA-insured and VA-guaranteed loans. Its sources of funds are borrowings from Federal Home Loan Banks, the issuance of GNMA mortgage-backed securities, the issuance of participation sale certificates, and direct sales from its mortgage portfolio.

**Program Activity.**—At the end of 1977, the Mortgage Corporation held \$4.1 billion in mortgages. Outstanding commitments totaled \$5.5 billion.

**Authorization.**—Emergency Home Finance Act of 1970.

#### Conservation Policies and Opportunities

The National Energy Conservation Policy Act authorized the Mortgage Corporation to purchase title I loans whose proceeds were used to finance energy conservation improvements and authorized FNMA to buy and sell conservation and solar energy-related home improvement loans.

FNMA and FHLMC have taken some actions to promote conservation. They have issued a new home mortgage appraisal form requiring appraisers after March 1, 1979, to determine whether insulation exists and is adequate, whether the home has storm windows, and to note any special energy features, their costs and contribution to the property's value. The FHLMC has announced that it will purchase refinance loans with loan-to-value ratio's of up to 90 percent rather than 80 percent if its proceeds will be used for rehabilitation, renovation, or energy conservation improvements.

FNMA and FHLMC are in a position to provide leadership to sensitize lenders to energy conservation considerations in lending. Their influence on lending practices is substantial

because lenders commonly follow secondary market practices and requirements so that mortgages will be readily salable if the lender wants to dispose of them. Their forms are widely used in the industry. DOE has tried to encourage these institutions to induce lenders to require energy-efficiency information on mortgage applications, to consider energy costs in approving properties and judging the credit of borrowers, and to revise their guideforms and lending guidelines accordingly. A number of actions could be taken to promote conservation. Forms and procedures could require more explicit considerations of the energy efficiency of properties. Appraisals could take into account the actual energy costs of specific homes. Appraisers could identify and give greater consideration to the existence or absence of conservation improvements. Lenders could be required to use energy

costs as a factor in determining the ability of the purchaser to afford a home. These actions would make homebuyers more aware of energy conservation issues and would provide financial incentives to purchasers of energy-efficient properties.

The Mortgage Corporation is in a particularly strong position to change lender practices because it can require sellers to repurchase mortgages if it is determined that prescribed procedures and practices were not followed in originating the loan. On the other hand, appraisers and lenders are reluctant to use information on the past energy consumption of a home because of the importance of lifestyle and family size in determining energy costs and because of potential issues of liability that might arise.

## ENERGY CONSERVATION AND FEDERAL TAX POLICY

Federal tax policy can do much more than it has to stimulate energy conservation. Taxes have substantial impact on individual decisions about the construction, rehabilitation, improvement, and ownership of all kinds of residential property in the United States. Until very recently, existing law has not encouraged expenditures for energy conservation.

The tax laws may be used—as they have been in a number of similar situations—to affect certain investment decisions and to require certain behavior as a prerequisite to the availability of a financial benefit. If energy conservation is accepted as a valid national objective, long-term conservation goals may be assisted substantially by changes in the tax laws that affect the building and improvement of residential housing.

Some tax law changes have already been made to encourage energy conservation expenditures, and others could be made to strengthen the incentives. These changes fall into two categories: 1 ) limiting tax benefits to cases where energy conservation needs have been considered, and 2) providing new, spe-

cific tax incentives for energy conservation expenditures.

### Present Law (Prior to the Energy Tax Act of 1978)

Under present law, four types of tax law provisions principally affect the construction, rehabilitation, improvement, and ownership of residential property. They relate to the deductions available for the payment or incurrence of: 1 ) interest on indebtedness, 2) real property taxes, 3) depreciation, and 4) the costs of operating residential property. Section 163 of the Internal Revenue Code (the "Code") provides a specific deduction for all interest paid or incurred on indebtedness. Section 164 of the Code provides a specific deduction for real estate taxes paid or incurred. Section 167 of the Code is the basic depreciation provision—providing various methods of depreciation for the owners of rented residential property, including a special 5-year amortization provision for the rehabilitation of low- and moderate-income residential property. For certain properties having historic significance, Congress

added in 1976 a special 5-year amortization provision for rehabilitation expenditures (section 191 of the Code). With respect to the cost of operating rental residential property, sections 162 and 212 of the Code provide deductions for all of the ordinary and necessary expenses related to the operation of such property.

Single-family homeowners (whether the dwelling is a freestanding house, a condominium unit, or a unit in a cooperative) who occupy their own homes may take only the interest and real estate tax deductions. Owners of multifamily residential property (without regard to the number of rental units) are entitled, additionally, to the benefits available under the depreciation provisions and to deductions for the costs of operating the property.

### The Effect of Present Law on Energy Conservation

The interest and real property tax deductions are both important factors in decisions made by individuals to build, rehabilitate, improve, or purchase a single-family home. The interest deduction reduces the real cost of the mortgage loan. The real estate tax deduction reduces the cost of providing shelter. The interest deduction indirectly encourages expenditures for capital equipment or structural changes that conserve energy. For example, to the extent that the cost of original construction or later rehabilitation or improvement is financed by a mortgage loan, the interest deduction reduces the real cost of the energy conservation expenditures. To the extent that such expenditures increase the appraised value of single-family homes — and thus, the applicable real property taxes — the real estate tax deduction reduces shelter costs.

While neither of these deductions is now available to renters, an effort is underway to make the real property tax deduction available. Under a recently enacted New York statute, a renter would become directly responsible for the real property tax allocable to his dwelling unit. The Internal Revenue Service is considering whether this new State law re-

sults in the availability of the Federal tax deduction to renters.

The interest and real property tax deductions are available to the owners of multifamily residential property, with similar economic effects. In addition, such owners have the opportunity to recover the cost of energy conservation expenditures through depreciation — ordinarily, over the useful life of the capital equipment or structural feature involved. While the depreciation deduction does afford cost recovery, it does not provide any greater incentive to make an energy conservation expenditure than to make any other capital equipment or structural expenditure. While the knowledge that energy operating costs will be reduced by such expenditures may affect certain decisions concerning newly constructed buildings, those costs have a much lower priority in rehabilitation and improvement decisions, particularly when utility costs are simply passed on to tenants.

Overall, therefore, it may be concluded that tax laws enacted before 1978 have provided very little encouragement to the owners of residential property considering decisions to make energy conservation expenditures.

### The Energy Tax Act of 1978

To stimulate energy conservation expenditures by those homeowners who are not entitled to depreciation, the Energy Tax Act of 1978 provides certain new Federal income tax credits. The credits may be applied only against investments relating to a taxpayer's principal place of residence (whether owned or rented), which must be located in the United States and — to be eligible for the first category of credits — have been "substantially completed" before April 20, 1977.

