CONSUMER ENERGY CONSERVATION POLICIES AND PROGRAMS IN THE UNITED STATES AND THE PACIFIC-NORTHWEST REGION

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CONSUMER ENERGY CONSERVATION POLICIES (CECP)
A Multi-National Study

CECP is an international cooperative research undertaking, initiated in 1981, which evaluates and compares energy conservation policy and programs in eight Western countries. Its aim is to contribute to improved design and implementation of policies and programs conducive to a rational use of energy at the level of private households and the residential sector.

Research is conducted in three phases: Phase I documents and compares existing policies and programs of central and local government, utilities, consumer, environmental, and voluntary organisations. In Phase II, started in 1983, empirical studies of the linkages between program-level and household-level processes are carried out in exemplary communities. Phase III compares and synthesizes the results of all national studies and draws conclusions on energy, environmental, and consumer policy issues in relation to the processes of consumer energy conservation.

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The contents of these reports are entirely the work of their authors and express neither the views of the Commission, nor of other funding institutions.
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ABSTRACT

This report presents an overview of current energy conservation policies in the United States and analyses them in terms of program objectives, conservation strategies, household energy saving potential, and impacts on consumers' lifestyles and on the environment. Particular attention was given to the Pacific Northwest region where some of the most vigorous local conservation efforts were undertaken and fairly rigorous program evaluations have been performed. It is documented that existing conservation programs rely primarily on economic arguments to mobilize consumers to take conservation actions. Most consumers are concerned about rising energy costs and are receptive to financial motivational appeals. Nevertheless, the effectiveness of this mobilization technique is limited by the fact that many people have relatively few technical or economic opportunities to take conservation actions, and by the fact that a number of non-economic factors also strongly influence energy consumption. However, evaluation studies unequivocally show that (a) impressive energy savings can be attained through many different kinds of conservation programs, so that most households can reduce their total energy consumption by up to one-third through adequate weatherization and other conservation measures; (b) although informational and educational activities must be an integral part of all comprehensive conservation programs, they are not sufficient in themselves to ensure significant energy savings, so that comprehensive programs must also contain a mixture of publicly acceptable financial and mandatory components; (c) virtually all conservation programs and measures presently in use in the U.S. and the Pacific Northwest are highly cost-effective when compared with the costs of constructing new electrical generating plants.

The study formulates recommendations concerning future policy directions, program development, and research priorities. Extensive appendices provide documentation of exemplary policies, programs, and evaluation studies.
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INTRODUCTION

The Multi-National Study of Consumer Energy Conservation Policies, which is funded by the Directorate of Environmental and Consumer Protection of the Economic Commission of Europe, and is coordinated by the International Institute for Environment and Society in Berlin, has the following five objectives:

- Document and evaluate existing energy conservation programs and instruments at local, national, and European levels.
- Conduct a comparative European analysis to identify successful and/or promising instruments for energy conservation and develop and assess them for wider implementation.
- Assess the impact and consequences of particular instruments on consumers' lifestyles and on the environment.
- Identify those areas in energy conservation policy where a uniquely European dimension exists.
- Develop a research strategy going beyond attitudinal surveys to include the interplay of micro, or personal, and macro, or contextual, factors which influence the effectiveness of particular instruments.

Although the main focus of this study is on European countries, the United States is included to provide a comparison case, and also because so much of the existing research on energy conservation has been conducted in this country.

The main purpose of this Phase I report of the project on the United States is to present an overview of current conservation policies and programs in the U.S., and to analyze them in terms of the general model guiding the Multi-National Study.
Particular attention is given in this report to the Pacific Northwest region, for three reasons: (1) it is the only part of the country for which broad energy policies have been established; (2) it is the setting for several of the most vigorous state and local conservation efforts in the U.S.; and (3) it is the only region in which fairly rigorous assessments of the costs and benefits of conservation have been performed.

The report is divided into three main parts: Part I., National, Regional, and State Policies and Practices, contains chapters on national energy, environmental, and consumer policies, regional and state conservation policies, and on public support and practice of conservation. Part II., Conservation Programs and Effects, includes chapters that give an overview of current conservation programs, that summarize existing evaluations of conservation programs, and that analyze those programs using the general model which guides the Multi-National Study. Part III., Conclusions, consists of a chapter on overall conclusions and a chapter giving recommendations and final thoughts. Seven appendixes contain detailed material on topics discussed in the report. One appendix reports U.S. national energy consumption statistics for the years 1970-82.
PART I. NATIONAL, REGIONAL, AND STATE POLICIES
To provide an overview of the energy scene in the United States at the present time, this chapter sketches general energy policies, energy conservation policies, conservation statutes, environmental policies, and consumer policies.

1.1 General Energy Policies

At the time of the 1973 oil embargo, the United States had no national energy policy. The first steps toward formulating such a policy were a series of studies conducted in 1974 and 1975 under the Energy Policy Project of the Ford Foundation (e.g., Brannon, 1975; Newman & Day, 1975). The summary report of that project, titled *A Time to Choose* (Energy Policy Project, 1974), outlined three alternative energy scenarios for the United States during the next 25 years. (1) Historic Growth, in which energy consumption would continue to increase at the then-current rate of 3.4 percent per year, so that total national energy use would rise from 75 quads (quadrillion Btu's) in 1973 to 187 quads in 2000. (2) Technical Fix, in which technical modifications would increase energy use efficiency, so that consumption would grow at only 1.9 percent per year and total use would be only 124 quads in 2000. (3) Zero Energy Growth, in which extensive conservation efforts would slowly reduce the energy growth rate to zero by 1990 and thereafter retain it at that level, so that total energy use in 2000 would be merely 100 quads. At the time that report was published, achieving the Technical Fix scenario was considered to be a demanding goal, and hardly anyone gave serious consideration to the Zero Energy Growth scenario as a viable possibility.

Since 1974, the U.S. Congress has passed a considerable amount of energy legislation, some of which
dealt with energy production and some with energy conservation. The most important of these acts -- the Energy Policy and Conservation Act (EPCA) of 1975 -- strongly emphasized conservation as a national energy policy. In 1977, President Carter proposed a comprehensive energy policy for the U.S., in which conservation would be the cornerstone and reducing energy consumption would become the "moral equivalent of war." His conception of serious energy conservation, however, was merely to limit the energy growth rate to 2.0 percent per year. And by 1979, President Carter's attention had largely shifted to large-scale synfuel development, so that increased energy production replaced conservation as the focus of national energy policy debates.

In 1981, the Reagan Administration took the position that the proper role of the federal government is only to bring energy resources on publically owned land into production, leaving all other energy matters to the private sector as far as possible. As stated in the National Energy Policy Plan released by the U.S. Department of Energy in July 1981 (U.S.D.O.E., 1981): "Increased reliance on market decisions offers a continuing national referendum which is a far better means of charting the Nation's energy path than stubborn reliance on government dictates or on a combination of subsidies and regulations" (p. 1). Consequently, "Public spending for energy-related purposes is secondary to ensuring that the private sector can respond to market realities" (p. 2). Appendix A contains selections from the National Energy Policy Plan.

Reliance on the market does not apply to some forms of energy, however, since "Federal spending should be considered...in those promising areas of energy production and use where the private sector is unlikely to invest" (p. 2). In particular, the Reagan Administration places great emphasis on nuclear power as an energy resource for
the future: "The Administration is committed to reversing past Federal Government excesses and to providing a more favorable climate for efficient energy production, thus allowing nuclear power to compete fairly in the market place with other potential sources of energy supply"(p.7).

1.2 Energy Conservation Policies

Prior to 1973, the idea of conserving energy had barely entered the consciousness of most Americans, and -- with a few exceptions (e.g., Office of Emergency Preparedness, 1972) -- was not a topic of serious national policy discussion. Most public policy makers, energy managers, and energy economists firmly believed that continually increasing energy use was an imperative requirement for economic growth and national well-being. That belief persisted for several years after the oil embargo, with the result that conservation was viewed only as a technical problem of improving energy use efficiency and was not seriously considered as a national energy policy.

One of the first indications that the U.S. might be grossly underestimating its potential for reducing energy consumption appeared in late 1976, when Lee Schipper and Allan Lichtenberg (1976) published a widely read article which pointed out that Sweden then consumed only 54 percent as much energy per capita as the U.S., despite its colder climate and its higher gross national product per capita. Part of Sweden's lower level of energy use is attributable to differences in patterns of living (more multifamily housing, fewer automobiles), but a considerable portion of it results from more efficient energy technology in all realms of life. Later research (Darmstadter, Dunkerley, and Alterman, 1977) demonstrated that all other industrialized nations (except Canada) use less than one-half as much energy per capita as the United States. These and subsequent studies suggested to more
and more people that continual energy growth might not be necessary for economic well-being in modern nations. (Empirical evidence supporting that conclusion had been available as early as 1974, in Mazur and Rosa.)

In 1978, the report of the Demand and Conservation Panel of the Committee on Nuclear and Alternative Energy Systems (CONAES, 1979) of the National Academy of Sciences concluded that with "aggressive" energy conservation policies directed toward maximum efficiency, plus minor lifestyle changes and steadily rising energy prices, energy demand in 2010 could be only 77 quads per year -- compared to 78 quads in 1978. The following year, the Council on Environmental Quality (CEQ, 1979) concluded from its review of all energy studies conducted up to then that: "Energy demand in the year 2000 could even be significantly less than today's, while still allowing a steady increase in GNP...." In short, between 1977 and 1979, energy policy thinking in the United States--especially outside the government--had shifted from viewing a 2 percent energy growth rate as a demanding goal to believing that an absolute .reduction in energy consumption was entirely practicable.

The importance of energy conservation as a major component of U.S. national energy policy was also emphasized by three extensive studies of the country's total energy situation that were all published in 1979 (Landsberg, et al., 1979; Schurr, et al., 1979; Stobaugh and Yergin, 1979). The most widely read of these reports concluded that: "It is striking the extent to which conservation, with the aid of solar energy, rather than ever-increasing oil imports and domestic supplies of coal and nuclear, could help meet U.S. energy needs" (Stobaugh and Yergin, 1979:231-3).

The idea of reducing the total amount of energy consumed in the U.S. was only speculation in 1979, but in
1980 it became reality. Total national energy consumption during 1980 fell to 76.2 quads, compared to 79.0 quads in 1979, for a reduction of 3.5 percent. And in 1981 it was only 74.2 quads, which was a reduction of 2.6 percent over 1980 and 6.1 percent over 1979 (U.S.E.I.A., 1981 and 1982).

A recent analysis of the declining rate of energy consumption in the U.S. since 1973 found that about half of that reduction could be attributed to a slower rate of economic growth. The other half was apparently the result of conservation efforts induced by a combination of rising energy prices and community conservation programs (Hirst, et al., 1981b). It thus appears that Americans are beginning to take energy conservation very seriously, and that the country can significantly reduce its total energy consumption.

A critical point about the evolution of a national energy policy in the United States since 1973 is that it has occurred largely outside the Federal government. The principal participants in this process have been private organizations such as the Ford Foundation, Harvard University, Resources for the Future, the Worldwatch Institute, Friends of the Earth, the Solar Lobby, and others. Their thinking, analyses, and proposals have consistently been far ahead of the U.S. Department of Energy. As a result of the sustained efforts of all these concerned private organizations, energy conservation has now become the principal de facto energy policy of the United States, and is being enacted by a large proportion of the population.

The U.S. government, meanwhile, has never treated energy conservation as a top-priority goal. Under President Carter, Congress made what might be described as a "half-hearted" attempt to promote conservation by enacting a series of laws aimed primarily at the
individual states. The major features of all those conservation statutes are summarized in the following section of this report. None of the conservation efforts created by that legislation were very ambitious in goals or extensive in scope, however, and all of them were very inadequately funded.

The Reagan Administration strongly emphasizes energy production over conservation. The National Energy Policy Plan states that conservation of energy is to be achieved largely in the marketplace as a result of rising energy prices, especially as promoted by deregulation of oil and natural gas prices. The application of this policy has resulted in almost total elimination of all efforts by the Federal government to promote energy conservation.

Basically, the present policy of the United States government toward energy conservation is that (1) the Federal government has little or no responsibility for promoting energy conservation; (2) this is a proper concern for local governments if they wish to undertake it, but they must fund all such efforts themselves; (3) the primary responsibility for conserving energy lies in the private sector, with private utilities, oil companies, and firms providing conservation goods and services; and (4) the decision of whether or not to conserve energy must ultimately rest with each individual consumer, acting in the marketplace. As succinctly stated in the 1981 National Energy Policy Plan: "When individual choices are made with a maximum of personal understanding and a minimum of government restraints, the result is the most appropriate energy policy" (p. 1).

1.3 Energy Conservation Statutes

Since 1974, the U.S. Congress has enacted a number of laws pertaining to energy conservation, which are summarized below. This legislation constitutes the legal framework within which most conservation programs in this
country are organized and operated. The most recent of these statutes -- the Pacific Northwest Electric Power Planning and Conservation Act -- pertains only to the Pacific Northwest region, and hence is discussed in the next section.

Federal Energy Administration Act of 1974. Established the Federal Energy Administration as a temporary (two-year) agency after the 1973-74 oil embargo, for the purpose of managing short-term energy problems. One of the principal functions of the FEA was to inform the public about the nature of the energy situation and the measures needed to cope with it. In addition, the FEA was to draw up a comprehensive national energy plan that included mandatory energy-saving measures that could be implemented if needed. This was the first systematic effort by the federal government to conduct a broad-scale public information campaign on energy shortages and energy conservation. By placing primary emphasis on information and education techniques, FEA set the course of governmental action on energy conservation for the next several years.

Energy Reorganization Act of 1974. Replaced the Atomic Energy Commission with the Energy Research and Development Administration and the Nuclear Regulatory Commission. Energy conservation was specified as one of the six broad functional responsibilities of ERDA.

Non-Nuclear Energy Research and Development Act of 1974. Established a ten-year, $20 billion program within ERDA to study and develop renewable energy sources and energy conservation. Particular emphasis was placed on improving building designs, automobile engine efficiency, and electricity cogeneration.

Emergency Highway Energy Conservation Act of 1974. Established a national maximum speed limit of 55 miles per
hour.

**Energy Policy and Conservation Act (EPCA) of 1975.** The first comprehensive U.S. energy policy statute. Directed all states to establish energy conservation programs that covered at least the areas of building standards, lighting standards, procurement practices, carpool and vanpool programs, and traffic flow. Provided most of the funding for these state programs, and specified energy consumption reduction targets that the states were to attain for continued funding. Established mandatory gasoline efficiency standards for new automobile fleets, which rise on a gradual basis to 27.5 MPG for the 1985 fleet of new cars. Also specified energy efficiency standards for all household energy-using equipment and required manufacturers to attach labels to their products indicating their energy efficiency. Instructed ERDA to conduct a public education program to inform consumers of the benefits of life-cycle costing of these appliances.

**Energy Conservation and Production Act (ECPA) of 1976.** Authorized additional state conservation programs beyond the five areas specified in EPCA, with emphasis on public information activities and building energy audits. Initiated research to establish energy efficiency requirements for all new buildings. Provided financial assistance for residential weatherization for low-income homeowners.

**Department of Energy Organization Act of 1977.** Established the U.S. Department of Energy to replace the Energy Research and Development Administration. As in ERDA, energy conservation was specified as one of the major responsibilities of DOE.

**National Energy Extension Service Act of 1977.** Created the Energy Extension Service as a community based
and oriented program to provide information, education, and technical assistance on energy conservation and renewable resources to households and small businesses. After a one-year trial period in ten states, all states were to establish and operate EES programs, but the design and content of these programs were left for the individual states to determine.

**Small Business Energy Loan Act of 1978.** Directed the Small Business Administration to administer $30 million in direct loans and $45 million in loan guarantees to small businesses producing energy conservation and renewable energy equipment. These loans were to be used for plant construction, start-up, conversion, or expansion. Engineering, architectural, and consulting firms were also eligible for loans to work on energy conservation and renewable energy projects.

**Public Utilities Regulatory Policies Act (PURPA),** part of the National Energy Act of 1978. Required utilities to purchase excess electricity produced by cogeneration and small renewable resource generators at fair rates, and exempted such facilities from federal regulations covering electric utilities. Also required state utility commissions to consider, but not necessarily adopt, six kinds of utility rate reform: time-of-day pricing, seasonal rates, cost-of-service pricing, interruptible rates, elimination of decreasing block rates, and lifeline rates. Commissions must also consider prohibiting master metering in multifamily housing.

**Energy Tax Act,** part of the National Energy Act of 1978. Provided a credit of up to $300 for homeowners who install conservation equipment, and up to $2200 for renewable energy equipment. Businesses that install such equipment receive an extra 10 percent tax credit. Also imposed an excise tax on fuel-inefficient new automobiles, with the efficiency requirements and the tax amount to
rise gradually to 1985.

**National Energy Conservation Policy Act (NECPA)**, part of the National Energy Act of 1978. Required state governors to submit plans to the Department of Energy specifying how electric and gas utilities and oil dealers will advise consumers about conservation and renewable energy measures and the costs and benefits of such measures. Utilities are required to perform residential energy audits on request, to estimate the costs and potential energy savings of all recommended conservation improvements, and to arrange for the installation and financing of the improvements if desired. Also authorized grants of up to $800 for low-income urban families to weatherize their homes, and up to $1500 for rural families. Required the Department of Housing and Urban Development to set minimum energy efficiency standards for multifamily houses and for new FHA housing, and provided grants through HUD to finance conservation improvements to multifamily housing projects for the elderly, handicapped, and low- or moderate-income families. Provided loans and loan insurance for residential energy-saving improvements and for installing solar equipment. Established a 3-year program of energy audits and improvements in schools, health-care facilities, and other public buildings. Expanded the provisions of EPCA pertaining to energy efficiency standards for major home appliances.