The new law permits tax credits amounting to 15 percent of the cost of energy conservation investments of up to \$2,000 (i. e., a maximum credit of \$300) made during a taxable year between 1977 and 1985. Eligible investments include insulation, furnace efficiency improvements, clock thermostats, storm windows and doors, caulking and weatherstrip-

ping, utility meters that show the cost of service, and any other items “of the kind which the Secretary specifies by regulations as increasing the energy efficiency of the dwellings.” Draft regulations specifically exclude heat pumps, according to Internal Revenue Service sources.

A second provision of the Energy Tax Act provides tax credits amounting to 30 percent of the cost of investments of up to \$2,000 in renewable energy sources, and 20 percent of up to \$8,000 in additional costs of such renewable energy sources (i. e., a maximum credit of \$2,200). The renewable-energy tax credit, which may be used for newly constructed as well as pre-1977 dwellings, may be applied against an investment in active or passive solar systems, geothermal energy, wind energy, or “any other form of renewable energy which the Secretary specifies by regulation, for the purpose of heating or cooling such dwelling or providing hot water for use within such dwelling.” At this writing, the draft regulations are expected to prohibit application of the credit to wood-burning stoves. They are also expected to be restrictive with respect to passive solar features; they will exclude such things as greenhouses, draperies, special materials used in roofing, siding, or glazing, and any construction components that serve structural functions as well as passive solar functions.

The new credits may be used only to reduce tax liability, not to gain a refund. However, if the eligible expenditures exceeds a taxpayer’s tax liability for the year in which the investment is made, the amount of the tax liability may be carried over to the next taxable year. This provision seeks to avoid discrimination against low-income persons with little or no tax liability.

### Further Changes to Encourage Energy Conservation Expenditures

Further changes in tax policy would encourage additional energy conservation expenditures. Two broad categories of change deserve consideration:

1. Requiring that certain existing tax benefits be available only if energy conservation needs have been taken into account.

2. Providing new, specific tax incentives for energy conservation expenditures.

Two special provisions of present law allow owners of multifamily residential property to recover their costs of rehabilitation and improvement over a 5-year period (rather than the much longer useful life of the rehabilitated or improved property).

Under section 167(k) of the Code, owners of rehabilitated low- and moderate-income residential property may recover their rehabilitation expenditures — to the extent of \$20,000 per residential unit—over a 5-year period. The availability of this special provision should be conditioned upon making energy conservation expenditures that meet HUD standards. As the present \$20,000 limitation on rehabilitation expenditures to which this special provision now applies often does not cover the full cost of the actual rehabilitation, the present provision might be amended to provide similar treatment for up to an additional \$2,000 per unit of “certified energy conservation expenditures” made in connection with such a project. Such a requirement would produce a long-term budgetary benefit through its reduction of the long-range increase in section 8 housing assistance payment costs in section 167(k) housing projects. It would, thereby, offset the revenue losses in early years from such a change in tax policy.

Under sections 191 and 167(o) of the Code, the owners of substantially rehabilitated historic properties have been afforded the ability to deduct rehabilitation expenditures, without limit, over a 5-year period (under section 191) or to claim depreciation with respect to such costs in the same manner as would the owner of newly constructed residential property (section 167(o)). The availability of these special provisions should also be conditioned upon making energy conservation expenditures that meet HUD standards. In the case of owners who make an election under section 191, no new tax incentive is required, as all rehabilitation expenditures are deductible over a 5-year period. In the case of section 167(1) elections, a substantial tax incentive already exists and it seems improper to increase it at this time

before any experience has been accumulated concerning its use.

Somewhat different considerations apply to owners of residential property who use it in a trade or business, or hold it for the production of income and are, therefore, entitled to claim depreciation deductions. In such cases, the tax laws have been utilized in two ways to encourage particular types of investments — either the provision of an investment tax credit or the provision of a form of rapid amortization of the costs of the investment. Either technique could be selected to encourage investments in energy conservation.

### Investment Tax Credit

The existing investment tax credit provisions do not encourage energy conservation expenditures in that they do not now provide a credit for the cost of buildings (or the structural components of buildings) or for any tangible personal property used in connection with residential property (see section 43 of the Code). It would be necessary to amend the provisions of present law to provide for an exception for "certified energy conservation expenditures" to encourage such investments.

Indirectly, Congress has given such a provision active consideration for expenditures in connection with the rehabilitation of certain commercial and industrial buildings. Under section 314 of H.R. 13511 (which passed the House and reached the Senate Finance Committee in the 95th Congress), the investment tax credit would be available for qualifying energy conservation and all other expenditures made in connection with a qualified rehabilitated building. These expenditures include investments in structural components of the building as well as capital equipment expenditures that constitute personal property.

Having recognized the importance of making available the investment credit in such circumstances to encourage the recycling of ex-

isting commercial and industrial structures, it would seem equally important to extend such policy to "certified energy conservation expenses" — including structural components and capital equipment— in both newly constructed and rehabilitated residential structures. While the definition of "certified energy conservation expenditures" would require careful drafting to avoid abuse, the principle is the same as in the expansion of the investment credit.

### Rapid Amortization

An alternative tax incentive to the expansion of the scope of the investment credit provisions is the enactment of a special rapid amortization provision for "certified energy conservation expenditures. " The technique of a 5-year amortization provision has been used in the past to encourage investments in such areas as soil and water conservation (section 175), fertilizer (section 180), the clearing of land (section 182), the rehabilitation of low- and moderate-income housing (section 167(k)) and, most recently, the rehabilitation of historic structures (section 191 ). Such a technique seems particularly adaptable to encouraging investments in energy conservation.

Congress has, in more recent years, expressed the belief that incentive tax provisions should not become permanent parts of the Internal Revenue Code, but should be readily susceptible to review, change, and elimination as necessities and priorities change. Thus, for example, the 5-year amortization of expenditures for the rehabilitation of historic buildings applies only to expenditures made between June 15, 1976, and June 15, 1981. Such provision may be thereafter extended by Congress, as has the section 167(k) rehabilitation expense deduction for further periods (generally, of 2 years each in duration). A separate 5-year amortization provision for energy conservation expenditures should be easily susceptible to such treatment.

## CONSERVATION R&D ACTIVITIES, OFFICE OF CONSERVATION AND SOLAR APPLICATIONS, DEPARTMENT OF ENERGY

The buildings and community systems program of the Office of Conservation and Solar Applications is the major division within DOE that conducts R&D activities related to energy conservation in the residential sector. Under this program, there are a variety of subprograms which address specific areas of conservation R&D. The purpose of this discussion is to provide a general description of the various subprograms and to address some of the problem areas in the R&D component of residential energy conservation.

### Program Objective and Strategy

Specifically, the near-term objective of the buildings and community systems program, "is to produce total energy savings through the development and implementation of new technology equal to 2.4 million barrels of oil equivalent per day by 1985 by lowering unit energy consumption 20 percent in existing buildings and community systems; and 30 percent in new buildings, community systems, and consumer products."<sup>1</sup>

The program is aimed at increasing energy utilization efficiency, providing options to substitute energy forms such as coal for natural gas, and providing technologies that decrease the need for energy to satisfy human needs. All activities are directed toward providing these new technologies within an economically and environmentally sound framework. Also, activities focus on preparing for transfer of energy-efficient technologies following demonstration to the residential and commercial sectors.

The strategy for attaining program objectives is to:

1. encourage and support the installation of energy-efficient technologies as soon as possible;

<sup>1</sup>Management Review and Control Document, Office of Conservation and Solar Applications, p. 1, Mar. 23, 1978

- 2 develop and commercialize systems that will reduce dependence on petroleum and natural gas;
- 3 develop and disseminate information about new and existing technologies concerning energy-efficiency utilization improvements;
- 4 promote the use of energy-conserving technologies and energy-conserving practices in the facilities and operations of the Federal Government;
- 5 develop and implement energy efficiency standards for new buildings and appliances; and
- 6 implement the weatherization program to meet certain energy needs of low-income citizens. <sup>2</sup>

Another important objective of the buildings and community systems program is to involve nongovernmental groups in research, development, demonstration, and implementation activities to facilitate the transfer of technology and information to potential users as soon as the technology has been demonstrated to be economically and technically feasible. A majority of the funds that support these activities are spent with industry on a large number of cost-sharing projects. The program also works closely with various trade and non-Federal organizations to obtain comments from a variety of sources, including the National Governors Conference, the National Conference of States on Building Codes and Standards, the League of Cities, Public Technology, Inc., the National Association of Home Builders, the American Institute of Architects, the American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., and the National Savings and Loan League.

### Budget Allocation

Table 71 presents a summary of budget estimates (in thousands of dollars) by program ac-

<sup>2</sup>U.S. Department of Energy, FY 1979 Congressional Budget Request, Jan. 23, 1978, p. 1.

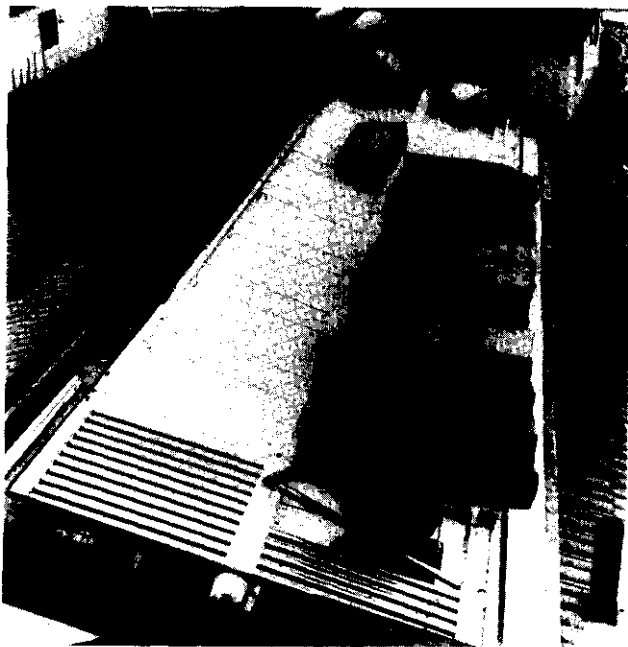


Photo credit: U.S. Department of Energy

**Energy-saving homes**—Construction of homes in Mission Viejo, Calif., designed to use less than half the energy of surrounding conventional houses in a research project supported by DOE, Southern California Gas company, and the Mission Viejo Company, a real estate firm



U.S. Department of Housing and Urban Development  
in cooperation with the  
U.S. Department of Energy

## The Energy-Wise Home Buyer

**A Guide to Selecting  
an Energy Efficient Home**



Disseminating information on residential energy efficiency involves cooperation within the executive branch. This publication was a joint effort of HUD and DOE



Photo credit: Department of Energy by Jack Schneider

**Solar heating and cooling**—This house in Baltimore County, Md., designed by architect Peter Powell, uses passive solar concepts to provide "natural" heating and cooling. DOE is studying passive solar heating concepts to determine how well they can work to save energy and money in buildings

**Table 71.—FY1979 Budget Estimates for Residential and Commercial Components of DOE'S Conservation Mission**  
(in thousands of dollars)

Activity	FY 1978	FY 1979
Residential & commercial		
Buildings & community systems		
Building systems . . . . .	\$ 19,500	\$ 17,600
Community energy utilization. . . .	12,800	19,400
Urban waste. . . . .	11,000	8,500
Technology & consumer products	9,200	20,350
Analysis & technology transfer. . .	2,590	2,800
Subtotal. . . . .	55,090	68,650
Mandatory appliance standards . . .	4,267	3,750
Other commercial. . . . .	200	500
Weatherization . . . . .	64,166	198,950
Capital equipment . . . . .	170	1,200
Total, residential & commercial. . .	\$123,893	\$273,050
Estimate, residential & commercial, FY 1979. . .	\$27,050	
Estimate, residential & commercial, FY 1978. . .	123,893	
— INCREASE . . . . .		\$149,157

tivity for the residential and commercial component of DOE's conservation mission.

As the table indicates, the FY 1979 budget authority for \$273,050,000 represents an increase of \$149,157,000 from FY 1978. Part of this increase occurs in the community energy utilization program where projects are moving from the feasibility and design stages to demonstration. However, most of the increase occurs in the weatherization program to provide for weatherization of approximately 857,000 homes. The program essentially represents a balance between efforts which start to accumulate savings in the near-term (i. e., architectural and engineering systems, consumer products, weatherization, **and** utility retrofit programs) and the mid-term (i. e., community systems, urban waste, and technology development).

Table 72 represents a comparison of FY 1979 budget estimates for a variety of energy R&D activities within DOE.

**Table 72.—FY 1979 Budget Estimates for DOE Energy R&D**

Activity	FY 1979
Energy conservation R&D . . . . .	\$707,101,000
Fossil energy R&D . . . . .	576,888,000
Solar energy R&D . . . . .	441,900,000
Geothermal R&D. . . . .	156,200,000
Fuels from biomass . . . . .	42,400,000
Fusion R&D. . . . .	348,900,000

As the figures suggest, conservation R&D remains a high priority in the Federal energy agenda.

## Activities of the Buildings and Community Systems Program

**Building Systems.**—The building systems objective is geared toward development and commercialization of energy-efficient design, methods of construction and operation, and the development of standards for new and existing residential and commercial buildings. For the residential sector, R&D attempts to provide cost-effective and acceptable technologies for retrofit of existing buildings (e. g., applications of revised mechanical ventilation and redesign of existing equipment to improve overall seasonal performance). Another major priority is the improvement of installation practices for mechanical equipment and the building envelope.

**Community Systems.**— There are three major thrusts to the community systems program: 1 ) integrated systems, 2) planning design and management, and 3) implementation mechanisms. All of these programs are moving from feasibility studies and initial design into demonstration activity, and the work is being performed cooperatively with other programs within other Federal agencies.