**National Gas Policy Act**, part of the National Energy Act of 1978. Established a schedule for the phased deregulation of natural gas prices, with all such controls to be eliminated by 1985.

**Used Oil Recycling Act** of 1980. The states received funding to set up programs to recover and recycle used motor vehicle lubricating oil.
**Gasoline Rationing Act of 1980.** Established a standby gasoline rationing plan, to be implemented when the President determines that a 20 percent shortage of gasoline exists, if neither branch of Congress objects to its implementation. The Department of Energy would distribute ration checks to all registered vehicles every three months. These could be exchanged for ration coupons at local outlets. Coupon distribution would be based on recent state consumption patterns. Priorities were established for various special transportation activities, and states were authorized to develop their own procedures to deal with supply imbalances and hardship cases.

**Solar Energy and Energy Conservation Bank Act,** part of the Energy Security Act of 1981. Created the Solar Energy and Energy Conservation Bank to help finance conservation and passive solar improvements by single-family households, multifamily households, small businesses, and farms. The Bank would pay a portion of the principal of loans made by lending institutions to low and middle income people for such actions. The Bank has not yet been established by the Reagan Administration.


**1.4 Environmental Policies**

In contrast to the situation with energy conservation, the United States does have a comprehensive environmental policy. It was established by the National Environmental Policy Act (NEPA) of 1969. This act requires that all policies, regulations, and public laws of the United States shall be administered in ways that will enhance environmental quality. It also specifies that an environmental impact statement must be prepared for every proposed law, program, project, and other major
federal action that could significantly affect the quality of the environment.

A large proportion of the projects for which environmental impact statements have been prepared thus far have been energy development, processing, or transmission facilities. Several hundred environmental impact statements have been written on such projects as nuclear power plants, coal strip mines, oil pipelines, and high-voltage electric lines. Anticipated undesirable impacts on the natural environment have led to the rejection of some proposed projects (such as the Northern Tier oil pipeline across Puget Sound in the State of Washington). Other proposed projects (such as two nuclear power plants in the Skagit Valley of Washington State) have been abandoned after impact studies revealed that the selected site was not geologically suitable. No major projects have been cancelled because of unfavorable social or economic impacts, but socioeconomic impact studies have frequently led to the creation of impact mitigation programs designed to prevent or minimize social and economic impacts. (Such mitigation measures have been a major consideration in all socioeconomic impact studies done in conjunction with proposed sites for nuclear waste repositories, for example.)

Two federal agencies administer national environmental policies in the United States. The Environmental Protection Agency (EPA) is charged with enforcing all of the various environmental standards that have been established by Congress since 1970, covering water, air, and land. The Council on Environmental Quality (CEQ) was created by NEPA and located in the Executive Office of the President. Its functions are to assist agencies in preparing environmental impact statements, and to review the final EIS's.

Since NEPA and the other statutes establishing air,
water, and land quality standards are federal law, the Reagan Administration has not been able to eliminate them. Its strategy instead has been to drastically reduce the budgets of both EPA and CEQ, leading to massive firings of professional and support personnel, which has left both agencies seriously decimated and dispirited at the present time. Consequently, although the United States has a comprehensive and strongly worded national environmental policy, that policy is increasingly being ignored in practice under the Reagan Administration (Natural Resources Defense Council, 1981).

In addition to these environmental activities by the federal government, several nation-wide private organizations in the U.S. are concerned with protecting the natural environment. The best known of these are the Sierra Club, Friends of the Earth, the Natural Resources Defense Council, Resources for the Future, Environmental Action, and the Audobon Society. In addition, there are countless local environmental groups in most urban communities.

The federal government has, for the most part, tended to view environmental and energy policies as incompatible. Policies designed to protect the environment are often seen as hampering energy production, while policies to promote energy production are frequently criticized because they increase environmental pollution. This environmental-energy conflict has occurred in regard to off-shore oil drilling, leasing of natural lands for oil and natural gas drilling, coal strip mining, conversions of industrial heating plants from oil to coal, the construction of nuclear electrical generating plants, and several other issues. In an effort to find workable tradeoffs between the conflicting goals of environmental protection and energy production, Congress has passed several pieces of legislation dealing with these issues, including the Energy Supply and Environmental Coordination
Act of 1974, the Clean Air Act Amendments of 1977, the Strip Mining Act of 1977, the Outer Continental Shelf Act of 1978, and the Alaska Land Use Act of 1980. Although these acts have attempted to maintain adequate standards for environmental protection, they have generally tended to favor energy production over environmental protection.

It is critical to realize, however, that this conflict between environmental and energy policies occurs almost entirely with what Amory Lovins (1977) calls the "hard energy path." That type of energy policy emphasizes continual growth in energy production and reliance on fossil fuels (oil, natural gas, and coal) and nuclear power to meet the ever-growing demand for energy. The extraction and consumption of those energy sources almost invariably create environmental problems and degradation. In contrast, a "soft energy path" would attempt to use energy as efficiently and judiciously as possible, reduce total energy consumption, and increasingly utilize renewable energy sources. Energy conservation and solar energy programs do sometimes pose environmental problems, as has occurred in the controversy over lowering automobile emission standards in order to increase fuel efficiency. But most conservation and solar policies and programs pose no threats to the natural environment (Edelson and Olsen, 1980; Lovins, 1977), and hence avoid the need for costly policy tradeoffs.

The overall relationship between energy and environmental policies was recently examined in great detail in a massive report on world environmental conditions prepared by the Council on Environmental Quality and the U.S. State Department (1980), titled "The Global 2000 Report to the President. It concluded -- as had an earlier study conducted by the private organization Resources for the Future (Schurr, 1979) -- that in the long run, national commitment to a soft energy path might well prove to be the most effective way of protecting the
natural environment against the ravages of industrial society. Reduced energy consumption and reliance on renewable energy sources would preserve scarce natural resources, prevent pollution, and generally bring our societies into better balance with the world ecosystem.

1.5 Consumer Policies

The United States does not presently have any kind of national consumer policy. The U.S. Food and Drug Administration and several other federal agencies have established numerous regulations to protect consumers against specific kinds of dangers, and there is a Consumer Affairs Advisor on the President's executive staff, but the work of these various agencies and offices is not guided by any comprehensive policy.

Most consumer protection activities in the U.S. are carried out by private organizations such as the Consumers Union. To date, these organizations have given relatively little attention to energy matters, although The Institute for Consumer Policy Research has recently been emphasizing energy issues in its newsletter and publications (e.g., Stern, Black & Elworth, 1981).

Another type of advocate for consumer interests in the U.S. are the Public Interest Research Groups (PIRGs) that have been created in most states -- often by students -- as an outgrowth of Ralph Nader's work. The issues addressed by these PIRGs vary widely, but they sometimes involve energy problems. Since the PIRG in each state operates relatively autonomously, however, these organizations have not developed any common positions or policies regarding energy.

In general, the U.S. government has given far more attention to energy producers (e.g., major oil companies, nuclear energy development) than to energy consumers. Many energy conservation programs have been aimed at
consumers -- such as home weatherization programs, appliance labeling programs, and carpooling/vanpooling programs. But virtually no attention has been given in any federal or state conservation ascertaining the needs and concerns of consumers or to protecting consumers against deception and exploitation (Stern, Black and Elworth, 1981). One of the principal arguments for organizing conservation programs in local communities rather than at the state or national level is to enable those programs to take account of and be responsive to consumer interests, needs, and problems (Olsen and Joerges, 1981).

The primary concern of the U.S. government regarding consumers and energy policy has revolved around the issue of energy pricing. If national energy prices are deregulated and allowed to rise to world levels, or if additional taxes are imposed to further raise energy prices, consumers will eventually reduce their energy consumption and energy companies will be encouraged to explore for additional resources and/or develop new energy sources. Consequently, the federal government (and especially the Reagan Administration) relies heavily on a pricing strategy to deal with the national energy problem. From the perspective of consumers, however, that strategy is the least desirable way of reducing energy consumption. In a recent study (Olsen, 1981c), over 90 percent of the respondents rejected the pricing strategy as a means of encouraging conservation. In addition, a pricing strategy creates serious equity problems, since it often imposes severe financial hardships on low income people who have little leeway for reducing their energy consumption and cannot afford to pay higher energy prices (Morrison, 1978).

In sum, the U.S. has thus far failed to adequately integrate its energy policies with consumer policies or needs.
CHAPTER 2. REGIONAL AND STATE POLICIES

This chapter first discusses the comprehensive energy policy for the Pacific Northwest region of the country that was enacted by Congress in 1980. It then summarizes the federal policies that have largely shaped state energy conservation activities in the U.S.

2.1 Pacific Northwest Regional Energy Policy

Although the United States lacks a comprehensive national energy policy, in 1980 Congress established such a policy for the Pacific Northwest region, consisting of the states of Washington, Oregon, Idaho, and Montana. The enabling legislation, the Pacific Northwest Electric Power Planning and Conservation Act, deals only with electricity. By necessity, nevertheless, it created a broad policy framework for all energy planning and conservation in the region.

The six basic purposes of the Act are the following (BPA, 1981; NPPA, 1981):

- To encourage (a) conservation and efficiency in the use of electric power, and (b) renewable resources development in the Pacific Northwest.

- To assure an adequate, efficient, economical, and reliable regional power supply.

- To provide for widespread public, governmental, and user participation and consultation in (a) developing effective plans and programs for energy conservation, renewables, other resources, and fish and wildlife protection, mitigation, and enhancement, (b) facilitating orderly regional power planning, and (c) providing environmental quality.

- To provide that Bonneville Power Administration (the federal agency that controls all federally funded electricity generation and transmission in the region) customers and regional ratepayers continue to cover all costs to produce, transmit, and conserve needed resources, including the
amortization of the federal investment in BPA facilities.

- To insure that (a) the authorities and responsibilities of state and local governments, electric utilities, water management agencies, and other non-federal entities for regulation, planning, conservation, supply, distribution, and use of electric power are maintained, and (b) the ability of customers to plan, develop, and operate resources and to achieve conservation in accordance with other applicable federal and state law, continues unrestricted.

- To protect, mitigate, and enhance the fish and wildlife, including related spawning grounds and habitat of the Columbia River and its tributaries.

To achieve these objectives, the Regional Energy Act created the Pacific Northwest Electric Power and Conservation Planning Council, with two members appointed by the Governor of each of the four states. The principal function of the Council was to prepare a Regional Electric Power and Conservation Plan by the fall of 1983. That plan contains an extensive energy conservation program for the region (described in Chapter 4 of this report), a 20-year electric power demand forecast for the region that takes into account the likely power savings from the conservation program, an analysis of which power resources the Bonneville Power Administration should acquire to meet forecasted loads, recommendations for necessary research and development concerning Pacific Northwest power needs, and an analysis of power reserve and reliability requirements for the region. It also contains a program for protecting and enhancing the welfare of spawning salmon and other wildlife in the Columbia River, on which all the BPA dams are located.

The most novel and significant aspect of this Act is its stipulation that the Regional Plan must give highest priority to cost-effective conservation as a source of power to meet regional power needs, with second priority going to renewable energy resources and third priority to
co-generation. Only after those top three categories of power sources have been fully utilized can the plan consider constructing any new conventional (coal, oil, natural gas, or nuclear) generating facilities. Moreover, when comparing the cost effectiveness of conservation with that of conventional generating sources, conservation must be given a 10-percent advantage.

The conservation plan developed by the Council for the region outlines specific programs to be undertaken by BPA, state and local governments, and utilities to promote reduced electricity consumption and development of renewable energy sources. As an inducement for utilities to implement these activities, BPA is authorized to give billing credits to utilities for all reductions in electricity consumption below specified levels, which they can either pass on to their customers or invest as capital in additional conservation or renewable resource efforts. Conversely, BPA can impose a surcharge on the power costs of utilities that fail to enact an adequate conservation program.

Finally, the Regional Power Act requires that the Council carefully consider the environmental impacts of all proposed projects and adhere to the principles and procedures of the National Environmental Policy Act, as well as other laws pertaining to land and water management. The Council must set up criteria for quantifying the physical and social costs of all proposed energy projects in the region, and take these estimates into account when calculating the likely costs and benefits of conservation programs, renewable energy resource development, and conventional generating plants.

In sum, the Pacific Northwest Electric Power Planning and Conservation Act provides an excellent model for creating energy planning and conservation policies in all regions of the United States. It takes a comprehensive,
long-term approach to energy planning; it treats conservation as an energy source; it gives top priority to conservation and solar for meeting future energy needs; and it explicitly provides for environmental protection. Appendix B contains selections from the draft Regional Conservation and Electric Power Plan released by the Council in January 1983.

2.2 State Conservation Policies

A large proportion of all conservation programs in the United States have been conducted by the state energy offices that exist in all states. The federal government has imposed considerable uniformity upon state conservation programs, as outlined below, but the states have also been free to initiate additional programs of their own. In 1980, over 700 individual state conservation programs were in operation. Some states — such as Oregon — have developed very extensive conservation programs, while others — such as Washington — have not gone very far beyond the efforts required by the federal government. Outside the Pacific Northwest, especially noteworthy state efforts are Minnesota's program innovations (Hirst and Armstrong, 1980), New York's comprehensive state energy plan (Carter, 1978), and California's policy of moving the state toward an alternative energy future (California Energy Commission, 1979).

As early as 1976, there was clear recognition in the United States that there must be a division of labor between the federal government and the state governments in promoting energy conservation. In that year, the Council of State Governments sponsored a workshop on the role of the states in energy conservation policy formation and program development, which led to publication of a booklet titled "Energy Conservation: Policy Considerations for the States" (The Council of State Governments, 1976). It described the role of the states in conservation efforts in these terms:
The nature and magnitude of the energy demand-supply problems suggest the need for a 'division of labor' between the federal government and the States as they address the energy problem and seek to minimize its impacts. The basic long-term factors of supply and price must be addressed at the national level by the federal government working with the private sector. The need for national leadership does not mean that the states are not or should not be concerned with energy policy. In spite of the past and current state efforts to address energy supply problems, energy conservation is an even more appropriate policy option for the states. The State has limited resources and legal authority to influence energy supply and price, but it does have appropriate power to affect energy conservation strategies (p. 8).

Until 1981, most of the funding for all state energy programs was provided by the federal government. To receive those funds, a state had to administer the following five federally mandated conservation programs:

**State Energy Conservation Program.** Created by the Energy Policy and Conservation Act of 1975 and amended by the Energy Conservation and Production Act of 1976. All states are required to establish (a) statewide thermal efficiency requirements for new residential, commercial, and public buildings; (b) energy efficient procurement practices for state and local governments; (c) statewide lighting efficiency standards in new and existing commercial and public buildings; (d) a ridesharing (carpools and vanpools) or traffic control program in at least one urban area; (e) an energy audit program for buildings and industries; (f) traffic laws permitting a right turn on a red light; (g) intergovernmental coordination on energy programs; and (h) a public energy conservation education program.

**Weatherization Assistance Program.** Established by the Energy Conservation and Production Act of 1976. This program provides subsidies for weatherizing low-income residences, including caulking, weatherstripping, insulation, storm windows, and storm doors.
Energy Extension Service Program. Created by the National Energy Extension Service Act of 1977. Patterned after the Cooperative Extension Service which has provided information and assistance to farmers and homemakers for many years, the EES is intended to help individual consumers and small businesses conserve energy and convert to renewable energy sources. EES programs differ widely among the states, but most of them provide information and technical assistance through workshops, classes, building audits, and similar procedures.

Public Institutions Program. Initiated by the National Energy Conservation Policy Act of 1978. This program provides matching funds to states to conduct audits of public buildings and nonprofit institutions and to retrofit existing buildings with conservation measures. The principal recipients are schools, hospitals, public care institutions, and local governments.

Residential Conservation Service. Also established by NECPA in 1978. It requires electric and gas utilities to offer residential customers conservation information, energy audits, and assistance in purchasing, installing, and financing conservation measures and renewable energy systems.

Since the Reagan Administration took office in 1981, federal funding for all these state conservation programs has been severely reduced or totally eliminated. Consequently, most state conservation programs have been drastically curtailed or totally eliminated. Only in a handful of states -- including Oregon and California -- has the state legislature agreed to provide sufficient funds to maintain viable conservation programs at the state level.
CHAPTER 3. PUBLIC SUPPORT OF CONSERVATION

In a democratic society, public policies are effective only to the extent that they are supported and observed by at least a majority of the population. This chapter therefore addresses the questions of how thoroughly the American public accepts energy conservation as an important national goal, and how extensively conservation practices have been adopted.

3.1 Previous Research

Numerous studies conducted during the past several years have examined the extent to which people in the United States support and practice energy conservation (Beck, Doctors, and Hammond, 1980; Cunningham and Lopreato, 1977; Gladhart, Zuiches, and Morrison, 1978; Perlman and Warren, 1977; Socolow, 1978).

Several broad conclusions have emerged from that research, which were originally formulated by Olsen (1978) and recently updated by Van Til (1982:154) in the following manner:

- While most people can define an energy crisis, half the population is unaware of the basic facts of our dependence upon foreign oil.
- While belief in the seriousness of the energy crisis is widespread, Americans remain highly confident that it will ultimately be resolved.
- Almost everyone has taken a number of conservation actions, and as a partial result, historical patterns of energy growth have been stabilized.
- Relatively few people have taken major conservation steps, and the pace of this activity is not dramatically increasing.
- Acceptance of proposed conservation measures is widespread indeed.

All of those previous studies are now somewhat dated, however. Consequently, the following section concentrates on the most recently conducted survey of conservation
opinions and actions in the United States.

3.2 The Western States Conservation Energy Study

In 1980, the Cooperative State Research Service of the United States Department of Agriculture sponsored a massive survey of household energy consumption and conservation in the ten Western states, plus the Eastern state of Pennsylvania for comparison. Completed questionnaires were obtained from nearly 10,000 households in those eleven states. Because of the nature of the sample, the findings cannot be directly generalized to the entire U.S. However, the fact that very little variation in patterns of responses to any of the questions occurred among the various states included in the study (including Pennsylvania) suggests that those patterns are quite generally applicable to the total country. The following highlights from the findings of that study are taken from Dillman, et al., 1981; Olsen, 1981b; Olsen, 1981c; and Olsen, Rosa, and Dillman, 1982.

Energy conservation as a policy choice for meeting future energy needs is strongly supported by the public in this study. Increased use of solar energy is favored by 92 percent of all the respondents, reducing energy use in homes is favored by 69 percent of them, reducing energy use in business and industry is favored by 56 percent, and reducing energy use in individual travel is favored by 53 percent. In contrast, more use of nuclear power is favored by only 47 percent of the respondents. Support for conservation as a national policy is evenly divided between men and women, but is much stronger among persons under age 35 than among people older than that. People who have continued their education beyond secondary school (regardless of whether or not they are college graduates) tend to be more supportive of conservation than are those with a high school education or less. There is no relationship between favoring energy conservation and family income in this study, however. Finally, homeowners
give much stronger support to conservation as a national policy that do renters.

Respondents were then asked whether they favored or opposed a series of governmental conservation actions designed to achieve the goal of reducing energy consumption. The most strongly supported measures were providing larger tax credits for improving home energy efficiency, 83 percent; requiring appliances to tell how much energy they use, 81 percent; requiring manufacturers to make appliances that use less energy, 81 percent; changing building codes and mortgage requirements to encourage new types of energy-saving housing, 81 percent; providing larger tax credits for adding home solar heat and/or cooling, 78 percent; requiring utilities to provide regular reports to users on current energy use compared to the previous year, 69 percent; keeping the 55 MPH speed limit, 60 percent; and requiring utilities to charge lowest rates to small energy users and highest rates to large energy users, 59 percent. In contrast, requiring all homes to pass an energy audit was supported by just 33 percent of the respondents, despite the fact that having such an audit is the required first step in virtually all current utility sponsored conservation programs. In addition, only 17 percent of these people favored discouraging building homes away from towns and cities to lessen travel by car, even through this kind of community reorganization is strongly endorsed by many community planners. Finally, placing higher taxes on gasoline in order to raise their prices and discourage consumption is supported by merely 12 percent of the people in this study, which stands in sharp contrast to the strong emphasis placed on the pricing strategy by the Reagan Administration.

When the focus was shifted from governmental policies to personal actions, 60 percent of the respondents said that they could reduce their total energy consumption by.
one-fourth if necessary. And many of these people have already taken actions in their homes to conserve energy. Between one-half and two-thirds of all households report that they have: (1) installed weatherstripping and caulking on doors and windows; (2) added more insulation in their ceilings or attic; (3) added insulation to outside walls; (4) set the furnace thermostat at 65°F (18°C) or lower; and (5) set the hot water heater at 120°F (49°C) or lower. However, only about one-fourth of them have added double-pane or storm windows and storm doors to their homes.

In sum, it appears that a large proportion of Americans support the goal of reducing energy consumption, favor a variety of fairly demanding governmental actions to achieve that goal, believe they can substantially reduce their personal energy use, and have taken a number of actions in their homes to save energy. Energy conservation is clearly acceptable and desirable to the majority of Americans.
PART II. CONSERVATION PROGRAMS AND EFFECTS
CHAPTER 4. OVERVIEW OF CURRENT CONSERVATION PROGRAMS

Since there are estimated to be over 1000 energy conservation programs in effect in the United States at the present time, it is impossible to describe all or even a major portion of them in this report. Instead, this chapter gives a brief overview of the kinds of programs currently being conducted at the national, regional, and local levels in the U.S., as a means of illustrating their nature and diversity. Special attention is given to programs in the Pacific Northwest region.

4.1 National Energy Conservation Program Directions

The most vigorous efforts by the U.S. Department of Energy to promote energy conservation have been through information programs. The Energy Information Administration within DOE prepares and distributes a wide variety of reports, pamphlets, booklets, audio-visual materials, and other kinds of informational items on all aspects of energy conservation and renewable energy resources. Many of these are aimed directly at individual consumers, although some of them are intended for businesses, industries, local governments, utilities, and other audiences.

Until the end of 1980, the U.S. Department of Energy also conducted a variety of financial and regulatory conservation programs. The Office of Conservation and Solar Energy within DOE was responsible for carrying out most of these programs at the national level. Typical of the efforts of that unit were the activities of the Office of State and Local Assistance Programs, whose responsibility was to provide technical and financial assistance at the state, county, and local levels to improve the energy efficiency of homes, commercial establishments, industry, and transportation, as well as comprehensive energy management assistance. As described in a booklet titled "DOE State and Local Assistance
Programs" issued by that office in October 1980:

Our mission is to plan, develop, and administer programs for implementation of energy conservation measures at the state, county, and local levels.... Activities have been undertaken to:

- Support state energy conservation offices and programs.
- Development programs that will lead to the adoption of more energy-efficient maintenance and operating procedures in public buildings.
- Improve the energy efficiency of schools and hospitals.
- Develop, in conjunction with states, emergency energy conservation plans for reducing energy demand during future emergency supply constraints.
- Assist individual and small business innovators in local communities through the support of promising inventions and appropriate technology projects.
- Encourage actions to conserve energy through direct, personalized advice and assistance.

The Department of Energy also operates ten regional offices around the United States, whose principle function is to implement federal programs at the regional level. Most of these programs involve administering grants to state energy offices, Energy Extension Service offices, local governments, businesses, low-income groups, and individuals to promote conservation efforts and facilitate development of alternative energy sources. The regional offices also administer some regulatory programs, such as petroleum allocation and pricing regulations and state emergency energy conservation programs. In practice, these ten regional offices of DOE are its principal operating arms in the realm of energy conservation and renewable resources.

This entire situation has changed radically since the beginning of 1981, as a result of the Reagan
Administration's policy of taking the federal government out of energy conservation. All federal energy conservation programs have been drastically reduced in scope, funding, and staffing, and many of them have been or soon will be entirely eliminated. Consequently, it is not possible at the present time to predict what the role of the federal government in energy conservation programs will be in the future.

4.2 Pacific Northwest Regional Conservation Programs

Bonneville Power Administration Programs. In 1979, BPA -- working in conjunction with its utility customers -- initiated a Regional Residential Conservation Program, as well as conservation programs for the industrial, commercial, and agricultural sectors of the region. The purpose of the residential program is "to help consolidate residential conservation requirements imposed on some of [BPA's] customer utilities by law...and by other agencies..., and to provide more uniform conservation services to all residential consumers in the region.... Conservation programs required by some utilities are being extended to all BPA utility customers, with BPA paying one-half of the costs beyond those incurred by the utilities to meet the conservation requirements imposed by Federal law or by other Federal agencies" (Moorman, 1979).

The principal component of BPA's Residential Conservation Program is its Residential Weatherization Service. The ultimate goal of this service is to promote full weatherization of all houses in the region with electric space heating. The responsibilities of local electric utilities participating in the program are to (a) provide information to residential consumers on conservation measures and their typical costs and energy savings; (b) perform audits on dwelling units and prepare reports to consumers on the findings of the audits; (c) install low-cost conservation measures such as heating duct insulation and water pipe wrap to consumers at no
charge; (d) install clock thermostats in homes at wholesale cost; (e) provide consumers with a list of qualified contractors who can perform major weatherization services; (f) arrange with a contractor to perform those services for a consumer; (g) offer BPA-funded zero- or low-interest, deferred payment (until time of sale) loans for such retrofitting actions; and (h) be responsible for all administrative and accounting aspects of this service. In turn, BPA will (a) prepare the informational materials for consumers; (b) train the energy auditors; (c) give participating utilities a "buy-back" payment for each house weatherized, with the size of this payment depending on the amount of electricity that is expected to be saved by the weatherization actions over the life of the house; (d) reimburse utilities for up to 75 percent of their administrative costs for providing weatherization services; (e) provide funds to cover the zero- or low-interest loans offered to consumers who weatherize their homes to BPA specifications; and (f) coordinate the entire service. Thus far, about 4000 homes have been weatherized through this program.

Three other more limited services are also included within BPA's Residential Conservation Program: (1) Water Heater Wraps. BPA reimburses utilities for the full cost of providing and installing insulating wraps on residential electric hot water heaters in the region, so that this service is provided free to consumers. (2) Shower Flow Restrictors. BPA reimburses utilities at a fixed rate for all shower flow restrictors it distributes to residential consumers in the region. (3) Faucet Flow Control Devices. BPA gives utilities a flat fee of $7 per household for performing inspections to identify possibilities for faucet flow control devices. It also reimburses utilities for the actual cost of whatever control devices are installed, up to specified limits.

Appendix C contains selections from BPA's most recent description of its conservation programs.
Regional Conservation and Electric Power Plan. Adopted by the Northwest Power Planning Council in 1983, this Plan directs the BPA to develop and implement a wide variety of conservation programs in the region during the next twenty years. For the residential sector, the long-range goals of these programs are that: (1) "Existing and new residential...buildings in the region will be made as energy-efficient as current technology and life-cycle economics allow." (2) "Electricity consuming buildings in the region will be operated in an energy-efficient manner." (3) "Renewable energy resources, in particular passive solar applications, will be used in new and existing...buildings where economically justified." (4) "Energy management considerations will be an integral part of the planning and administrative processes of local and state government and the private sector."

To achieve those goals, the Plan establishes conservation programs for existing buildings, new buildings, and major appliances. For existing electrically heated homes, a retrofit weatherization program will seek to install all conservation measures that are cost-effective for the region. These measures vary among locations within the region, but typically include at least R-30 ceiling insulation, R-18 wall insulation, double-pane windows, and storm doors -- all of which cost less than 2 cents per kilowatt hour saved. The program will pay the full cost of all these measures for renters and for homeowners with incomes below $16,000 a year. For other homeowners, the program will pay "whatever amount" is necessary to achieve its goals.

To ensure that all residential buildings constructed in the region after 1985 are as energy-efficient as possible, the Plan specifies mandatory performance standards for space heating. Depending on the climate in a particular location, these standards (which are expressed in kilowatt hours of electricity per square foot
per year) range from 2.0 to 3.2 for single-family homes and from 1.2 to 2.8 for multi-family buildings. (In contrast, existing buildings typically use at least 5.0 kwh/square foot/year). Local governments will be reimbursed for the cost of implementing and enforcing these construction standards, the shelter industry will be given technical and financial assistance to develop a system for rating the energy efficiency of residences, and builders will be encouraged to explore a variety of innovative means of meeting the required performance standards.

To encourage the purchase of energy-efficient refrigerators, freezers, air conditioners, and heat pumps, the Plan offers financial incentives to dealers and customers to retire inefficient models and purchase efficient ones.

4.3 State Energy Conservation Programs

The energy conservation programs conducted by the fifty states in the U.S. vary tremendously in scope and effectiveness. In 1979, Common Cause (1979) evaluated all of the state energy programs and rated them on the extent to which they had initiated 14 key conservation activities. These included energy efficient building codes, utility ratemaking procedures, loans and grants for weatherization and solar energy development, auto efficiency inspections, and future energy planning. Twelve state programs were rated as excellent, 5 as good, 12 as fair, and 22 as unsatisfactory. In the Pacific Northwest, Oregon was rated excellent, Idaho and Montana were fair, and Washington was unsatisfactory -- although Washington did institute several of those policies and programs during 1979 and 1980.

Oregon's conservation program has often been cited as an example of the kind of effort that should be made by all the states. A brief description of this program will
therefore illustrate the most extensive state conservation program in the Pacific Northwest. Appendix D gives more details about this program.

The major conservation activities of the Oregon Department of Energy are (a) information and technical assistance on household conservation techniques; (b) energy audits of homes, schools, hospitals, and other institutional buildings; (c) development of voluntary weatherization standards for buildings; (d) weatherization loans to households; (e) assistance to schools and hospitals in implementing weatherization programs; (f) workshops and conferences for businesses and industries covering energy economics and energy-efficient production and management techniques; and (g) workshops on building conservation procedures for households and small businesses, through the Oregon Energy Extension Service.

The Department also conducts a variety of informational and financial incentive programs to promote more extensive development of renewable resources and cogeneration, including: (h) information, technical assistance, and workshops for individuals, businesses, and utilities concerning development of renewable resources; (i) a 25 percent tax credit on investments up to $4000 in residential and commercial solar wind, geothermal, and small hydroelectric energy projects; and (j) a 35 percent tax credit on investments up to $10,000,000 for the development of alternative energy systems, including solar, wind, geothermal, hydro, conservation, waste heat recovery, and recycling, by commercial firms.

Finally, the Department carries out several kinds of energy planning, such as (k) a state-wide emergency plan to be implemented in case of a severe petroleum shortage; (l) a plan for reducing energy usage in all state-owned buildings by 20 percent; (m) local community energy
management planning; and (n) land-use plans to reduce travel distances within communities.

4.4 Community Energy Conservation Programs

The most expeditious way of illustrating the kinds of conservation programs being conducted at the community level throughout the United States -- by city and county governments and by local utilities -- is to summarize two recent studies that were made of some of the most active of those programs. A brief description of the residential weatherization program recently implemented by the city of Eugene, Oregon, is also included. Detailed descriptions of the 29 residential energy conservation programs currently being conducted in Seattle, Washington, are given in Appendix E.

Local Government Energy Activities. The objective of this study by the U.S. Department of Energy (1979) was to identify 12 cities and counties that had exceptional energy conservation programs, and to examine those programs in detail. Two Pacific Northwest locations are included: Seattle and King County, Washington.

Vol. I of the report summarizes the main results of the study. Vol. II presents findings derived from analyses of the 12 locations, arranged under the headings of (a) Local Perceptions of Energy Problems, (b) Energy Goals and Policies, (c) Organization of Energy Activities and Intra-Governmental Relationships, (d) Energy Programs Within Local Governments, (e) Energy Programs in the Community, (f) Energy Data Collection and Use, (g) Energy Emergency Preparedness, (h) Program Monitoring and Evaluation, (i) Existing Relationships with Other Levels of Government and Outside Institutions, (j) Ideal Energy Roles in the Federal System, and (k) Summary of Findings. A critical observation made in the evaluation section is that: "There is almost no evaluation of the effectiveness of community-oriented programs (p. II-60)."
Vol. III contains detailed descriptions of the conservation programs being conducted in each of the twelve locations.

The report cites Seattle City Light as "the premier example of how a municipal utility can help in carrying out a local government's energy policy" (p. II-48). Portions of the description of Seattle's energy conservation programs are given in Figure 4-1.

Home Energy Conservation: Programs and Strategies for the 1980's. Conducted for the Institute for Consumer Policy Research by Stern, Black, and Elworth (1981), this study investigated 22 community energy conservation programs, including Seattle and Portland in the Pacific Northwest. Numerous tables summarize important features of each of those 22 programs, including who is served, what kinds of conservation efforts are made, how those activities are paid for, why consumers do or do not trust the program, how the program reaches its intended targets, how it informs and motivates consumers, how it assists consumers in making decisions about conversation actions, and how consumer interests are protected.

On the basis of their analysis, the researchers identified several factors that can affect the success or failure of a community conservation program. These include (a) who runs the program, (b) its available resources, (c) how it reaches the public, (d) the measures it employs, (e) who pays for it, and (f) how the various components of the program are combined into a unified package. They conclude that "More than one type of program should probably be available in each geographical area, because of the different types of people who must be served," and propose that all the programs offered in a community should be integrated into a "package program" of conservation services that provides "one-stop-shopping"
A. Citizen Participation

Active citizen participation was an important factor in the development of Seattle's energy policy. Participants in the Energy 1990 process feel that the widespread public involvement has had a variety of benefits, including:

- Development of an educated, sophisticated body of citizens and consumers;
- Making energy a legitimate issue for voters and public officials;
- Laying of the foundation necessary for successful implementation of a conservation program requiring active public support and participation.

Seattle now has five citizen committees, dealing with electric rates, service requirements, their cooperative agreement with DOE, planning for the City's CCEMP grant, and outdoor/decorative lighting.

B. Education/Public Information

Seattle City Light has an extensive public information and services program, including:

- Provision of on-site audits for industries and businesses, and energy management training by type of industry/business;
- Provision of home energy audits, available on weekends and evenings;
- Development of audit handbook for hotels, motels, multi-story office buildings, and community centers;
- Thermographic photographs, showing heat losses from all structures in the city, with new ones expected to be available every two or three years;
- Energy conservation programs in schools, and curriculum training for teachers;
- Program of grants to neighborhood organizations for innovative projects;
- Community Outreach meetings, to involve citizens;
- Ad campaigns on conservation in general and on particular SCL programs;
- Provision of exhibits for events like fairs;
- An Energy Information Center in the lobby of SCL's building;
- An information hot line.