Some of the technological options of the integrated systems focus on energy sources (coal, solar), scaling (small to large), kinds of applications (new and retrofit), and targets of implementation (municipalities, utility companies, etc.).

The planning, design, and management activities focus on the development and testing of concepts, tools, and methodologies that identify and define relationships between urban forms and functions and energy utilization. For example, many case studies are being conducted on the tradeoffs between energy conservation measures and other community services, lifestyles, and economic activities.

The implementation activity is intended to provide data and develop strategies for implementation of the community energy systems



and energy-conserving community design activities. Projects include market analysis for the integrated community energy systems, as well as development of financial strategies and management techniques for minimizing capital and operating costs and maintenance of community systems.

**Technology and Consumer Products.**—This activity strives to develop and encourage the commercialization of more energy-efficient new technologies in heating, cooling, and ventilating equipment and systems; lighting and windows; appliances; building controls; and diagnostic equipment for determining energy efficiency in buildings. Major activities are directed at the development and commercialization of advanced heat pumps and the development and testing of improved oil- and gas-fired furnace components and systems. Other projects include the development and commercialization of high-efficiency gas- and oil-fired space-conditioning systems and the development and testing of an integrated high-efficiency space heating/domestic hot water heating system. Laboratory investigation and testing will continue to measure various properties of insulation materials.

**Analysis and Technology Transfer.**—The goal of this activity is to encourage early acceptance of new means for improving energy efficiency through the development of information and technology transfer methods, to conduct research that will encourage consumer purchase of more energy-efficient products, and to encourage more energy-efficient practices in the home. Major effects are the provision of information on savings for energy-efficient products, information on lifecycle costing and the cost effectiveness of energy-efficient products, and the provision of information on new technologies to the builder, homeowner, and manufacturer.

**Appliances.**—The major objectives of this program include the development of test procedures, minimum efficiency standards, and certification methods for a variety of appliances that include furnaces, central and room air-conditioning, water heaters, etc. In addition, a consumer education program is underway to introduce the use of lifecycle costing

concepts in comparative shopping for more efficient appliances.

**Weatherization Assistance Programs.**— This activity provides grants to the States for weatherizing the homes of low-income persons, particularly the elderly and handicapped. At least 90 percent of the grant funds are expended on weatherization materials and related costs. In 1979, approximately 857,000 homes will be weatherized.

**Utility Insulation Service.**— This effort is designed to guide the programs of insulation service that will be offered to the customers of large electric and gas utilities, and home heating suppliers, as directed by the National Energy Act of 1978. Implementation funding to State regulatory agencies, intervention in some hearings, and technical assistance to State agencies and utilities is involved.

**Other Programs.**— Other activities include the Energy Extension Service, designed to provide information and technical assistance to building owners and renters on reducing energy use; the State Energy Programs mandated under EPCA and EC PA; and the schools and hospitals program that assists these institutions in retrofitting buildings.

## Program Evaluation

Activities in DOE represent a broad approach covering a number of technologies, institutional factors, and surveys of consumer attitudes. The R&D program employs extensive analytical techniques to choose priorities, including cost/benefit calculations and projections of energy savings from proposed new technologies based on a sophisticated engineering-economic model. Despite this broad approach and strong analytical base, there are significant problems that are a result of both the general R&D philosophy in the executive branch and program operation.

**Problem Areas in Conservation R&D.**—This report has identified four areas with shortcomings in the current DOE conservation program. First, there is too much concentration on projects for the short term (5 to 15 years). Second, there is an insufficient connection be-

tween supply R&D programs, particularly solar, and the goals of the conservation program. Third, there is an inadequate amount of basic R&D relevant to increasing energy productivity. Fourth, there is no clear relationship between the R&D activities and the policy and other program (weatherization, energy extension service, etc.) portions of conservation.

1. Time Horizon. As stated earlier, the current buildings and community systems R&D program relies very heavily on sophisticated cost/benefit analyses and energy use projections to determine its direction. While this has merit in choosing between projects of near-term (5 to 15 years) application, it tends to bias against choice of anything that may have long-term (25 to 50 years) potential. The reason is that the only way to calculate the payoff of a project under this procedure is to estimate its likelihood of success, its use, and the amount of energy it will save. Such estimates became harder and harder the more speculative a project and therefore tend to be more readily dismissed when making funding decisions.

A certain portion of the research budget devoted strictly to more speculative proposals would help solve this problem, if it was based on a review process that did not have the short-term bias built into the one just described. For example, the appropriate technology program not within the buildings and community systems division is designed to take some chances; the principal technical requirement is that the proposal not violate the laws of physics. Beyond that, the review process specifically goes after innovative and novel proposals. The procedure involves considerably more risk than the standard approach, and the frequency of failure will naturally be high. Change is needed because near-term technologies, such as the direct-fired heat pump, will be undertaken by private interests as energy prices continue to rise. The acceleration of technology development, which is supposedly the main reason for Government involvement with such R&D, may be of marginal value in the residential sector, particularly when the inherent difficulties of commercialization are considered.

There is currently very little incentive to explore more efficient ways to use energy that will not be economical for decades. This could involve technologies requiring substantial modification of existing construction practices, extensive use of solar or other onsite generation, or new lighting, water heating, or space-conditioning methods. Work in these areas is not likely to gain support in the private sector, because the risk is so great and the potential payoff too far in the future.

2 Relation to Supply R&D. One of the principal guidelines of an R&D program on demand technologies is that it should address the likely energy supply options. Currently, national research efforts are focused on synthetic fuel production from coal and biomass, solar thermal and electricity, geothermal, and electricity from nuclear and thermonuclear resources. All of these options will be expensive, and therefore it is important that new ways be found to use these sources efficiently. This coordination of goals is not apparent in the conservation R&D program. In particular, there is little work going on to explore appliance technologies, building construction techniques, and lighting schemes that would make use of solar energy in novel ways. Most of the work is directed toward conventional heating and cooling methods with solar replacing fossil combustion or electricity. Are there photochemical processes or passive solar designs that would dramatically reduce the amount of solar energy that needs to be collected, and therefore collector and storage costs? The OTA solar report indicated community solar energy systems could be economically attractive even using today's technologies if conventional energy prices continue to rise. Might not there be novel community designs and/or construction techniques that could reduce material costs for such systems? Although somewhat speculative, these proposals offer the potential for large economic benefits several decades from now. Similar arguments can be made about exploring ways to use expensive synthetic fuels, direct heat from geothermal steam, and electricity energy. To reiterate, the important points are that long-term, more speculative research should receive greater emphasis, and that it should be

directed at the "inexhaustible" energy sources that will eventually be used.