C. Conservation Incentives

Seattle does not offer conservation incentives such as property exemptions, however the utility offers a number of services which would encourage conservation. SCL provides free home insulation to low income and handicapped persons. They install water heater jackets for the cost of materials.... Electric heat customers are offered insulation financing for three years at six percent interest, and are only required to repay 90 percent of the loan. ... Any home insulated under an SCL program is so certified, which can be useful at time of sale.

D. Regulatory

Seattle has the power to establish a more stringent building code than the state. In conjunction with King County, they are developing an energy-conserving code based on ASHRAE 90-75. In addition, the City has prohibited the installation of a single master meter in a multi-family residential structure, and set minimum efficiency standards that buildings must meet before they will be provided with a new SCL hook-up. The City Energy Office is examining the feasibility of requiring that attics be insulated by the time the residence is sold or a new/transferred hook-up is requested from SCL.
E. Planning

Rather than a comprehensive plan, Seattle has a policy catalog which includes a chapter on energy. Their Capital Improvement Program and their Community Development Block Grant plan both specify energy conservation as a high priority. Other than beginning research to develop a solar access code, there has been no action to modify existing land use regulations.

F. Transportation

Freeways around Seattle have special carpool/bus lanes and exits. The City is implementing a Comprehensive Bikeway Plan which, when complete, will provide a north-south bikeway through the central business district to facilitate commuting. An extended walkway system is planned for downtown, and the limitation of downtown parking is a goal of the Seattle 2000 plan.

G. Resource Recovery and Fuel Production

Seattle and King County are jointly investigating the feasibility of a regional resource recovery system.

H. Municipal Utility

Seattle City Light has primary responsibility for implementation of the City’s conservation program. The utility is regulated by the City Council and Mayor. Residential customers are charged on an inverted rate schedule. Some industries still get declining block rates, but these rates are being flattened. Seasonal time-of-day rates have been adopted for all customers. SCL is conducting a study of the effect of different rate structures on consumption. They are also developing an Hourly Load Prediction System, to improve the quality of short-term load forecasting (1-24 hours). SCL is maximizing the efficiency of their existing system through Operation Sweep Up, which is upgrading hydro facilities, transmission lines, and distribution systems. They are also investigating the use of renewable energy resources for power production.

I. Solar and Other Alternative Technologies

Despite the cloudiness for which Seattle is famous, SCL has stated that the city receives about 80 percent as much solar insolation as the Southwest. To encourage its use, the city has begun research leading to development of a solar access ordinance. SCL offers public information on solar energy and has requested a new consumer-oriented solar technical advisor position. ... SCL is working with the University of Washington on the feasibility of using local trees as a source of fuel for electric generation. They are also prospecting for good wind sites, and planning a district heating demonstration system using waste heat from substation transformers.

J. Data Collection and Use

The Municipal Energy Consumption and Cost Reporting System is being implemented by the City Energy Office. This system requires eleven City departments to keep records on electric usage.... SCL has been collecting community electric consumption data by end use. The City will develop a similar set of data for oil and gas....

K. Energy Emergency Preparedness

The State of Washington has lead responsibility in development of an energy emergency plan. Work on the plan has been undertaken, but has not yet been completed.
convenience for consumers. Figure 4-2 gives profiles of
the conservation programs included in this study.

**Eugene Residential Weatherization Program.** This
innovative program -- the first of its kind in the U.S. --
was adopted by the Eugene City Council in February 1981
and implemented by the Eugene Water and Electric Board
(the city-owned utility) in January 1982. The program is
voluntary until January 1, 1985, after which it will
become mandatory with a maximum fine of $500 for
noncompliance. Seven weatherization measures must be
satisfied by all single-family homes, duplexes, triplexes,
and fourplexes built prior to 1974, when a set of required
weatherization standards for all residences went into
effect.

The seven weatherization measures are the following:
(1) R-30 attic insulation in buildings not presently
insulated to at least R-11; (2) attic ventilation; (3)
R-19 floor insulation over uninsulated crawl spaces; (4)
six-millimeter vapor barriers on the ground of crawl
spaces; (5) R-11 insulation/joint sealing of accessible
heating ducts in unheated spaces; (6) R-11 insulation of
water heaters; and (7) caulking and weatherstripping of
exterior windows and door frames.

After these improvements have been made on a
dwelling, the utility will inspect it and certify it if
the work is satisfactory. Families can obtain financial
assistance for these improvements from the Eugene Water
and Electric Board, the Oregon State residential
weatherization program, or the Bonneville Power
Administration's buy-back program that pays 29.2 cents for
each kilowatt hour saved during the first year after the
improvements are made.
## Profiles of the Conservation Programs Examined in Home Energy Conservation: Programs and Strategies for the 1980's*

<table>
<thead>
<tr>
<th>Program and Sponsor</th>
<th>Consumers Served</th>
<th>Package</th>
<th>Audits</th>
<th>Do-It-Yourself</th>
<th>Access to Materials</th>
<th>Access to Funds</th>
<th>Publicity Strategies</th>
</tr>
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<tbody>
<tr>
<td><strong>GRASS-ROOTS PROGRAMS</strong></td>
<td></td>
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</tr>
<tr>
<td>Banana Kelly, BRONX, N.Y.</td>
<td>Urban renters &amp; low income</td>
<td>No</td>
<td>Furnace &amp; building</td>
<td>Optional</td>
<td>Free materials</td>
<td>Not an issue</td>
<td>Newsletter, building meetings</td>
</tr>
<tr>
<td>Walter and Berner, New York, N.Y.</td>
<td>Urban renters &amp; low income</td>
<td>No</td>
<td>Furnace only</td>
<td>Not applicable</td>
<td>Free materials</td>
<td>Not applicable</td>
<td>Local housing groups</td>
</tr>
<tr>
<td>Federation of Southern Cooperatives, Epes, Ala.</td>
<td>Rural homeowners &amp; low income; elderly</td>
<td>Yes</td>
<td>Formal audits</td>
<td>Optional but encouraged</td>
<td>Free materials</td>
<td>Government and private grants; FHA loans</td>
<td>Newspaper ads</td>
</tr>
<tr>
<td>Massachusetts Fair Share, Boston, Mass.</td>
<td>Urban low &amp; moderate income</td>
<td>No</td>
<td>Audits cost $45</td>
<td>Optional</td>
<td>Free materials</td>
<td>None available</td>
<td>Mail campaign, newspaper and radio ads, workshops</td>
</tr>
<tr>
<td><strong>PUBLIC SECTOR PROGRAMS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>National Black Veterans Organization, Washington, D.C.</td>
<td>Urban renters &amp; low income</td>
<td>Yes</td>
<td>Formal audits</td>
<td>No</td>
<td>Free materials</td>
<td>CETA labor, so no funds needed</td>
<td>TV and radio ads, meetings with housing authorities</td>
</tr>
<tr>
<td>Pembroke Solar Project, Hopkins Park, Ill.</td>
<td>Rural low income</td>
<td>No</td>
<td>None</td>
<td>Only choice</td>
<td>Second-hand materials available</td>
<td>Occasional demonstration grants</td>
<td>Word of mouth</td>
</tr>
<tr>
<td>People's Alternative Energy Services, San Luis, Col.</td>
<td>Rural low income homeowners</td>
<td>No</td>
<td>Informal audits</td>
<td>Only choice</td>
<td>Help in locating materials</td>
<td>None</td>
<td>Workshops, word of mouth</td>
</tr>
<tr>
<td>Whiteaker Energy Inc., Eugene, Ore.</td>
<td>Urban renters, low income, &amp; elderly</td>
<td>No</td>
<td>Formal audits</td>
<td>Optional</td>
<td>Materials at cost; free tool bank</td>
<td>Information on loans and grants</td>
<td>Displays at fairs, word of mouth</td>
</tr>
<tr>
<td>Ferry Village Neighborhood Housing, S. Portland, Me.</td>
<td>Urban low income</td>
<td>Yes</td>
<td>Formal audits with clients</td>
<td>Optional</td>
<td>Free materials</td>
<td>Low- and no-interest loans; grants</td>
<td>Energy fairs, personal contacts</td>
</tr>
<tr>
<td>Fitchburg Action to Conserve Energy, Fitchburg, Mass.</td>
<td>Urban renters &amp; low income</td>
<td>Yes</td>
<td>No</td>
<td>Only choice, with volunteer workers</td>
<td>Free materials</td>
<td>Only low-cost measures, no financing</td>
<td>Workshops, neighborhood storefronts, community council</td>
</tr>
<tr>
<td>Fresno County Economic Opportunities, Fresno, Calif.</td>
<td>All renters, low income, and elderly</td>
<td>Yes</td>
<td>Formal audit audit</td>
<td>Optional</td>
<td>Free materials to low income and elderly</td>
<td>Free for low income &amp; elderly; no-interest loans</td>
<td>Public meetings, TV ads, door-to-door visits, etc.</td>
</tr>
<tr>
<td>Program and Sponsor</td>
<td>Consumers Served</td>
<td>Package</td>
<td>Audit</td>
<td>Do-It-Yourself</td>
<td>Access to Materials</td>
<td>Access to Funds</td>
<td>Publicity Strategies</td>
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</tr>
<tr>
<td>Philadelphia Home Weatherization Program Philadelphia, Pa.</td>
<td>Urban low income</td>
<td>No</td>
<td>Informal audit</td>
<td>Optional</td>
<td>Free materials to low income</td>
<td>CETA labor, so no funds needed</td>
<td>Radio &amp; TV ads, newsletters, organizational contacts</td>
</tr>
<tr>
<td>Seattle City Light Seattle, Wash.</td>
<td>Urban homeowners</td>
<td>Yes</td>
<td>Formal audit</td>
<td>Optional</td>
<td>Materials at cost</td>
<td>Low-interest loans</td>
<td>Workshops, radio &amp; TV ads, bill inserts</td>
</tr>
<tr>
<td>Philadelphia Home Weatherization Program Philadelphia, Pa.</td>
<td>Urban low income</td>
<td>No</td>
<td>Informal audit</td>
<td>Optional</td>
<td>Free materials to low income</td>
<td>CETA labor, so no funds needed</td>
<td>Radio &amp; TV ads, newsletters, organizational contacts</td>
</tr>
<tr>
<td>Seattle City Light Seattle, Wash.</td>
<td>Urban homeowners</td>
<td>Yes</td>
<td>Formal audit</td>
<td>Optional</td>
<td>Materials at cost</td>
<td>Low-interest loans</td>
<td>Workshops, radio &amp; TV ads, bill inserts</td>
</tr>
<tr>
<td>Long Island Lighting Co. Mineola, N.Y.</td>
<td>1- to 4-family residences</td>
<td>Yes</td>
<td>Formal audit, costs $10</td>
<td>Optional</td>
<td>No</td>
<td>Financing with local banks</td>
<td>Newspaper ads, displays in stores</td>
</tr>
<tr>
<td>North Arkansas Electric Cooperative Salem, Ark.</td>
<td>Rural low income</td>
<td>No</td>
<td>Formal audit, encouraged</td>
<td>Strongly encouraged</td>
<td>Supplied by contractors</td>
<td>Low-interest loans</td>
<td>TV, radio, and newspaper ads, newsletters, workshops</td>
</tr>
<tr>
<td>Pacific Power and Light Portland, Ore.</td>
<td>All residences in service area</td>
<td>Yes</td>
<td>Formal audit</td>
<td>Optional</td>
<td>List of contractors</td>
<td>Low-and no-interest loans</td>
<td>TV and radio ads, bill inserts</td>
</tr>
<tr>
<td>Tennessee Valley Authority Chattanooga, Tenn.</td>
<td>All low income in the region</td>
<td>No</td>
<td>Formal audit</td>
<td>Optional</td>
<td>None</td>
<td>No-interest loans</td>
<td>TV and radio ads, pamphlets, schools</td>
</tr>
<tr>
<td>Valley Rural Electric Cooperative Huntington, Va.</td>
<td>All members</td>
<td>No</td>
<td>Informal audit</td>
<td>Primary emphasis</td>
<td>Materials at cost</td>
<td>Low-interest loans</td>
<td>Radio programs, public meetings, direct contact</td>
</tr>
<tr>
<td>Wisconsin Power and Light Madison, Wisc.</td>
<td>All renters in service area</td>
<td>No</td>
<td>Formal audit with tenant</td>
<td>Not likely</td>
<td>No</td>
<td>Bank financing</td>
<td>Personal contacts with landlords</td>
</tr>
<tr>
<td>Energy Service Companies Va. and N.J.</td>
<td>Everyone</td>
<td>Yes</td>
<td>House doctor</td>
<td>Not an issue</td>
<td>No</td>
<td>No cost to clients; paid by utilities</td>
<td>Experimental with selected homes</td>
</tr>
<tr>
<td>New Mexico Solar Energy Institute Las Cruces, N.M.</td>
<td>Rural low income</td>
<td>No</td>
<td>Generic audit</td>
<td>Largely, with technical assistance</td>
<td>Free materials</td>
<td>Funded by FHA and local matching contributions</td>
<td>Radio &amp; TV ads, workshops, word of mouth</td>
</tr>
<tr>
<td>Northeast Package Program</td>
<td>Urban homeowners</td>
<td>Yes</td>
<td>Formal audit</td>
<td>Sometimes recommended</td>
<td>None</td>
<td>Bank loans</td>
<td>Radio &amp; TV ads, word of mouth</td>
</tr>
</tbody>
</table>

CHAPTER 5. ENERGY CONSERVATION PROGRAM ANALYSIS

Although it is impossible to analyze the hundreds of energy conservation programs presently being conducted in local communities throughout the United States, we can discuss those programs in a generic manner and assess their typical strengths and weaknesses. This discussion follows the analytical model developed for the multinational study (Olsen and Joerges, 1981). The model divides the process of promoting consumer energy conservation into five broad stages:

- Policy establishment, involving setting basic goals and selecting appropriate agencies.
- Objectives selection, involving determining program targets, energy use areas, and program design criteria.
- Strategies design, involving identifying relevant contexts and choosing appropriate instruments.
- Program implementation, as agencies enact instruments to alter contexts of energy use.
- Program evaluation, covering the energy savings, cost effectiveness, and other impacts of conservation programs.

This chapter analyzes current U.S. conservation programs in terms of the first four stages. The fifth stage of program outcome evaluation is covered in Chapter 6. The descriptions of Seattle energy conservation programs given in Appendix B include an analysis of each program in terms of its goals, objectives, contexts affected, and implementation instruments.

5.1 Policy Establishment

The basic goal of all local energy conservation programs has been to reduce energy consumption. Relatively little consideration has been given, however, to the meaning of energy conservation. Does it mean eliminating energy waste and using energy more efficiently? Does it mean cutting back on total energy use by some specified amount? Or does it mean changing
our whole way of life toward a less energy demanding lifestyle? No one objects to conservation if it is defined simply as greater efficiency in energy use. But when the possibilities of "curtailment" or "lifestyle modifications" are introduced, many policy makers and consumers become either warry of or opposed to energy conservation as a community or societal goal. Consequently, most conservation program goals have been described solely in efficiency terms, even if they were in fact intended to produce absolute reductions in energy use. As a result, their program goals have typically been very unambitious. However, the two major cities in the Pacific Northwest -- Seattle, Washington, and Portland, Oregon -- have been quite straightforward in stating their energy conservation goals as major reductions in total energy consumption. Seattle's goal, for instance, is to reduce the city's projected electricity demand by 20 percent by 1990 (Olsen and Cluett, 1979).

Another important policy decision that has been strongly emphasized in both Seattle and Portland, as well as several other communities in the Pacific Northwest, has been to actively involve citizens in all planning and decision making concerning conservation programs. As stated by the Executive of King County (which includes Seattle): "Based on our experience in Seattle..., effective citizen participation helps produce better energy policies and significantly increases the chance of successfully implementing them. We have therefore concluded that knowledgeable, hard-working, and dedicated citizens are an essential ingredient for effective energy policy-making" (Revelle, 1979). Citizen participation in conservation program planning has been almost nonexistent outside the Pacific Northwest, however.

A third policy consideration that is gaining increasing support throughout the United States, and is a fundamental assumption of energy policy planning in the Pacific
Northwest, is that consumer conservation programs are most effective when conducted at the level of the local community (Olsen and Joerges, 1981; Stern, Black and Elworth, 1981). It has now become abundantly evident that national conservation programs tend to be too broad and too rigid to be applicable to the wide variety of economic, political, and social conditions existing in local communities. The regional energy plan presently being formulated by the Northwest Power Planning Council will place responsibility for conducting all conservation programs within local communities—with city and county governments, local utilities, and private business firms.