3. Basic R&D. Basic R&D in the conservation sector should be increased. Areas of importance include materials research for thermal insulation, optical coatings for windows, energy storage, air handling, and distribution to increase the overall efficiency of heating and cooling systems, and electro- and photochemical processes for more efficient use of electric and solar energy. Some work is underway in optical coatings and energy storage materials, but is only loosely connected to the residential conservation program, thus reducing the chances for application of results.

Other basic research areas concern nonhard-ware issues. For example, what constitutes comfort? A better understanding of the psychological mechanisms could suggest more efficient ways of delivering or removing heat. As suggested in the environmental section, indoor air quality may become very hazardous as buildings become tighter. Research on chemical pollutants that may be released in the home and ways to control them could be very useful in removing a potentially severe constraint to energy conservation.

More work needs to be done to learn how people actually use energy in their homes. A better understanding of use patterns is important for identifying areas for governmental action in education and information. Technological decisions must be initiated not solely on the basis of technical feasibility, but on whether or not consumers will accept and use the technology.

The basic R&D efforts described here do not necessarily have to fall within one division of conservation for an effective program to exist. What is important is that basic conservation research be part of a comprehensive plan that is guided in part by the principals discussed above. Basic R&D is an essential part of any research effort that attempts to develop long-term, innovative technologies.

4. Relation to Conservation Policy and Programs. Under the Assistant Secretary for Conservation and Solar Applications in DOE there are several programs directed at increasing

energy conservation in buildings. These include the weatherization and State energy management programs, and the energy extension service. In addition, the Assistant Secretary for Policy of DOE is charged with Federal energy conservation policy. The issue here is the manner in which conservation R&D is used in carrying out the programs and developing policy. Currently there is no indication that this is done in a systematic fashion. The programs offer a unique opportunity to test new results coming from the near-term aspect of the R&D programs. If the latter had a specific goal for assisting Federal conservation programs, rapid commercialization of new technologies and more cost-effective conservation assistance could be possible.

The policy area is where the link between supply and demand R&D can be best made. By seeing to it that R&D on demand technologies associated with long-term supply options is given top priority, greater emphasis could be placed on long-term research in conservation. The policy could then be directed at encouraging the most economically efficient energy systems rather than just supply options. If R&D results identify technologies that use "inexhaustible" resources in novel and efficient ways, a national energy policy that better accounts for the contribution of conservation R&D can be outlined. The philosophy here is that there might be cases where development of new end use technologies could lower operating costs below that by improvement in energy production. For example, consider a home using solar energy to supply its needs. New construction techniques and materials might lower its energy requirements and improve the economics well below that resulting from any improvement in the energy production and conversion technologies. If policy is designed to encourage only the latter, however, the most economic solution would be missed. Therefore energy conservation R&D should be a major part of policy design with particular emphasis on looking for means to use the long-term energy source most effectively.

## Conclusion

These problem areas appear to be more related to the general philosophy of conserva-

tion apparently held by administration officials rather than to the management of the residential R&D programs. An excessive concern for quick results has contributed to this posture. Part of the responsibility lies with OMB. It is in OMB that the decision to pursue near-term R&D is most prevalent. This rests in part on the need for OMB to maintain control over the Federal budget. As we have argued, however, if energy prices continue to rise, many of the DOE projects would become at-

tractive enough to be undertaken by private interests.

As a result, there is probably a considerable amount of shifting that could take place within the program's current budget limits and still meet the objectives discussed above. This would seem to satisfy the OMB goals of budget restraint while simultaneously emphasizing the important long-term and basic research needs of residential energy conservation.

## STANDARDS AND CODES

Building codes represent an obvious mechanism for improving the energy-use characteristics of new housing. In light of the growing awareness of concern over energy cost and availability, the Federal Government, both Congress and the executive branch, has taken an increased interest in codes. This section reviews the current level and extent of Federal activities that influence building codes with regard to energy. Because of congressional action, this is an area of much activity and controversy. The effort of the Federal Government to directly influence local building codes represents a new role in Federal-State-local relationships and raises many questions of equity, compliance, measurement, regulatory philosophy, and enforcement.

The energy-consciousness of the post-embargo era triggered a number of congressional initiatives for encouraging greater energy efficiency in housing. Agencies with housing responsibility also turned to standards and codes. Building codes are adopted by States and/or localities, normally in concert with codes endorsed by one of the three national code groups. Without exception, the principal responsibility for enforcement lies with localities. (In some States, the State may act if localities do not.) Thus, the Federal Government does not write building codes. The Federal Government does, however, determine standards for participation in a number of federally funded housing programs. These standards have often influenced codes and practice.

Building codes have been used for nearly 4,000 years, to protect the safety and health of occupants. The earliest known example is the Code of Hammurabi, which dates from about 1750 B.C. Codes apply to new structures (or to very substantial alteration of a structure) and define acceptable materials and methods of construction. In this country, the emphasis of most codes has been to ensure a structurally sound building, reasonably resistant to deterioration over time, and reasonably protected against sanitation and fire hazards.

Two principal Federal programs have influenced building codes for a number of years: a) Minimum Property Standards and b) Building Energy Performance Standards.

### Minimum Property Standards

The Department of Housing and Urban Development's MPS define and describe the minimum levels of acceptability of design and construction of housing built under HUD mortgage insurance and low-rent public housing programs. Although some of the requirements permit flexibility of design, the bulk of the standards are specified. In other words, they tell a builder what materials and methods are acceptable. This type of standard is known as a "prescriptive" standard, and is the type of standard of code in widest use today in the homebuilding industry. Designers, builders, and local code enforcement officials can refer to MPS and be certain that a given design or building is in compliance.

Minimum Property Standards are mandatory national standards that cover one- and two-family dwellings, multifamily housing, and certain care facilities insured or financed under HUD or FHA programs. MPS are also used to determine loan eligibility by VA and, until recently, FmHA.

Minimum Property Standards grew out of the National Housing Act of 1934. The purpose of that Act was to encourage improvement in housing construction and provide a base level of acceptability for mortgage insurance as the country began the great, federally supported housing expansion. Since that time, standards have been developed for a variety of housing types and a variety of factors. However, it is only recently that the use of MPS as a direct method to encourage energy efficiency has been perceived as a policy tool.

A decentralized network of HUD field offices (approximately 82) administers MPS in which architectural analysis and construction inspections are performed by architectural and engineering personnel. Working drawings and plans are reviewed and checked for compliance, and inspections are made during construction. If the construction does not meet the standard, Federal funding can be refused or withdrawn. This system of inspections has served to ensure a high level of compliance with MPS. It requires a substantial amount of time.

In 1977, about one in six private housing starts were insured by HUD's FHA or guaranteed by VA.

Over the past 2 years, HUD has been involved in upgrading MPS in response to new emphasis on energy conservation. The alterations to the standards have been controversial, and as of February 1979 final action was not complete.