Within various communities, several different kinds of agencies or organizations have taken the lead in promoting energy conservation. In many cases it has been the local utility (e.g., Seattle, Eugene), and that pattern is becoming increasingly prevalent throughout the country. In the Pacific Northwest, the Power Planning Council and the Bonneville Power Authority both view local utilities as the primary—though not the only—vehicles for carrying out conservation programs. In other cases, the primary impetus for promoting energy conservation has come from a city energy office (e.g., Portland) or other agency of the local government. A third pattern, found in smaller communities such as Davis, California, is for the City Council to be the leader in the conservation movement. There is no one best pattern of community organization for conservation programming, as long as the lead agency (a) commands the respect of the entire community, and (b) is able to cooperate smoothly with all the other groups and organizations in the community that are working for or concerned about energy conservation (Stern, Black, and Elworth, 1981). Inadequate community-wide organization and coordination of conservation programs remain a problem in most Pacific Northwest communities, however, as well as throughout the rest of the country.
5.2 Objectives Selection

Objectives are specific statements of what is to be accomplished by a program. Three critical aspects of all energy conservation objectives are the target populations for the programs, the areas of energy use to be covered by the programs, and the criteria to be used in planning programs.

The intended target population for many consumer energy conservation programs in the United States thus far has been either (a) all consumers, or (b) homeowners. These targets are far too broad for effective program design, however, since different kinds of people have vastly different needs and patterns of energy use. If conservation programs are to be effective, they must be tailored to specific target populations (Stern, Black, and Elworth, 1981). Two more narrowly defined categories that have been the targets of federal and conservation programs are low-income people and elderly people, but such categories as renters, condominium owners, and ethnic groups, have been largely ignored. Meanwhile, a different kind of program limitation has emerged during the past few years, as electric utilities have begun to offer household weatherization loans and other financial incentives for conservation. Their programs are available only to households with electric heating, which ignores the 60 to 80 per cent of residences in most communities that heat with oil or natural gas. And in Seattle, the natural gas utility has discontinued its conservation program because it presently has a surplus of gas to sell.

It is also important to determine exactly what areas of energy use are to be addressed by a conservation program. Most consumer conservation efforts have thus far dealt primarily with space heating and cooling, since by far the largest proportion of energy use in all residences is for those purpose. A few years ago, considerable attention was also given to household appliances, from
stoves and refrigerators to lights and television sets. Unfortunately, much effort was wasted during those years in trying to persuade people to throw away their electric toothbrushes or not put up Christmas lights, without realizing that such activities consume only miniscule amounts of energy. At the present time, most conservation efforts aimed at household appliances focus on hot water heaters and other major appliances such as refrigerators, freezers, and stoves. Conservation programs concerned with personal transportation have primarily attempted to persuade people to walk or ride bicycles more, and to form carpools or vanpools. Some communities and employers have gone to great lengths to facilitate the formation of carpools and vanpools (even to the extent of providing the vans). In the realm of public transportation, the main effort has been to encourage people to use public transit systems. Finally, virtually no consumer conservation programs conducted thus far have dealt with consumer purchasing, even though 40 percent of all energy consumption occurs indirectly as consumers purchase goods and services which embody energy in their manufacture or distribution.

In planning a consumer conservation program, several different criteria should ideally be applied. Five of these are the following: (a) energy effectiveness, or the amount of nonrenewable energy saved in comparison with present levels of consumption; (b) cost effectiveness, or its total financial and other costs in relation to its energy savings; (c) environmental effects, or its impacts on the natural environment and natural resources; (d) consumer protection, or the amount and kinds of risks or hazards that fall onto consumers; and (e) side effects, or all other psychological, social, and cultural consequences of the program for individuals, families, and communities. In practice, however, none of these criteria have been given very serious attention. Until very recently, almost no information has been available on the actual energy
saving potential or the costs of various kinds of conservation programs, so that neither their energy savings nor their cost effectiveness could be ascertained. Even less is known about the environmental or social impacts of most conservation programs. And the consumer has been an almost totally ignored element in conservation planning.

5.3 Strategies Design

A strategy is a course of action intended to achieve the objectives of a policy such as energy conservation. Designing a conservation program strategy involves two interrelated activities: identifying the relevant contexts of energy consumption that must be changed to conserve energy, and developing a set of appropriate implementation instruments to alter the relevant contexts and influence individuals' actions.

Five distinct contexts that influence energy consumption are (1) the technical characteristics of the equipment used in producing, distributing, and using energy; (2) the structures and practices of existing economic institutions; (3) existing legal institutions; (4) features of relevant social and cultural settings; and (5) personal characteristics of individual consumers.

The vast majority of conservation efforts made thus far in the United States have had a predominant orientation toward changing the technical context of energy consumption. They have viewed conservation as merely a task of improving the thermal characteristics of buildings, increasing the efficiency of heating and cooling systems, replacing energy inefficient appliances with more efficient ones, or producing more fuel-efficient automobiles. Two serious problems with this widespread "technical fix" approach to energy conservation are that (a) the actual energy savings obtained through these kinds of measures tend to vary widely among different situations; and (b)
this approach pays no attention to any of the other contexts that also affect energy use. One recent study, for example (Socolow, 1978), discovered that energy consumption in identical houses in a housing development often varied by 50 percent or more. Nevertheless, most conservation program planning in the U.S. focuses primarily on technical measures and treats energy conservation as an engineering problem.

When conservation program designers have moved beyond purely technical considerations, their next concern has usually been with economic factors such as direct capital costs of conservation measures, payback periods to consumers, energy prices, energy rate structures, billing procedures, etc. All of these economic factors do affect energy consumption and must be taken into account in conservation program designs. But a very common misconception among energy policy makers has been to assume that the consumption of energy is a purely economic transaction, governed only by principles of rational exchange in the marketplace. This perception, which is especially common among governmental energy planners (Landsberg, et. al., 1979), ignores all the psychological and sociological factors that influence people's energy consumption.

Governments and legal systems also affect energy use in numerous ways, through utility regulations, energy price ceilings, buy-back requirements, allocation limits, efficiency standards, zoning laws, and environmental standards. In this context, the typical problem in the U.S. has been lack of adequate attention rather than overemphasis. Our understanding of how the legal context influences energy consumption, and hence the ways in which legal changes can stimulate conservation, is still quite incomplete. Consequently, as Barry Commoner (1979) has repeatedly observed, the U.S. has failed to develop any kind of governmental policy concerning energy conservation and much of the conservation legislation that has been
passed by Congress has not yet been translated into effective programs.

The sociocultural context has been even more thoroughly ignored in most energy conservation program planning in the U.S. This context includes very complex sets of factors such as cultural values and belief systems, patterns of community organization and power arrangements, networks of interpersonal interactions, activities of special interest associations, and characteristics of household social structures. A number of sociologists have written about the importance of these various sociocultural aspects of energy consumption (e.g., Gentemann, 1981; Von Till, 1982; Warkov, 1978), but relatively little empirical research has been done on any of these topics and they have been almost totally ignored in designing energy conservation programs. As an illustration, recent public opinion polls have repeatedly found that over two-thirds of all Americans say they want to reduce their consumption of material goods and live simpler lifestyles, but this fact has not been incorporated into energy conservation planning in any manner.

In contrast, many conservation programs have attempted to influence the consumer's personal context of energy use, including personal attitudes and values, beliefs about the energy problem, lifestyle orientations, knowledge about energy use, experiences with conservation activities, and exposure to others practicing conservation. The assumption underlying these efforts has been that if conservation is not solely a technical or economic process, then it must be a matter of individual decision making. That assumption is correct up to a point, and a great deal of valuable research has been conducted by psychologists and social psychologists on the effects of the personal context on energy consumption (for a comprehensive review of this research, see Stern and Gardner, 1981). In general, this research has discovered that
personal or psychological factors do affect between 10 and 30 percent of a person's energy consumption, depending on the factors and conditions involved. But there is also a clear limit to the influence of these personal factors, since the personal context is always shaped and constrained by the larger sociocultural context. Yet at the present time, neither social scientists nor energy planners know very much about how sociocultural factors affect personal decision making about energy consumption.

A wide variety of implementation instructions can be used to alter the contexts of energy consumption and induce people to take energy conserving actions. Nine types of instruments commonly used in energy conservation programs are information, persuasion, participation, pricing, taxing, incentives, standards, reorganization, and allocation. The following review of past experience with these instruments in the United States is abridged from an earlier report (Olsen and Jeorges, 1981), which gives extensive references to the relevant research literature.

By far the most commonly employed implementation instrument in U.S. consumer energy conservation programs has been presentation of information through the mass media, various kinds of publications, lectures, workshops, home energy audits, and many other means. The information conveyed has pertained to the nature of the energy problem, people's current energy use patterns, possible conservation actions, the potential energy and monetary savings of those actions, etc. Such information is obviously necessary if people are to understand the importance of conservation, know how to practice it, and evaluate the effectiveness of their actions. Many studies of information campaigns have concluded, however, that information by itself is rarely sufficient to produce significant energy savings among most of the population, especially when it is presented through the mass media.
Communication channels such as conservation workshops, home energy audits, and consumption feedback do appear to have some influence on promoting conservation, but they are most effective when combined with other instruments. In short, information is a necessary but rarely sufficient instrument for promoting consumer energy conservation. This central factor is now fairly well understood among energy conservation planners in the U.S.

Many information campaigns have shaded imperceptibly into persuasion efforts aimed at changing people's general attitudes concerning the seriousness of the energy problem, support for conservation policies, and acceptance of an "environmental ethic." For the most part these efforts have not been very successful. There is no empirical relationship between belief in the reality and seriousness of the energy problem and taking conservation actions, nor between acceptance of governmental conservation policies and taking conservation actions. The basic problems with this persuasive approach are that (a) it usually reaches only those people who are already positively oriented toward conservation, and (b) even if it does reach other people, such attitudes are very difficult to change through direct persuasive appeals. There is some evidence, nevertheless, that very specific attitudes concerning anticipated personal consequences (desirable or undesirable) of reducing one's energy consumption do affect conservation actions. In particular, program designers have frequently emphasized the financial benefits of conservation as a means of persuading people to take such actions. Many nonfinancial factors -- such as personal health and comfort, safety, convenience, and the desire to live a less materialistic lifestyle -- can also be powerful motivating forces for conservation, but they have not often been incorporated into conservation program planning.

Participation programs, which emphasize the
transmission of new experiences, expectations, and interpersonal influences, have been conducted in only a few communities in the U.S. thus far. This is rather surprising, since a large body of social science research has demonstrated that people are most accepting of new ideas and practices that reach them through other individuals they respect or through organizations to which they belong, and that local neighborhood and community organizations can be very effective vehicles for introducing social change. Those relatively few communities that have attempted comprehensive participatory programs -- involving block meetings, home energy audits, neighborhood workshops, voluntary association programs, and community planning activities -- have found them to be quite effective, however. The first such program was carried out in Davis, California, but this approach has been applied most extensively in the Pacific Northwest cities of Seattle, Washington, and Portland and Eugene, Oregon. Eugene is presently making extensive use of its well organized neighborhood associations as vehicles for transmitting information about energy conservation.

In the view of most U.S. energy economists and policy makers, the most effective type of conservation instrument is pricing. This may involve decontrolling fossil fuel prices and allowing them to rise to world market levels, or raising the rates of regulated gas and electric utilities. As energy prices rise, consumption will presumably decline. Numerous researchers have attempted to determine the price elasticity of energy in the United States, but these estimates have varied widely among studies, energy use sectors, and time periods. Moreover, many sociologists and psychologists have demonstrated that numerous factors other than price influence energy consumption, especially in the short run. There is no doubt that rising energy prices eventually lead people to reduce their energy consumption, and this
approach is the primary policy of the Reagan Administration. Nevertheless, it is a very imperfect instrument with many operational limitations. In addition, it creates serious financial problems for low-income people, without reducing their energy consumption. Moreover, the pricing approach to conserving energy is almost universally disliked by the U.S. public. A final limitation to this instrument is that it cannot easily be used by utilities or local government.

If government officials feel that market prices for energy are not high enough to produce sufficient conservation, they can impose taxes on energy to raise its cost even higher. These taxes may be applied to the initial extraction or generation of energy, or to end-use energy sales. There have been numerous proposals by federal and state governmental officials to use taxation as a conservation instrument, but (except for limited gasoline taxes) this approach has generally not been adopted in the U.S. Many consumers feel that the principal problem with energy is that its prices are already too high, and hence vehemently oppose further price increases through taxation. Moreover, taxation incurs all the problems mentioned above in connection with pricing, as well as the political question of what to do with the revenues generated by the energy taxes.

In contrast to the strong public opposition to pricing and taxing instruments, almost all citizens support the use of financial incentives to promote energy conservation. Many public officials also have a strong preference for financial incentives because they avoid the political hazards of inequitable pricing or unpopular regulatory standards. Several kinds of financial incentives for energy conservation have been tried in the United States, but generally on a limited basis. The federal government allows a 15 percent tax credit for
household conservation improvements and moderate tax credits for solar improvements, but these credits appear to have little influence on people's decisions about home weatherization. Only a few states (including Oregon and California) have extensive financial incentive programs, although many states (including Washington) exempt conservation and solar improvements from property taxes. Several states and many utilities now offer low- or no-interest loans for such household improvements, although a considerable portion of the public (at least one-third) is not interested in a conservation loan at any interest rate. A few utilities are now initiating grant programs for household weatherization, in which the utility pays about three-fourths of the total cost of those actions (which is less expensive for them than administering long-term loans), but it is too early to know how such grants will be received by the public. In short, this is a very promising conservation instrument, but our understanding of how to design an effective incentive program is still quite incomplete.

Some states (including Washington and Oregon) and some local communities (including Seattle and Portland) have adopted mandatory energy efficient standards for new residences and other buildings. Eugene, Oregon has also adopted standards for existing residences. The federal government has sponsored a considerable amount of research to develop a national set of building standards, but the Reagan Administration has abandoned that effort. The U.S. does have mandatory standards pertaining to transportation, however, in the form of fuel efficiency standards for new cars and a maximum speed limit. It has also established energy efficiency standards for all household appliances, but these are only voluntary in nature. The effectiveness of this conservation instrument depends on several factors, including the nature of the standards established and the manner in which they are enforced. The U.S. public is generally supportive of this
approach to conservation, as long as standards are seen as fair and equitable. This approach is limited, however, by the fact that it tends to promote minimum rather than maximum conservation efforts. Standards can also quickly become obsolete, as has happened with the automobile efficiency requirements adopted by Congress in 1978; by 1982, all U.S. automobile manufacturers were exceeding those standards by a considerable margin. In general, the potential for promoting energy conservation through construction and/or operational standards has not been very fully explored in the U.S., despite public receptivity.

If our communities -- including their buildings, transportation system, and land-use patterns -- had initially been designed for energy efficiency, we might not have an energy problem today. The intent of the reorganization instrument is to compensate for that historical oversight by redesigning and redeveloping communities for greater energy efficiency. The goals of such efforts might include constructing more multifamily dwellings, redeveloping inner-city areas to attract middle-class residents, locating industries in "industrial parks" with nearby housing for their workers, developing new forms of mass transportation, substituting communication facilities for transportation lines, or arranging cities into "neighborhood clusters" containing all necessary services and facilities within easy walking distance. Several years ago, Davis, California, attempted to reorganize itself as an energy conserving community, but it had only limited success in this effort, and thus far no other U.S. communities have attempted to carry this approach to conservation any further.

Allocation brings the government directly into the process of deciding how much energy will be distributed or consumed. Allocation programs must be mandatory if they are to be effective, but they can vary considerably in
their scope and requirements. During the gasoline shortages that followed the 1973-74 oil embargo, all the states and many communities imposed gasoline distribution quotas, but those have since been eliminated. Many communities have recently specified limitations on the number of new dwelling units they may be connected to existing electricity or natural gas systems for heating purposes, but full-scale rationing or other restrictions on energy consumption are not presently in force anywhere in the U.S. The federal government has developed a gasoline rationing system to be employed in case of another serious oil embargo, however, and all of the states have created emergency energy allocation plans. Meanwhile, social science research on this instrument has discovered that a majority of the public strongly opposes its use unless absolutely necessary, and that any rationing scheme would undoubtedly give rise to a "black market" for energy unless the government permitted a legal "white market" for trading or selling rationing coupons.

5.4 Program Implementation

After a policy has been established, objectives have been selected, and strategies have been designed, a program must be implemented which employs those strategies to attain the designated objectives and thus realize the desired policy outcomes. The following discussion of program implementation addresses the four questions of: (a) Who will conduct the program?; (b) How will the program be organized?; (c) How will the program reach its targets?; and (d) How will the program mobilize individuals to take action?

Who will conduct the program? Consumer confidence in the principal agency conducting a conservation program is critical for its success. As a general rule, U.S. consumers tend to place much more trust in local government agencies than in state or federal agencies, which is one reason why energy conservation programs tend
to be more successful when conducted by a community energy office or similar agency. Understanding of the importance of community-based conservation programs spread quite rapidly among energy planners in the U.S. during the late 1970s, which led to a number of conferences and publications on this theme (e.g., Ridgeway, 1979; Solar Energy Research Institute, 1979).

A problem arises from the fact, however, that many local governments, especially in smaller communities, lack the technical knowledge, staff personnel, and financial resources to conduct an adequate conservation program. To meet these needs, the local government must often turn to other organizations, including energy companies, utilities, private businesses, community organizations, and special-interest groups. However, some of these organizations—especially energy companies and utilities—are viewed by the public as having a conflict-of-interest between selling energy and promoting conservation. Consequently, a few communities—such as Seattle, Portland, and Eugene—are now attempting to organize the city and county governments, the local utilities, and private energy conservation firms into coalitions in which all the participants cooperate in promoting energy conservation in the community.