The revised MPS reflect a decision to determine the acceptable level of certain measures in houses—those measures that reduce heating or cooling requirements—on the basis of costs over a 30-year period; the normal life of the mortgage. In addition to this time period, the DOE projected fuel costs are used. The use of these price projections means that MPS as

altered will be a much more energy-efficient standard than those currently in use.

HUD employed a National Bureau of Standards computer model that uses a prototypical house with 15 different possible shell modifications to reduce heat transfer. The modifications include various levels of attic, wall, and floor insulation, double- and triple-glazing, and storm doors. The prototypical house has an unfinished attic and an unheated crawl space below the slab. The National Bureau of Standards load determination program (NBSLD) was used to calculate heating and cooling requirements of the house with various modifications for 14 cities with different climates. Cost data was determined by present market levels and fuel prices were determined by DOE price data for 10 regions. (These prices assume increases until 1990 and a constant real price level thereafter.) A 6-percent inflation rate is assumed throughout, and a 10-percent discount rate. The computer program combines all the variables, and calculates a cost-benefit figure for each modification, in each location, based on a 30-year lifecycle cost. Separate calculations are made for electric resistance heat, gas heat, oil heat, and heat pumps. Results indicate whether each modification is cost-effective (savings over time exceed costs) or not.

The resulting new MPS thus attempts to balance costs, benefits, climates, and available technology to reach an optimum level of reasonable energy conservation for new housing. There are three pathways for compliance with the standard.

The first method is the "component performance" approach, which defines the thermal transmission (U-value) through each of the components in the building. This approach sets a target for heat transmission through any component and allows flexibility in selecting materials. For example, a certain level of heat transfer for wall insulation, etc. Most homebuilders are expected to select this approach.

The second method is called an "overall envelope approach;" the overall thermal transmission of the dwelling must meet a stated value but components can be combined and

manipulated within the structure. For instance, increased levels of insulation in the walls might be used to compensate for high heat losses through large window areas. This approach is the same conceptual method used in the ASH RAE 90-75 standard (see Model Code, below) but the standards as drafted appear to be more stringent. Some builders are expected to use this approach, particularly those building innovative housing and multifamily units. Masonry industry builders generally favor this approach, as it provides greater leeway for compliance and suits the particular needs of masonry structures.

The third avenue of compliance is "overall structural performance." Builders using this approach must demonstrate that they can meet or improve on the energy uses determined by either of the other two methods. Builders of manufactured housing and some masonry builders are expected to favor this approach.

The revised MPS are expressed in two forms; one for homes heated by electric resistance units and one for homes using heat pumps or fossil fuels. Approximately 49 percent of HUD-financed buildings are estimated to use electric resistance heat, close to 50 percent are thought to use natural gas and only 0.5 percent use oil.

The new MPS will clearly mean an increase in first-costs as a result of increased amounts of insulation, more use of double- and triple-glazing, and possible increases in labor costs. They are designed, however, to effect a net savings in total costs through reduced energy bills, and to lower the consumption of fossil fuel.

A number of conservation groups, represented principally by the Natural Resources Defense Council, have objected to various aspects of the standards as not sufficiently effective in light of the necessity for lowering consumption of fossil fuel. The homebuilding industry has objected on the basis that the new MPS will be overly stringent, require levels of thermal protection that are not cost-effective, and will present technical difficulties for builders. (The National Association of Home-

builders has argued that conservation investments should payback over a 7-year period, the time in which most homes are resold.)

#### Farmers Home Administration Thermal Performance Standards

The Farmers Home Administration adopted MPS in 1971 as the minimum design and construction criteria for all residential structures constructed or purchased with FmHA loans or grant funds. At that time, FmHA found MPS provided adequate protection for its low- and moderate-income borrowers. However, escalating fuel costs and other economic pressures caused many FmHA borrowers to experience serious financial difficulties in the 1970's. There was an increase in the rate of foreclosures, abandonments, and voluntary transfers of FmHA housing units. Given what was then perceived to be HUD's lag in revising MPS, FmHA decided to act independently.

In March 1978, FmHA issued its thermal performance standards. The goal of the standards is to conserve energy and to control the heating and cooling costs for its borrowers. The economic rationale behind the thermal performance standards closely parallels that used by HUD for the revised MPS. However, FmHA elected to standardize its basic energy costs at 80 cents per 100,000 Btu delivered, and did not adopt a dual fuel standard, as most of their units (85 percent) are serviced by electric resistance heating.

The standards are more stringent than the proposed new MPS for fossil fuels, but are approximately the same for electric resistance. Higher levels of insulation are required in the ceilings, walls, and floors of dwellings. The choice of compliance paths is the same as for MPS – component performance, envelope performance, or overall structural performance.

Criticisms of the 1978 standards have been similar to the criticisms of MPS; conservation and some consumer groups have argued for strong standards to protect residents against rising costs; builders and some consumer groups have argued for keeping first costs low.

One of the major differences between the FmHA and the MPS programs is the approval

process. FmHA activity occurs primarily at the county level; some 1,800 county offices serve the national constituency of the agency. Applicant interviews, review of plans, appraisals, and inspections are provided from the county office.

The Farmers Home Administration accounts for approximately 6 percent of the annual national housing starts. With the adoption of the new standards, FmHA estimates that the number of new housing starts for FY 1978 will decrease by up to 12 **percent**.

### Model Code for Energy Conservation in New Buildings

In 1975, Congress enacted the Energy Policy and Conservation Act (Public Law 94-163). One of the numerous provisions of the measure is an authorization for funds to assist States in reducing the growth rate of energy consumption. States must initiate certain programs to receive the funding. (See chapter VII for discussion.) One of the requirements is the adoption of mandatory thermal efficiency standards and insulation requirements.

In implementing this legislative mandate, DOE had to determine a measurement of acceptability for the standards chosen by the States. This process led to creation of the Model Code, and launched a major Federal initiative affecting local building codes. The Department entered into a contractual agreement with NCSBCS. NCSBCS acts as a coordinator and an agent for uniformity and/or compatibility between the major code groups. The major code groups are the Building Officials and Code Administration International, Inc. (BOCA), the International Conference of Building Officials, (ICBO), and the Southern Building Codes Congress International (Southern). The Model Code reflects the technical provisions of ASH RAE 90-75, "Energy Conservation in New Building Design," a document prepared by the American Society of Heating, Refrigeration and Air Conditioning Engineers. ASH RAE 90-75 as a consensus standard.

The provisions of the Model Code reflect its basis in standard engineering analysis. **It is**

compatible with the language and approach of existing codes. Selection of this approach represented a major success for the engineering profession.

The provisions of the Code "regulate the design of building envelopes for adequate thermal resistance and low air leakage, and the design and selection of mechanical, electrical, and illumination systems and equipment that will enable the effective use of energy in new building construction." Three compliance paths are offered:

1. Specified Acceptable Practice Provisions. A basic component approach, allowing the builder to check all materials and practices against guidelines.