How will the program be organized? As large numbers of individuals, community organizations, and local government agencies become involved in implementing a community conservation program, problems of communication and coordination can increase acutely. To meet this challenge, Stern, Black, and Elworth (1981) have recommended organizing all of the conservation services offered in a community into a single "package program" that enables consumers to do "one-stop-shopping" for all their conservation needs.

Included within a comprehensive consumer energy
conservation package program might be the following services: (a) Information about the actions that consumers can take to save energy, approximately how much each action is likely to cost and how much energy it may save, and other important benefits or problems associated with it. (b) Audits of residences to identify ways in which they are wasting energy, steps that might be taken to reduce those energy losses, and the likely effects of those actions. (c) Workshops to teach interested persons how to carry out household conservation actions. (d) Assistance to households in taking conservation actions, such as handling all arrangements with a contractor to do the necessary work, or providing a list of recommended contractors, or supplying materials to people who want to do the work themselves. (e) Financial services, including help in applying for available grants and tax credits, providing no-interest loans, and arranging with utilities to "buy-back" the energy saved by consumers through conservation or generated by solar facilities. (f) Inspection of all conservation work to ensure that it meets established performance and safety standards. (g) Protection of consumers by offering warranties on all work performed, handling complaints, and providing legal assistance when necessary. To date, however, no U.S. community has developed anything like a comprehensive package program of energy conservation services.

How will the program reach its targets? Conservation information and persuasion programs in the U.S. have used a variety of communication channels, including television and radio, newspapers, pamphlets and brochures, announcements with utility bills, lectures, workshops, classes, graphic displays, energy fairs with displays, and others. Evaluations of these efforts have discovered that they reach a fair proportion of the population, especially people who are already at least moderately interested in energy problems. The main limitation to this approach is that it fails to reach several other
categories of people, including those who are poorly educated, elderly, socially isolated, do not speak the prevailing language, or are uninterested in conservation.

One effective way of reaching people who are not presently concerned about energy conservation is to contact them through existing local organizations of all kinds to which they already belong. These might include business and civic organizations, recreational groups, labor unions, special interest associations, churches, and neighborhood associations. A few U.S. communities -- such as Eugene, Oregon -- have begun using these communication channels. But most conservation programs still rely on mass media messages, pamphlets and other printed materials, notices distributed with utility bills, and other such techniques with limited effectiveness.

How will the program mobilize individuals? If households and other consumers are to practice energy conservation and reduce their energy consumption, they must be mobilized for action. This mobilization process contains both psychological and sociological components.

Psychologically, individual consumers must be (1) made aware of the nature of the energy problem and the importance of conserving energy; (2) motivated to take new actions; and (3) given the necessary information that will enable them to take such actions. Awareness of, and concern about, energy conservation is now quite widespread in the U.S. (Olsen, Rosa, and Dillman, 1982). In addition, a great deal of easy-to-understand information is now available on all kinds of household conservation techniques, so that the interested consumer should have little difficulty learning what actions to take to conserve energy. Three main kinds of motivational appeals are presently being employed by most conservation programs: (a) reducing household energy costs, especially in the future as energy costs continue to rise; (b) making
one's home more comfortable and maintaining its market value; and (c) helping to solve the national energy problem and/or supporting a broad conservation ethic. Most program designers appear to be convinced that the first of those motivations is the most powerful, so that it has been used much more extensively than the other appeals, but recent research has indicated that all of the other motivations can also be moderately effective (Olsen and Cluett, 1982).

Sociologically, consumers must have an environment that provides both opportunities and reinforcement if they are to act on their intentions to practice energy conservation. The necessary technical equipment and procedures must be available. Capital must be available for investing in conservation improvements. Legal obstacles to conservation must be removed. And cultural values and social structures must emphasize low energy living patterns. All of these various opportunities for conservation are expanding at the present time. If such actions are to be sustained through time, nevertheless, consumers must also receive confirmation that their actions are actually saving energy, that those actions have no undesirable side-effects, and that significant others approve of their actions. Without regular reinforcement of that kind, conservation actions are not likely to continue for long. Yet conservation program planners in the U.S. have given virtually no attention to this critical confirmation process.

5.5 Seattle Program Analysis

More than one-third of the 29 Seattle-area energy conservation programs described in Appendix E are conducted by local utilities, almost one-third are conducted by agencies of the city or county governments, and the remaining one-third are sponsored by neighborhood associations or private organizations. Many of these programs are aimed at all energy consumers within the
residential sector, some are directed toward low-income people, the elderly, and/or renters, and a few are targeted for specific audiences such as teachers or contractors.

All of the programs are intended to alter the technical context of energy consumption in some manner. All of them also attempt to change the personal context of individual consumers. To achieve those objectives, most programs utilize a wide range of formal and informal communication instruments to give people information about conservation techniques and to persuade them to take appropriate actions. Many programs also employ various participatory instruments, from workshops to hands-on instruction. The other contexts of energy use are not addressed very extensively, however. While a number of programs disseminate information about the economic context, they rarely try to change it. Financial instruments in the form of free services are used by some programs, but only a handful of them offer economic incentives such as loans or grants and none deal with energy prices or taxes. The city energy code for new buildings is the only program that directly affects the legal context, through those mandatory standards. None of the programs involve allocation or reorganization instruments. And the sociocultural context is almost totally ignored by these programs, except to the extent that they emphasize the importance of a conservation ethic. In general, the utility programs are the most comprehensive in scope. Those programs often include not only extensive information and education efforts, but also home energy audits, free services such as wrapping the water heater, financial assistance through loans and grants, and sale of conservation materials at cost.

Overall, Seattle has a very extensive set of consumer energy conservation programs, but the majority of them are of a relatively limited nature.
CHAPTER 6. ENERGY CONSERVATION PROGRAM EVALUATIONS

This chapter reviews the most significant information presently available on the fifth stage of the analytical model of consumer conservation programs. This evaluation stage focuses on program outcomes, including both their benefits (actions taken, energy savings, environmental protection, and community consequences and consumer benefits) and their costs (economic and other costs). Particular attention is given to evaluations of programs being conducted in the Pacific Northwest region. The importance of evaluating program outcomes to determine their effectiveness and efficiency is a well established principle of program administration. Ideally, all action programs should be continuously evaluated, from their initial design phase through implementation to their eventual outcomes and impacts. Because most energy conservation programs have been rather poorly designed and funded, however, relatively few of them have been formally evaluated, and most of those evaluations have been less than adequate.

Two guidebooks for conducting such evaluations have recently been prepared as a means of stimulating more evaluations of conservation programs. One of these (Söderström, et al., 1981) is a general introduction to the process of program evaluation as applied to energy conservation activities. The other one (Olsen, et al., 1980) contains a general discussion of program evaluation techniques, followed by detailed procedures for evaluating all the energy conservation programs being conducted by the Washington State Energy Office at that time.

This review of energy conservation program outcome evaluations is divided into five sections dealing with: (1) two summary analyses of evaluations of home energy audit programs conducted by various utilities around the U.S., (2) evaluations of several conservation programs in
the Pacific Northwest region, (3) the detailed analyses of conservation programs conducted by the Pacific Northwest Conservation Assessment, (4) studies of the potential environmental, community, and individual impacts of conservation efforts, and (5) an overview of the evaluations conducted thus far on all the Seattle energy conservation programs described in Appendix E.

6.1 Home Energy Audit Program Evaluations

**Review of Evaluations.** A fairly extensive review of evaluations of utility home energy audit programs was recently conducted by several researchers at Oak Ridge National Laboratory (Hirst, et al., 1981a). Almost all of the 35 utilities examined were making some efforts to evaluate the results of their audit programs, but in most cases this consisted merely of asking people a few months after the audit if they had taken any of the conservation actions recommended in the audit. Comparison groups or other control procedures are rarely used. And only three utilities throughout the entire country had conducted evaluations that measured actual energy savings. These were the Seattle City Light and Pacific Gas and Electric Company studies summarized below, plus the Tennessee Valley Authority. That latter evaluation reported energy savings of 20 percent, but this was due to the fact that the evaluation was limited to households that both had an energy audit and agreed to install additional insulation, so that it ignored all households that had an audit but declined to participation in the insulation program.

**Residential Conservation Services Program.** Under this program, which was established by the National Energy Conservation Policy Act (NECPA) of 1978, all large electric and gas utilities in the U.S. are required to provide home energy audits to their customers on request, to estimate the purchases and installation cost and potential energy savings of each purchase, and to arrange for the installation and financing of these improvements
Five major conclusions resulted from this analysis. (1) The evaluations "showed positive results from program participation, but the findings were neither significant nor consistent among the studies" (p. viii). (2) "Although program participants generally considered utility representatives to be credible sources of energy information and praised the programs, they nevertheless suspected the utilities' motives" (p. vii). (3) "With some exceptions, the programs experienced relatively low participation rates" (p. vii). (4) "Factors other than insufficient information were found to impede increased conservation; these include the investment cost of the measures and housing stock" (p. vii). (5) "Because of methodological flaws and mixed results, we were unable to determine whether home energy audits led to increased conservation activity and whether the...programs actually resulted in significant energy savings" (pp. vii-viii).

In short, these evaluations tell us very little about the effectiveness of home energy audit programs. Table 6-1 summarizes the main characteristics of those eight programs and the major findings from their evaluations.

6.2 Pacific Northwest Program Evaluations

Bonneville Power Administration Residential Weatherization Program. Since 1980, BPA has been conducting a test of its residential weatherization program in the Pacific Northwest region (BPA, 1980) (Hirst, et al., 1983). This program provides free home energy audits and no-interests loans for recommended weatherization actions in electrically heated homes. The average cost per home for complete weatherization has been $2100. The average amount of electricity saved
<table>
<thead>
<tr>
<th>Utility Evaluation</th>
<th>Type of Evaluation</th>
<th>Sample Size</th>
<th>Observation Period</th>
<th>Findings</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific Gas and Electric (PACE RIS)</td>
<td>Continuing opinion survey</td>
<td>400 interviews per survey; total sample of 1200 households</td>
<td>Eight months</td>
<td>Considerable public interest in energy conservation: Ambivalence about utility participation; Little evidence about RCS model</td>
<td>Careful random sample selection</td>
<td>Possible &quot;social desirability&quot; bias</td>
</tr>
<tr>
<td>Pacific Gas and Electric (Energy Run Survey)</td>
<td>One-shot postaudit survey</td>
<td>5197 respondents (response rate: 44%)</td>
<td>One year</td>
<td>Audit program well received; Marketing program successful; Conservation measures planned as result of audit</td>
<td>Validation survey</td>
<td>Self-selection bias</td>
</tr>
<tr>
<td>Gulf States Utilities</td>
<td>One-shot postaudit survey</td>
<td>54 respondents (average response rate: 24%)</td>
<td>Unknown</td>
<td>Audit program well received; Conservation measures planned as result of audit</td>
<td>Validation survey</td>
<td>Self-selection bias</td>
</tr>
<tr>
<td>San Diego Gas and Electric</td>
<td>One-shot postaudit survey</td>
<td>353 residences (response rate: 83%)</td>
<td>Six weeks after audit</td>
<td>Audit program well received; Ambivalence about utility participation; Customers unwilling to invest heavily in conservation</td>
<td>Able to provide feedback for pilot program improvement</td>
<td>Self-selection bias</td>
</tr>
<tr>
<td>Seattle City Light</td>
<td>Designed as part of program Systematic interviews and fuel consumption analysis</td>
<td>Market study: 168 Phase I: 30 Phase II: 104 Phase II: 104 Phase II: 104 Phase II: 104 Phase II: 104 Phase II: 104 Phase II: 104</td>
<td>Program improved public knowledge about conservation; Participants increased conservation activity but did not necessarily save correspondingly more energy; Participants saved 1.1-12.9% more fuel than nonparticipants</td>
<td>Matched sample groups</td>
<td>Matched sample groups</td>
<td>Small sample size</td>
</tr>
<tr>
<td>Tennessee Valley Authority</td>
<td>Analyses of existing records and fuel consumption survey</td>
<td>Description of 1274 participants; Heating impacts: 346 Cooling impacts: 192</td>
<td>1-1/2 years</td>
<td>Participants reduced fuel consumption by 2% Combined program was cost-effective</td>
<td>Improved fuel consumption equation</td>
<td>Severe data problems</td>
</tr>
<tr>
<td>Pacific Gas and Electric-Emerson</td>
<td>Designed as part of program One-shot postaudit survey Fuel consumption analysis</td>
<td>600</td>
<td>March-May for three successive years</td>
<td>Do-it-yourself audit cheaper and more popular; Participants did not save significantly more fuel than nonparticipants</td>
<td>Carefully designed evaluation Representative study site and sample groups</td>
<td>Short observation period</td>
</tr>
<tr>
<td>Wisconsin Power and Light</td>
<td>Evaluation compatible with program Interviews Home visits Fuel consumption analysis</td>
<td>Participants: 446 Nonparticipants: 386</td>
<td>Five peak heating months, 1977-1980</td>
<td>Little evidence of independent conservation: Mixed or perverse fuel savings results; Participants often undertook conservation measures with unreasonable or uninformed economic expectations</td>
<td>Two-year reaudit to determine long-term conservation Control group</td>
<td>Short observation period in fuel consumption analysis Self-selection bias</td>
</tr>
</tbody>
</table>
annually per home as a result of the program has been 4130 KWH, or a 14% reduction in total energy use. Consequently, the cost per KWH saved has been 1.8¢. Hence this program appears to be quite successful in terms of both energy savings and cost-effectiveness.

**Seattle City Light Neighborhood Energy Conservation Program.** During 1978, Seattle City Light (the municipal electric utility in Seattle, Washington) conducted a trial Neighborhood Energy Conservation Program based on the principle of implementing conservation through neighborhood activities and personal contacts. Three kinds of conservation activities were carried out in this program: neighborhood information campaigns, block conservation workshops, and home energy audits. Different combinations of these activities were provided by City Light in different areas of the city. The evaluation of that program (Olsen and Cluett, 1979 and 1982) measured the effects of the program on people's energy attitudes, information, conservation actions, and energy consumption.

The program did not affect people's general attitudes toward energy conservation, and program exposure only slightly increased people's knowledge about energy conserving techniques. Program participants did take significantly more home conservation actions after the program than did a control group on non-participants, however. Of the three kinds of program activities, home energy checks produced the largest number of conservation actions, and block workshops were almost as effective, but information campaigns had rather weak effects. The greatest program effects occurred among persons who were exposed to all three program activities.

To measure the actual effects of the City Light program on household energy consumption, records for all forms of energy consumption for the year following the
program were obtained for both program participants and non-participants. In all-electric homes (i.e., electric space heating, water heating, and cooking), persons exposed to the City Light program reduced their total energy consumption by an average of 5.6 kilowatt hours per day, for an energy savings of 8.6 percent, whereas persons not exposed to the program used approximately the same amount of electricity before and after the program was conducted. Roughly similar energy savings occurred in homes heated with oil or natural gas, for both their furnace fuel and their electricity consumption. However, people's scores on an index of reported conservation actions were unrelated to their actual energy savings, which indicates the importance in such evaluations of directly measuring energy consumption and not relying on people's verbal statements about what they have done to save energy.

As a result of this 1978 field test, Seattle City Light established the Home Energy Check Program on a regular basis beginning in 1979. In 1981, an evaluation was made of this program during its first two years of regular operation (Weiss, 1981). During that period, approximately 10,000 residences in Seattle were audited by City Light, almost all of which were single-family homes. The evaluation consisted of questionnaires completed by 335 households that had been audited, and a comparison group of 222 households that had not been audited.

Audited households were much more likely than non-audited households to turn down the hot water heater temperature (93% compared to 57%), to insulate their hot water heater (60% compared to 22%), to install shower flow restrictors (45% compared to 27%), and to insulate hot water pipes (33% compared to 16%). Most of these differences were due to the fact that the auditors did these actions themselves during the course of the audit. There were no significant differences between the audited
and non-audited households in taking any space-heating conservation actions. On the average, audited households with electric heat reduced their electricity consumption by about 1500 KWH per year as a result of the program, which represents a total energy reduction of 5.7 percent. Households with other types of heat reduced their electricity consumption by about 500 KWH per year because of the program, which is a 3.8 percent reduction in total energy consumption.

Appendix F contains a more detailed description of this evaluation.

**Washington Energy Extension Service Classes.** The King County office of the Washington Energy Extension service offers evening and weekend classes on a wide variety of conservation and renewable resource topics. They are intended to teach people how to save energy or use renewable resources, and to encourage them to take such actions. Eight types of WEES classes were recently evaluated to determine if persons who attended them subsequently took conservation or solar actions in their homes (Olsen and Dethman, 1981). The results showed that class participants took numerous conservation actions approximately twice as frequently as a comparison group of non-participants. On a Total Weighted Action Index of conservation actions taken after attending a WEES class, participants had a mean score of 10.7, compared to scores of 5.6 if they had not been exposed to any other conservation program, 8.6 if they had been influenced by mass media programs about conservation, and 10.1 if they had attended other conservation workshops or had a home energy audit. Overall, non-participants in the WEES classes had a mean total actions score of 7.1, which was significantly lower than the score of 10.7 among class participants.