2. Subsystem Approach. Various building elements can be combined to make a whole, i.e., the thermal performance and energy use of the envelope must be acceptable but there can be variation within the several parts of the structure [chapters IV through IX].

3. Systems Approach. Entire building and its energy using systems. This approach allows credit for the use of nondepletable resources (chapters X and XI).

Once the Model Code was endorsed by DOE, it began to enter the State and local building code system through the various adoption processes. It is now estimated that by the end of 1979, 42 States will have adopted the Model Code or a similar methodology, either through direct adoption by the State or by reference.

The Department of Energy has provided funding for training programs for State and local officials on the Model Code. The code groups and NCSBCS have been the principal instruments for training and test efforts, along with engineering groups and other interested trade groups. Basic training documents have been prepared and tested in a few States. Much of the training material developed thus far is quite technical in nature. Early evaluation of training efforts conducted by some States on an informal basis has indicated that, due to the complexity of the provisions and the

difference from existing practice, training will be needed for a long time.

It is not possible to conclude from the number of States that are in some stage of approving the Model Code the actual level of code enforcement. There is very little information available on code enforcement in general, in some jurisdictions a code is defined as enforced when it is adopted. This relieves the jurisdiction of the necessity for granting waivers. While local code inspectors have experience with traditional health and safety aspects of codes, the energy provisions are new and require learning new calculations and practices. Building inspection as an activity is traditionally underfunded, and inspectors frequently have very large work burdens and slight technical preparation. In the past few years, budget trimming measures have often kept the number of officials at low levels despite increasing construction activity. (There are about 50,000 local code officials in the country.) Building inspectors work for local governments and must be responsive to the desire of the locality and local builders to move quickly through the inspection process.

In addition to the normal range of objections to the Model Code (as being either too lenient or too demanding), the following principal technical objections are often raised:

1. The Code is not based on a clear measure of cost-effectiveness and therefore does not truly serve the interests of the consumer.
2. The Code is deficient in that the building envelope requirements are based entirely on heating degree days, with no consideration given to cooling loads.
3. The Code does not provide incentives for reducing the size of heating and cooling systems.
4. The Code allows the same building envelope requirements whether the fuel source is gas, oil, electric resistance, or heat pump.
5. The Code does not deal adequately with the important issues of siting, orientation, or dynamic effects.

6. The structural performance path, characterized as the most flexible compliance approach, is felt by some to be not sufficiently flexible to allow for real innovation in building design.

## Building Energy Performance Standards

In 1976, Congress once again turned to building standards in enacting the Energy Conservation and Production Act (Public Law 94-385). This law requires that States and localities adopt building energy performance standards (BEPS). Such a standard is to consider the total energy performance of a building design and set energy use parameters without regard to specification of materials or type of construction. As normally defined, a performance-based standard specifies a goal without specifying the methods, processes, or materials used to reach the goal. The stated purpose of the Act is to:

(1) redirect Federal policies and practices to assure that reasonable **energy conservation features will be incorporated into new commercial and residential buildings receiving Federal financial assistance;**

(2) **provide for the development and implementation, as soon as practicable, of performance standards for new residential and commercial buildings which are designed to achieve the maximum practicable improvements in energy efficiency and increases in the use of nondepletable sources of energy; and**

(3) **encourage States and local governments to adopt and enforce such standards through their existing building codes and other construction control mechanisms, or to apply them through a special approval process.**

(Public Law 94-385, sec. 302(b))

The adoption of such a standard as a national target was understood to represent the most modern and far-sighted approach to energy conservation in buildings. Proponents of such standards, principally representatives of the architectural profession and certain environmental groups, expressed the conviction that performance standards would allow free reign to new, innovative design approaches, promote the use of nonrenewable resources,



focus on energy consumption rather than materials or techniques, and in general raise the level of utility of standards. The adoption of performance standards was a victory for the architects, just as adoption of ASH RAE 90-75 as the basis for the Model Code had been a triumph for the engineering profession. It also marked a very new approach to measuring the energy use of building design. (No steps to require the building to actually meet the design energy level have been authorized.)

In November 1978, the "Advanced Notice of Proposed Rulemaking" (ANPR) containing the initial DOE statement on BEPS appeared in the Federal Register. Because of the legislative origin of BEPS, the new approach to standard setting BEPS represents, and the involvement of numerous interest groups in this issue, a great many important issues have emerged in the debate. Numerous studies and analyses have been prepared by the Government and private groups. This report does not attempt to restate the many complicated and thoughtful reports and analyses that are available on this topic. Six principal issues have been selected for specific discussion. These issues are likely to figure prominently in congressional debates.

**1. The Unique and Complex Nature of the Standard.** A performance standard approach to building design does offer the widest range of options to a designer. It appears to provide important freedom for innovation, particularly in the area of energy-conscious design ("passive solar"), where the structure itself acts as the heating and cooling mechanism. It also assures a focus on the energy consumption as a principal characteristic of the structure. It does not, automatically, ensure that a structure will use less energy than a comparable structure designed by standard code techniques. The practical side of the question, however, is that it has proven quite difficult to draw a performance standard that satisfies all the objectives and yet is correct for the majority of buildings and agreed on by all players. There are still many unanswered questions about the dynamic performance of buildings. An accurate figure is difficult to determine for likely actual infiltration rates. There is disagreement

over the accuracy of various computer programs and calculations used to derive energy budgets. While initial calculations have been expressed in Btu/ft<sup>2</sup>/degree day, some critics suggest that the function of various areas of the structure must be included (different budgets for homes with lots of bedrooms and little communal space, for example). Thus, a question exists as to whether the state-of-the-art is adequate to determine a valid energy budget equation, (not whether housing can be improved).

In addition to this issue, the draft statement released by the Department in the ANPR contains provision for RUFs – Resource Utilization Factors—and RIFs — Resource Impact Factors. The Resource Utilization Factor weighs the relative efficiency of total energy used in the various typical home fuels, and assigns a higher thermal integrity requirement to homes using electric heating. Traditional codes have measured energy from the input of the home rather than from the point of origin. While there are clearly different supply situations and different thermodynamic characteristics of various fuels, this issue has not been fully addressed by Congress. RIF, which has not been used as a meaningful factor as yet, represents an attempt to quantify the social, environmental, and similar "external" costs of using certain fuels. Reaching agreement on a quantitative value for RIF will be extremely difficult. Both RUFs and RIFs reflect an attempt to design a standard that measures impacts well beyond the simple heat use of buildings. Both RUFs and RIFs represent areas of great controversy and fuel the debate over BEPS.

**2. Regulatory Philosophy.** In any standard-setting process, there will be varying opinions on the regulatory philosophy to be employed. Regarding BEPS, proponents of rapid energy conservation, including many environmental groups, wish to have the initial standard set at a level attainable by the construction industry but well above the current level of practice. Building industry representatives contend that the existing codes are adequate, that the industry is responding to consumer demand for energy conservation as quickly as possible,

and that to require a higher level of performance would be injurious to the industry and cross the "reasonable" boundary.