This study also estimated -- extremely crudely -- the
total amount of energy that the class participants might potentially save if they actually took all the conservation actions they reported taking. These households were divided into the three categories of "high," "medium," and "low" energy consumption on the basis of the household size and income. The total amount of energy typically consumed annually by residences in each of the three categories, prior to taking conservation actions, was obtained from the earlier City Light evaluation, so that potential energy savings from conservation actions could be compared with total energy consumption within each category. Table 6-2 shows -- for each of the three energy-use categories and for all households in the WEES classes -- (a) the approximate typical annual total energy consumption, (b) the estimated mean percent of potential energy savings that could be attained through the reported conservation actions, and (c) the resulting approximate mean possible energy savings in kilowatt hours per year.

The data in this table do not show much variation across the three categories of households in their estimated percent of potential energy savings. In all three categories, the conservation actions reported by the respondents could potentially reduce their household energy consumption by over one-third. Because the three categories of households tend to use quite different amounts of energy, however, the energy savings that might result from those reported conservation actions differ considerably among the three categories of households. In low-energy-using households, this level of conservation effort might save approximately 5,000 KWH of energy per year. In medium-energy-using households this figure rises to approximately 8,500 KWH per year. And in high-energy-using households it reaches approximately 12,000 KWH per year. These estimates suggest two important generalizations. First, households that make a serious effort to practice energy conservation can probably reduce their total energy consumption by at least one-third,
Table 6-2

ESTIMATED ENERGY SAVINGS THAT COULD POTENTIALLY RESULT FROM HOUSEHOLD CONSERVATION ACTIONS BY PARTICIPANTS IN ENERGY EXTENSION SERVICE CLASSES IN SEATTLE

<table>
<thead>
<tr>
<th></th>
<th>Low energy using households</th>
<th>Medium energy using households</th>
<th>High energy using households</th>
<th>All households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate mean total energy consumption in KWH per year</td>
<td>14,000</td>
<td>22,000</td>
<td>36,000</td>
<td>24,000</td>
</tr>
<tr>
<td>Estimated mean percent of total potential energy savings from reported conservation actions</td>
<td>34%</td>
<td>39%</td>
<td>37%</td>
<td>36%</td>
</tr>
<tr>
<td>Approximate mean possible energy savings from reported conservation actions, in KWH per year</td>
<td>5,000</td>
<td>8,500</td>
<td>12,000</td>
<td>8,500</td>
</tr>
<tr>
<td>N</td>
<td>59</td>
<td>60</td>
<td>79</td>
<td>198</td>
</tr>
</tbody>
</table>

regardless of their present level of energy use. Second, these conservation efforts will save much more energy in households that use large amounts of energy than in households that already use less energy. The latter generalization in turn suggests that energy conservation efforts in the residential sector should be aimed primarily at high-energy-using households, which includes those of large size and high incomes, as well as buildings that have poor energy efficiency.

Pacific Gas and Electric Residential Energy Utilization Analysis. The home energy audit service of this utility was recently evaluated in Concord, California (Pacific Gas and Electric Co., 1979). Three samples of homes were randomly selected. One group received a thorough, in-person (Class A) energy audit. The second group received a do-it-yourself residential energy analysis packet (Class C audit). The third, control, group received nothing. Actual electricity and gas consumption was recorded for the homes in all three groups for four months before the audits and for the same four months a year after the audits. No statistically significant differences in energy consumption were found among any of the three groups in this test.

6.3 Pacific Northwest Conservation Assessment

This very recent study was carried out by Synergic Resources Corporation (1982) as part of a broader investigation of the need for completing the construction of two nuclear plants in Washington State. The overall study was coordinated by the Washington Energy Research Center at Washington State University. The purpose of the Conservation Assessment was to estimate the amount of electricity that could be saved through conservation programs in the Pacific Northwest Region during the next 20 years, and the costs of those savings. The results of the Assessment, together with those from a follow-up study presently being conducted, will also be used by the
Northwest Power Planning Council in developing its comprehensive long-term energy plan for the Pacific Northwest region.

The Conservation Assessment pertained only to electricity consumption, but most of the programs it examined are also applicable to buildings heated with oil or natural gas. The study examined all sectors of electricity use (residential, commercial, industrial, agriculture, and government), but this discussion is limited to the residential sector. The study did not deal with gasoline consumption in transportation.

To estimate the energy savings that could be realized through conservation programs in the future, the Assessment analyzed 20 different types of residential conservation programs that are presently being conducted in the Pacific Northwest. Under the heading of "information programs" were energy hotlines, weatherization clinics, energy audits, and appliance labeling. In the category of "financial assistance programs" were weatherization loans, weatherization grants for low-income households, conservation buy-back by utilities, house doctors, heat pump water heater rebates, shower flow restrictor distribution, hot water tank wraps, appliance rebates, and electrical heating conversion fees. "Mandatory programs" included thermal standards for new residential construction, time-of-sale standards for multifamily structures, thermal standards for electric conversions, and appliance efficiency standards.

Estimates of future outcomes of conservation programs are necessarily quite tentative, since it is impossible to predict with certainty (a) what programs will be implemented in the future, (b) how many and what kinds of conservation actions will be taken as a result of those programs, or (c) how much those actions will reduce electricity consumption. Nevertheless, the results of
this Assessment are the best data presently available on
the likely effectiveness of energy conservation programs.

The analytical approach used throughout the
Assessment was to treat conservation as an electricity
source similar to thermal generating plants and renewable
energy technologies. Electricity saved through
conservation is therefore entered into the supply side of
the overall model used to predict future electricity
requirements, not the demand side. Energy demand is
estimated on the basis of projected population growth and
economic activity in the region.

Within the residential sector, the first analytical
step in the Assessment was to select 20 conservation
programs for examination, divided into the three
categories of informational, financial, and mandatory
programs. These 20 programs -- which are listed in Table
6-3 -- were selected because they have already been
implemented to at least a limited extent, so that some
data (admittedly extremely crude in many cases) are
available concerning their effectiveness. As a result,
the Assessment did not consider several kinds of
conservation programs that have not yet been attempted
anywhere but which might likely produce substantial energy
savings. Two examples of such possible programs are (a)
Total Weatherization Grants by utilities or BPA that would
pay the full cost (up to some predetermined maximum) of
totally weatherizing existing residences; and (b)
Mandatory Weatherization Retrofitting of all existing
residences within a specified time period.

The second step in the analysis was to estimate the
likely "penetration rate" of each program, or the number
of households that will be reached by the program. With
mandatory programs this rate is assumed to be 100 percent
(although that is undoubtedly overly optimistic), but with
informational and financial programs these rates are
### Table 6-3

**RESIDENTIAL PROGRAM SUMMARY:**

**ENERGY CONSERVATION POTENTIAL AND COSTS BY 2000**

<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>PROBABILE PROGRAM</th>
<th>LOW PROGRAM</th>
<th>HIGH PROGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SAVINGS ($ x 10^6)</td>
<td>COSTS ($ x 10^6)</td>
<td>SAVINGS ($ x 10^6)</td>
</tr>
<tr>
<td>1. Energy Hotline</td>
<td>314.6</td>
<td>98.9</td>
<td>280.1</td>
</tr>
<tr>
<td>2. Weatherization Clinics</td>
<td>228.3</td>
<td>58.6</td>
<td>205.0</td>
</tr>
<tr>
<td>3. Class &quot;A&quot; Audits For Single-Family Homes</td>
<td>163.5</td>
<td>104.9</td>
<td>146.9</td>
</tr>
<tr>
<td>4. Class &quot;A&quot; Audits For Mobile Homes</td>
<td>23.5</td>
<td>19.7</td>
<td>14.1</td>
</tr>
<tr>
<td>5. Appliance Labeling</td>
<td>612.3</td>
<td>12.2</td>
<td>306.2</td>
</tr>
<tr>
<td>6. Weatherization Loans For Single-Family Homes</td>
<td>508.4</td>
<td>176.0</td>
<td>473.8</td>
</tr>
<tr>
<td>7. Weatherization Loans For Mobile Homes</td>
<td>44.4</td>
<td>32.6</td>
<td>26.6</td>
</tr>
<tr>
<td>8. Weatherization Grants For Low-Income</td>
<td>281.4</td>
<td>81.7</td>
<td>235.0</td>
</tr>
<tr>
<td>9. Conservation Buy Back</td>
<td>712.8</td>
<td>249.9</td>
<td>356.4</td>
</tr>
<tr>
<td>10. House Doctor</td>
<td>500.0</td>
<td>111.1</td>
<td>166.3</td>
</tr>
<tr>
<td>11. Hot Water Heat Pump Rebates</td>
<td>1,377.0</td>
<td>580.4</td>
<td>664.2</td>
</tr>
<tr>
<td>12. Shower Flow Restrictors</td>
<td>306.7</td>
<td>25.6</td>
<td>109.5</td>
</tr>
<tr>
<td>13. Hot Water Tank Wraps</td>
<td>132.9</td>
<td>16.2</td>
<td>55.4</td>
</tr>
<tr>
<td>14. Tank Wraps And Flow Restrictors For New Homes</td>
<td>403.8</td>
<td>30.8</td>
<td>191.5</td>
</tr>
<tr>
<td>15. Appliance Rebates</td>
<td>980.8</td>
<td>377.8</td>
<td>498.9</td>
</tr>
<tr>
<td>16. Thermal Standards For New Construction</td>
<td>6,347.2</td>
<td>1,394.0</td>
<td>4,061.2</td>
</tr>
<tr>
<td>17. Time Of Sale Standards For Multi-Family Units</td>
<td>727.7</td>
<td>197.9</td>
<td>480.8</td>
</tr>
<tr>
<td>18. Electric Conversion Thermal Standards</td>
<td>471.6</td>
<td>111.2</td>
<td>371.4</td>
</tr>
<tr>
<td>19. Electric Conversion Fee</td>
<td>2,321.4</td>
<td>1,450.9</td>
<td>1,450.9</td>
</tr>
<tr>
<td>20. Appliance Efficiency Standards</td>
<td>2,530.8</td>
<td>70.0</td>
<td>2,147.8</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>19,009.1</strong></td>
<td><strong>3,728.4</strong></td>
<td><strong>12,242.0</strong></td>
</tr>
</tbody>
</table>

considerably lower. The third step was to estimate the likely "implementation rate" of each program, or the number of households that will take the desired conservation actions. To obtain this figure, it was first necessary to estimate the "gross implementation rate," or the number of households that will take the actions with or without the program. The expected number of households that will act without being influenced by the program was then subtracted from that gross implementation rate to arrive at a figure for the "net implementation rate," or the number of households that will take action as a result of exposure to the program. Estimates of both the penetration and implementation rates for each program were taken from existing data sources. That procedure ignored the fact that most of these programs have thus far been only trial efforts, so that with experience their effectiveness may be considerably increased as a result of better program design and execution.

The fourth analytical step was to determine what conservation actions will likely be taken as a result of exposure to each program. Previous research (Olsen and Dethman, 1981) had discovered that program participants are quite likely to take additional actions beyond those proposed by a specific program, and may also avoid taking the recommended actions for a variety of reasons. The fifth step in this process was to obtain figures for the amount of potential energy savings associated with each possible kind of conservation action. Since most of these figures are available from existing engineering studies and are relatively precise, this was the easiest and most reliable step in the process. The sixth step was then to combine the potential energy savings that could result from each conservation measure taken in response to a program into a total energy savings figure for that program. In doing this, lack of available data necessitated considering only those measures recommended by a specific program, so that all additional "spin-off"
actions that might be taken by program participants were ignored.

The seventh analytical step was to estimate the full financial costs of each program, including its capital costs, start-up costs, administrative costs, and (with mandatory programs) enforcement costs. Since many of those costs were not known, it was necessary in the Assessment to estimate most costs (other than capital costs of specific conservation measures) from experiences with other types of public programs.

As a result of all the methodological limitations encountered in the Assessment of residential conservation program savings and costs, its findings must be taken as educated guesses, not precise data. Nevertheless, the energy savings and financial cost figures it produced are certainly the most thorough and complete data presently available on conservation programs. The report of the Assessment gives estimates of total electricity savings (in millions of KWH) and financial costs (in constant 1980 dollars) for three time periods -- 1990, 1995, and 2000 -- under three different sets of conditions: (a) most probable conditions, based on current figures; (b) low conservation conditions, in which the net implementation rates are reduced by one half or are delayed; and (c) high conservation conditions, in which the net implementation rates are increased or speeded up. Table 6-3 gives the estimated electricity savings and financial costs for each of the 20 programs analyzed under those three sets of conditions by the year 2000.

Very briefly, Table 6-3 shows that under all three conditions the greatest electricity savings are expected to result from establishing mandatory thermal efficiency standards for all new residential construction. The next most effective programs under probable and low conditions are setting mandatory efficiency standards for appliances
and charging a fee for converting from gas or oil heating to electric heating. The fourth most effective program under probable and low conditions is giving rebates for installing hot water heater pumps, but this program rises to second place under high conditions, reducing electric conversion fees and appliance efficiency standards to third and fourth places. Three other programs that promise to yield relatively large electricity savings under all three conditions are labeling appliances to show their energy efficiency, giving rebates on the purchase of energy efficient appliances, and providing loans for weatherizing single-family homes. Altogether, these 20 residential conservation programs promise to save approximately 19,000,000 megawatt hours of electricity in the region by the year 2000 under the most probable conditions, at a total estimated cost of about $3,700,000,000.

The eighth and final analytical step in the Assessment was to use the estimated electricity savings and financial cost figures to calculate the expected present value average cost of each program in mills per kilowatt hour saved over the entire lifetime of each program. Under the most probable conditions, those figures are as follows:

<table>
<thead>
<tr>
<th>Program</th>
<th>Average Cost (mills/KWH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy hotline</td>
<td>19.8</td>
</tr>
<tr>
<td>Weatherization clinics</td>
<td>14.2</td>
</tr>
<tr>
<td>Class A audits for single-family homes</td>
<td>29.9</td>
</tr>
<tr>
<td>Class A audits for mobile homes</td>
<td>51.8</td>
</tr>
<tr>
<td>Appliance labeling</td>
<td>1.6</td>
</tr>
<tr>
<td>Weatherization loans for single-family homes</td>
<td>19.0</td>
</tr>
<tr>
<td>Weatherization loans for mobile homes</td>
<td>45.9</td>
</tr>
<tr>
<td>Weatherization grants for low-income homes</td>
<td>16.3</td>
</tr>
<tr>
<td>Conservation buy-back</td>
<td>22.8</td>
</tr>
<tr>
<td>House doctor</td>
<td>13.1</td>
</tr>
<tr>
<td>Hot water heat pump rebates</td>
<td>34.8</td>
</tr>
<tr>
<td>Shower flow restrictors</td>
<td>5.1</td>
</tr>
<tr>
<td>Hot water tank wraps</td>
<td>12.3</td>
</tr>
<tr>
<td>Tank wraps and flow restrictors for new homes</td>
<td>6.7</td>
</tr>
<tr>
<td>Appliance rebates</td>
<td>34.5</td>
</tr>
</tbody>
</table>
Thermal standards for new construction 13.8
Time of sale standards for multifamily units 17.3
Electric conversion thermal standards 15.7
Electric conversion fee 0
Appliance efficiency standards 2.3

The most notable feature of those cost-effectiveness estimates is that — with the exception of mobile home audits and loans — all of them are less than 35 mills per KWH of electricity saved. In comparison, the current cost of constructing new coal or nuclear generating plants is approximately 70 mills per KWH — and that figure is constantly rising. In short, all of the residential energy conservation programs examined in the Assessment are unquestionably highly cost-efficient when compared with the cost of building new generating plants. Consequently, this study provides strong justification for utilizing conservation programs as fully as possible to meet future electricity needs in the Pacific Northwest region. And since there is no reason to think that the estimated energy savings or costs of these programs will be greatly different in other regions of the country, we can conclude that conservation is undoubtedly the most cost-effective means of dealing with the energy problem throughout the United States.

6.4 Environmental, Community, and Individual Impacts

In addition to the economic costs and energy-saving benefits of conservation programs, such activities may very likely have other kinds of costs and benefits in regard to the natural environment and individual and collective social life. Economists and other social scientists have given considerable attention to the impacts of rising energy prices on consumers (Berman, et al., 1972), and especially on low-income and elderly people (Unseld, et al., 1978). A few other researchers have examined the potential economic and social impacts of alternative energy policies, including conservation (Williams, et al., 1976; Morrison, 1978). Very little
effort has thus far been made, however, to empirically study the environmental, community, and consumer impacts of specific conservation programs.

Three main sources are drawn upon in this review. One is a paper by Morrison and Lodwick (1981) which critically examined Amory Lovins (1977) concept of a soft energy path. They extracted from all of Lovins' writings every claimed impact of a soft energy path, most of which were seen as beneficial. They concluded that Lovins' principal argument for the desirability of a soft over a hard energy path lay not in technical differences between these two energy policies, but rather in their anticipated impacts on society. Appendix G contains a summary table from that paper. The second source is a review of the existing literature on societal impacts of conservation that was compiled in 1979 (Olsen, 1981a). The third source is an empirical study of possible local environmental and social impacts of several conservation measures, as anticipated by community leaders (both public officials and private organizational leaders) in two Washington communities (Edelson and Olsen, 1979).