Resolution of this controversy is related to many other problems in home energy conservation. No established and consistent strategy exists to reduce residential energy consumption over time. No schedule has been established for upgrading MPS, the Model Code, or BEPS regularly, and no second- or third-level targets have been created. An example of target setting exists in the automobile industry. Manufacturers were put on notice as to the acceptable levels of fleet average fuel consumption that would be expected over a number of years. Some similar set of goals might be useful for the housing industry. (The State of Wisconsin has adopted such an approach.) Goal setting is particularly necessary if some form of sanctions is to be invoked for non-compliance, either now or in the future. Similarly, incentives that could be added to the program could be tied to reaching certain energy use levels prior to the required date.

In any event, the first BEPS levels were based on 1974 construction data. Since 1974, there has been a considerable improvement in the level of insulation, use of double- and triple-glazing, and other factors influencing energy use. (See "Housing Decisionmakers," chapter V and appendix B.) To establish a standard based on 1974 data may well be drawing a standard below current industry level of practice.

**3. BEPS Timetable.** Many of the problems that now characterize the debate over BEPS appear to result from DOE's attempt to respond to an unrealistically accelerated timetable for preparation and publication of a standard. The first BEPS draft regulations were to appear at least 1 full year prior to rulemaking, to allow for full comment and review. This schedule was not met. ANPR appeared on November 21, 1978, and hearings began on December 1, 1978. This timing has resulted in understandable cynicism from critics of ANPR regarding the openness of the process. Principal consultation during the drafting period for BEPS was with the construction industry, despite a legislative requirement for full public par-

ticipation. A proprietary computer program was used for commercial building calculations. Since not only the specific formulas used in BEPS but the assumptions and premises of the supporting analysis are presumably open to review, the time allowed appears totally inadequate. Interestingly, the Federal experience seems to be paralleling the experience of the State of California. California prepared an energy conservation code, including some energy budget standards. The standards were drawn quickly, and there was not enough time to fully consider comments or objections. The standard has met with resistance and litigation. While an agency cannot protect against litigation by taking a long time to act, the consequences of releasing a standard of such potential impact as BEPS without very thorough and sincere public review and involvement seem dire.

**4. Implementation.** Once agreement has been reached on the determination of the standard, very substantial problems will remain regarding Implementation. Implementation issues need to be faced from the beginning, in order that the standard as eventually promulgated can be as productive as possible. Federal standards that must be enforced by State and local officials face many problems of compliance. There is no indication that the problems of implementation have been given the appropriate level of consideration. Implementation problems are critical because DOE, through the Model Code, has already launched States on a very different code course. Several factors stand out:

A) Preparation for the New Standard. Due to the existing DOE State grant program, States have put considerable effort and resources into adopting the Model Code or similar, engineering-based standards. The training that has been done by code and professional groups has concentrated on that approach. No training has been done to prepare States for BEPS. While some HUD and DOE research studies and contracts have been initiated to prepare for the new standards, OTA interviews with State officials and people working in code enforcement indicates that there is

essentially no understanding of the performance standard, and almost no awareness that the standard is about to be adopted. The response of States contacted during the OTA study has been one of surprise that such a standard was in the pipeline, and skepticism about the seriousness of the Government in implementing it.

B) **Equivalency.** The enabling legislation states that States must adopt BEPS or a standard that will "meet or exceed the requirements" of the Federal standard. No determination has been made as to how the equivalency requirement will be defined. It could mean that all States and localities would have to adopt a performance standard using the same or similar methodology as BEPS. It could also mean that the localities must have in place, a standard that results in limiting energy consumption in buildings to approximately the same level. If this is the case, for example, changes in the Model Code to increase the level of effectiveness could meet the equivalency test. Without an indication of how the equivalency requirement will be interpreted, States have little guidance as to how to prepare. Will there be two separate, overlapping standards? If only a pure performance standard is acceptable, by whom will the design drawings be certified? Will computer analysis be made available by DOE, or will builders be required to obtain the imprimatur of an architectural and engineering firm for certification? Will local code officials be expected to interpret the BEPS criteria? Will special assistance or review be provided by DOE or HUD area offices? Who will monitor the progress of the industry? What sort of financial and technical assistance will be provided to localities for additional inspections? These problems are resolvable, but decisions must be made with the involvement of State and local officials if compliance is expected.

C) **Transition.** This issue relates once again to target setting, as well as to preparation. If

a performance-based standard is designated as the only acceptable path of compliance, will the new approach be phased in over time? States and towns cannot modify building codes quickly. Traditional processes of review and approval must be followed. Many States are still moving through this process on the Model Code effort. Who will train the building inspectors, State energy office technicians, and others who will bear the brunt of the effort?

5. **Sanctions and Incentives.** The enabling legislation requires that the Secretary of DOE recommend to Congress whether or not to adopt the authorized sanction of the program. This sanction is the withdrawal of Federal funding mechanisms for housing, including FHA funding and Federal lending programs. If adopted, the sanction would be extremely strong. If the sanctions are not adopted, it is unclear what mechanism or leverage would be available to encourage compliance. The use of incentives for the early periods has been suggested; homes meeting low energy standards could receive favorable loan terms from Federal programs or other forms of assistance. The new standard could simply be adopted and localities encouraged to incorporate it into existing codes, so that those wishing to use this approach could take advantage of it. Data could be collected on houses designed by this approach and this data could be used to determine if broader application is desirable. Federal property, or property directly assisted by Federal programs, could be required to meet BEPS criteria. The Minimum Property Standards could be revised to incorporate BEPS. Special grants could be made available to localities to test BEPS and experiment with alternative methods for measuring compliance. Awards for design competitions might encourage BEPS usage. Congress could consider adding any one of a number of options to the existing legislation either in addition to or in lieu of the authorized sanctions.

6. **Special Problems of Housing.** The energy consumption in commercial-sized buildings is better understood than the consumption of most houses. The principal involvement of ar-

chitects and engineers is with larger buildings rather than housing. Most housing in the United States is constructed by small builders who have little technical training or access to technical assistance and few resources (see chapter V). Most small builders use the simplest approach to meeting code approval; they follow accepted practice for their area and the prescriptive aspects of codes. Given the difficulties of determining an energy budget for a house, and the problems of training small builders to comply, it may be necessary to provide a simple methodology for the housing sector, such as previously approved designs that have been translated into specifications. In the

Advanced Notice of Proposed Rulemaking on BEPS, the residential sector was simply directed to follow the National Association of Home Builders Thermal Performance Guidelines. No rationale was given for this decision. A number of technical problems exist within the Thermal Performance Guidelines, although they do appear to be more responsive to climate and local conditions than the draft BEPS, which rely on seven climate zones.

If housing is to be included under BEPS, more thoughtful attention must be given to the special needs of the sector.