Environmental Impacts. Apart from a few possible health hazards associated with particular conservation measures (such as toxic fumes emitted by certain kinds of insulation), none of the above studies identified any serious negative environmental impacts from conservation actions. In contrast, a number of positive environmental benefits were expected to accrue from serious energy conservation. In addition to avoiding such problems as air pollution from coal burning and radiation leakage from nuclear plants, meeting energy needs through conservation could have several fundamental benefits for the entire ecosystem, including:

Preserving natural resources. Beyond preserving our limited supplies of fossil fuels, energy conservation can also help protect other vital resources from rapid
depletion. Two important examples are (a) metals such as iron and aluminum ore, and (b) fresh water. If we can reduce purchases of goods made with iron and aluminum, we will not only save the huge amounts of energy used in refining these metals, but also slow the rate at which their ores are depleted. Huge amounts of fresh water, meanwhile, would be required to produce synthetic fuels from oil shale and coal tar. If we reduce our total consumption of energy, it may not be necessary to employ those water-devouring technologies to produce more fuels.

Stabilizing the human ecosystem. The human ecosystem refers to all the complex interrelationships that exist between humans and the natural environment, ranging from basic food needs to aesthetic appreciation of natural beauty. Preventing pollution and preserving natural resources will certainly help to keep the ecosystem in balance. In a broader sense, many proponents of reduced energy consumption argue that the total ecosystem will function with more stability and permanence if humanity can learn to "live within the means" provided by the natural environment on which we are inexorably dependent for life.

Community Impacts. Conventional economic thinking has long believed that a high level of energy consumption was absolutely necessary for economic growth and higher standards of living. Several studies have rather convincingly demonstrated, however, that it is possible to "decouple" energy use from economic growth in industrial nations and to preserve a healthy economy while simultaneously reducing energy consumption (Mazur and Rosa, 1973; CONAES, 1980). In fact, conservation could actually stimulate faster economic growth by avoiding spending huge amounts of capital to construct new energy production facilities such as synfuel or nuclear plants. Because most conservation measures require relatively small amounts of capital, a national commitment to serious
energy conservation would free capital for investment in other kinds of economic ventures. And on the individual level, consumers would be able to reduce their energy costs and thus have more funds available for other purposes that would enhance their economic well being. Conservation could provide more economic flexibility in comparison with centralized high-technology energy producing processes. Instead of putting all our "economic eggs" in a few large baskets, they could be distributed among many small and low-risk endeavors. Even if some conservation efforts eventually proved ineffective or too costly, the wasted investment would be miniscule compared to the cost of closing down nuclear power plants. A small-scale, diversified approach to energy production through conservation would also provide opportunities for all kinds of new business development, thus strengthening the entrepreneurial spirit in society and promoting greater economic competition. Some industries and communities that are economically dependent on energy intensive technologies would experience economic problems during the transition to a lower energy consuming economy, but those differences should be only of temporary duration. As pointed out by numerous writers, conservation is a highly labor-intensive form of economic activity, which would have direct benefits for employment. While many workers might have to cope with temporary economic disruptions in their lives as they learned new trades, most of the skills required for conservation work are relatively low level and hence could be mastered by many people with a minimal amount of retraining. In addition, this type of craft work is usually fairly satisfying and rewarding for individuals, since it calls for personal initiative and creativity and gives workers a sense of accomplishing worthwhile work. As consumers seek to reduce their residential heating
costs, houses are likely to become smaller in size by eliminating rooms such as recreational or family rooms and reducing the sizes of other rooms. At the same time, an increasing number of people will live in multifamily housing such as apartments and townhouses. These trends, which are presently observable in the U.S., are also being caused by rising housing prices and smaller family sizes. Smaller living quarters may, in turn, have numerous social and psychological effects on families as people find it necessary to share more daily activities.

As a consequence of more multifamily housing, plus people seeking to live as near to their work as possible in order to reduce commuting distances, housing densities may markedly increase. This could have such positive benefits as decreasing problems associated with social isolation and creating a stronger sense of neighborhood and community solidarity, although other types of social problems such as juvenile delinquency might rise. And to the extent that people moved back from suburbs toward city centers, the values of single-family residences in distant suburbs might decline drastically while inner-city property values rose.

Both of the preceding trends have led a number of urban planners to begin envisioning radically new land-use patterns for communities. The main features of their new urban designs include (a) relatively self-contained neighborhoods in which most necessary shopping facilities, service establishments, schools, churches, recreational facilities, and local offices of public agencies would all be located within convenient walking distance; (b) arrangement of housing units into clusters that shared common heating and electricity generating equipment, recreational rooms and facilities (replacing individual family and recreation rooms), household appliances and tools, etc.; and (c) locating these housing clusters near the main employment sites of most residents so that they
could walk or ride mass transit to work. These kinds of land-use alterations would considerably alter the physical and social patterns of community life.

Serious efforts to conserve energy will certainly produce changes in our modes of transportation. In addition to the present shift to smaller and more efficient cars, the future will very likely bring: (a) more ride-sharing in carpools and vanpools, which has been found to create some novel kinds of interpersonal benefits and problems; (b) more use of mass transit systems, if those systems provide adequate transportation; (c) reduced travel for visits and recreation; (d) disappearance of large recreational vehicles; (e) less business travel, as more and more business transactions are conducted by telephone, computer systems, and other advanced types of personal communication.

Social and political conflicts are certain to arise over numerous issues, as some groups promote change and others resist it, as various groups struggle to secure what they perceive as their fair position or rewards under the new conditions, and as dominant groups seek to control the activities of others. Some of these conflicts might focus on economic questions of growth versus stability or imposition of new taxes; some of the conflicts might center on issues of land use or community planning; some of them might be over the desirability of establishing mandatory standards for efficient energy use in buildings, vehicles, and industry; and some of them might be over abstract principles such as valued lifestyles or desired standards of living.

To the extent that reliance on conservation avoided the necessity of constructing highly centralized energy production systems, policy making and planning for energy use would avoid becoming extremely centralized. On the contrary, energy management would tend to be a community-
level process, and individual households and businesses would retain considerable autonomy in their energy use decisions. Such dispersion of energy decision making could, in turn, promote a general movement toward greater decentralization in public policy formation and planning. This would strengthen the political autonomy of local communities, although it might produce conflicts between communities and higher levels of government.

Citizens may increasingly demand that government provide the services necessary to help families, businesses, and communities through the transition process toward a truly energy conserving society. Those services might include job retraining and placement, assistance in selling and buying residences, quality controls on conservation retrofitting, loans or grants to cover the initial capital costs of conservation actions, or ascertaining people's transportation needs so that mass transit systems would be more responsive to those needs. Regardless of the specific nature of the services required, the point is that government would be called upon to become actively involved in helping society move through a difficult process of social change.

Individual impacts. Extensive efforts to conserve energy could have an array of individual and interpersonal consequences, some of which might be viewed as beneficial and others as harmful. These consequences could include changes in: (a) household expenditures, such as budgetary shifts, new expenditures, or greater discretionary funds; (b) time allocations, such as old activities that require either more or less time, or new time demands; (c) energy management, as managing the consumption and conservation of energy in the household becomes a major "work" role; (d) household responsibilities, such as alterations in the household division of labor, or new household chores; (e) interpersonal conflict, such as eruption of new conflicts or resolution of existing conflicts; (f) emotional
stability, or household members experiencing either psychological comfort or distress from new patterns of interacting and living; and (g) group cohesion, in which the household either draws together and functions in a more unified manner, or becomes more factionated and disorganized.

Continually rising energy prices will undoubtedly lead most people to make strenuous efforts to reduce their energy consumption. For middle- and higher-income households, this will involve weatherizing their homes, purchasing more energy efficient appliances, installing solar hot water heaters, eliminating unnecessary energy uses such as heating swimming pools, and changing some of their energy use practices (such as keeping it colder at night). These changes will require capital expenditures and some lifestyle alterations, but they are not likely to create severe financial hardships for most of those people. Rising energy prices will create such hardships for low income people, however. Those households presently use considerably less energy, and hence have fewer ways in which to reduce their energy consumption. They do not have the money to weatherize their houses, buy energy efficient appliances, or fuel-efficient cars. And they cannot afford to pay higher energy prices. Already, the problem is being expressed as one of "food versus heat." Consequently, low-income people suffer severe personal hardships to the extent that a pricing strategy is used to promote reduced energy consumption (Morrison, 1978).

From a broader economic perspective, serious energy conservation would fit into and reinforce the development of a new set of values that placed more importance on one's overall quality of life and less emphasis on consuming material goods. Whether such a shift in values was viewed as desirable or undesirable would depend on one's life goals, but there is considerable evidence that
a large majority of the American public is presently searching for new values to replace our traditional consumption ethic (Yankelovich, 1981).

6.5 Seattle Program Evaluations

The 29 consumer energy conservation programs presently being conducted in the Seattle area can be divided into four categories in terms of the thoroughness with which they have been evaluated, as described in Appendix E.

A few programs are not being evaluated at all, usually because they are new or lack funds. The second category contains about one-third of the programs that do only informal annual evaluations of how well they are achieving their objectives. Another one-third of the programs fall in the third category of semi-formal evaluations. These are usually "process evaluations" of program activities, such as the number of brochures distributed or people who attend a workshop or homes that are audited, although in some cases an effort is made to ascertain the extent to which people are taking conservation actions. Finally, only the three utilities in the area are presently doing formal "outcome evaluations" of the amount of energy saved by their programs.

Those outcome evaluations have demonstrated remarkable energy savings. As an illustration, one electric utility found that total annual electricity consumption by all its customers with electric heat declined by 15 percent between 1979 and 1982. And homes that were weatherized through its program cut their electricity consumption almost in half. As a result of its conservation programs, this utility calculates that it is saving almost 200,000 MWH per year, or enough electricity to serve an additional 13,000 average residential customers. Quite clearly, at least some of the conservation programs being conducted in the Seattle area are saving considerable amounts of energy.
PART III. CONCLUSIONS
CHAPTER 7. SUMMARY

This chapter presents a series of summary generalizations concerning energy conservation in the United States and the Pacific Northwest, based on the material in Parts I and II of the report. It is divided into two parts, dealing first with conservation policies, and then with conservation programs.

7.1 Conservation Policies

Although the United States does not have a national energy conservation policy, Congress has enacted a large number of relatively far-reaching conservation statutes that provide a fairly comprehensive legal framework for developing such a policy. At the present time, however, the Reagan Administration has no interest in formulating a national conservation policy, since it believes that energy conservation should largely be a responsibility of local governments and the private sector. The U.S. Department of Energy is therefore presently doing very little to promote the conservation of energy.

Numerous private organizations in the U.S. have conducted a wide variety of energy policy studies, all of which have concluded that this country should adopt vigorous energy conservation programs as its primary response to the world and national energy problems. These studies have repeatedly demonstrated that the U.S. could fairly easily reduce its total energy consumption far below current levels without seriously detracting from economic production or the quality of social life. And in practice, the American public has recently begun to practice conservation fairly seriously, with the result that the total consumption of energy in the U.S. declined during both 1980 and 1981.

Although specific energy development programs are sometimes in direct conflict with environmental protection
programs, on a broader policy level there is a growing convergence between energy and environmental concerns in the United States. This trend is particularly evident among environmental organizations, non-governmental policy institutes, researchers and scholars, and public opinion leaders. The trend can also be seen in opinion polls among a majority of the public who consistently express support for both strong environmental protection policies and energy conservation and renewable energy policies. Throughout most sectors of American society, more and more people are rapidly becoming aware of the inevitable linkages between energy use and environmental preservation, and are beginning to propose policies based on that recognition.

In contrast, the consumer movement in the United States has been rather slow in developing a concern with environmental and energy issues. Because of its traditional focus on product quality and governmental regulation of consumer products, the consumer movement has resisted expanding its perspective to encompass the influence of environmental and energy conditions on consumer welfare. This situation has begun to change during the past few years, however, and the Institute for Consumer Policy Research of the Consumers Union Foundation has explicitly addressed the topic of home energy conservation programs and strategies (Stern, Black, and Elworth, 1981).

Congress has enacted a far-sighted energy policy for the Pacific Northwest region, the most important features of which are (a) the creation of a Power Planning Council with the responsibility of developing a comprehensive energy plan for the region to the year 2000; and (b) the provision that this plan must first utilize all cost-effective conservation programs to the fullest possible extent (followed in turn by renewable resource development programs and cogeneration programs) before constructing
any more thermal generating plants. After that regional power plan has been formulated, the Bonneville Power Administration must offer billing credits to utilities and local governments for all electricity saved through conservation, and must impose surcharges on all utilities that do not implement energy conservation programs. In addition, BPA is presently developing and implementing several consumer (as well as commercial, industrial, and agricultural) regional conservation programs of its own.

Several of the energy conservation statutes passed by Congress during the Carter Administration provided explicit guidelines and funding to the states for developing state conservation policies and programs. All of the states consequently established energy agencies and began establishing statewide conservation programs. The extent and nature of these programs varied widely among the states, with some states doing no more than the minimum required by federal law, while others implemented numerous innovative programs of their own in addition to the federally prescribed efforts. This federal funding has been largely eliminated by the Reagan Administration, however, so that at the present time most states are doing very little to promote energy conservation. In the Pacific Northwest, Oregon is the only state that has continued to operate a fairly vigorous energy conservation program.

7.2 Conservation Programs

There is a growing awareness in the United States that although broad energy policies must be formulated at the national or regional levels, actual program design and implementation is most effective when carried out in local communities. Most conservation programs in this country are therefore now being conducted by local government agencies and local utilities. It is vital that the administrators of these programs enjoy the respect of the
public, and that local citizens be actively involved in all phases of program development. In the Pacific Northwest, the cities of Seattle, Washington, and Portland, Oregon, have instituted extensive and vigorous conservation programs, so that these communities have become models for the rest of the nation.

Although most conservation programs are still described in terms of using energy more efficiently, in reality many of these programs are seeking to reduce total energy consumption and alter current social patterns and practices that require large amounts of energy. These programs are also increasingly being focused on particular target populations, rather than all consumers, and are dealing with specific forms of energy use such as home heating and cooling.

Thus far, most conservation programs in the U.S. have combined a "technical fix" focus on the technical context of energy use with a psychological orientation toward the personal context of individuals' attitudes and knowledge. Some attention has also been given to the economic context, but often this has been limited to the effects of energy prices on consumption. Relatively little attention has been given to the legal context of energy use, and virtually none to the sociocultural context. Rather belatedly, we are becoming aware that the latter two contexts are crucial determinants of energy consumption.

By far the most commonly employed implementation instrument has been information dissemination, which is often combined with persuasive appeals. Research has convincingly demonstrated, however, that these two instruments are not sufficient by themselves to promote extensive energy conservation. The preferred implementation instrument of the Reagan Administration is price increases, even though this approach has several serious practical limitations and ethical problems, and is
almost universally rejected by the American public. Several kinds of taxes to raise energy prices even further have been proposed, but have not been adopted in the U.S. A wide variety of financial incentives for conservation and solar actions are offered by all levels of government, however. Increasing use is also being made of mandatory standards for energy efficiency in buildings, vehicles, and appliances. Relatively little attention has been given to participation instruments, and no full-scale attempts at community reorganization for energy conservation have thus far been attempted. Allocation plans, finally, have been prepared in case of an energy emergency, but are not now in effect.

Most communities are presently encountering many serious problems of program coordination, as different agencies, utilities, and private organizations all attempt to provide various kinds of conservation services. The concept of organizing all those services into a comprehensive "package program" of integrated consumer conservation services has not yet been adopted by any community in the United States, despite its obvious benefits.

Existing conservation programs rely primarily on economic arguments to mobilize consumers to take conservation actions. Most consumers are concerned about rising energy costs and are receptive to financial motivational appeals. Nevertheless, the effectiveness of this mobilization technique is limited by the fact that many people have relatively few technical or economic opportunities to take conservation actions, and by the fact that a number of non-economic factors also strongly influence energy consumption.

Relatively few attempts have been made to evaluate energy conservation programs in the U.S. in terms of their costs and benefits. The studies that have been conducted
have demonstrated unequivocally that (a) very impressive energy savings can be attained through many different kinds of conservation programs, so that most households can reduce their total energy consumption by up to one-third through adequate weatherization and other conservation measures; (b) although informational and educational activities must be an integral part of all comprehensive conservation programs, they are not sufficient by themselves to ensure significant energy savings, so that comprehensive programs must also contain a mixture of publicly acceptable financial and mandatory components; (c) virtually all conservation programs and measures presently in use in the U.S. and the Pacific Northwest are highly cost-effective when compared with the costs of constructing new electrical generating plants; and, consequently, (d) conservation is an effective and adequate way of meeting energy requirements in the Pacific Northwest -- and probably throughout the U.S. -- for at least the next 20 years.

Although we know very little about the environmental and social consequences of energy conservation, it appears that even the most vigorous conservation efforts will (a) have few or no harmful effects on the natural environment; (b) protect and enhance the ecosystem in many critical ways; (c) produce some temporary economic disruptions and conflicts but few or no serious and permanent economic problems, and could stimulate considerable economic growth in many sectors of the economy; and (d) cause some social and psychological difficulties for consumers, but in the long run should greatly enhance the quality of most people's lives as they shift away from the present mode of high material consumption toward more personally satisfying and social beneficial patterns of living.
CHAPTER 8. RECOMMENDATIONS AND FINAL THOUGHTS

In this final chapter, a series of recommendations is offered concerning future directions for the United States and the Pacific Northwest in energy conservation policies, conservation programs, and further research in conjunction with the multinational research project. These recommendations are derived from the analyses in Part II of the report. The chapter ends with some final thoughts about energy conservation in the U.S.

8.1 Policy Recommendations

1. As recommended by all the major studies of U.S. energy policy that have been conducted since 1979, the federal government should adopt a national energy policy that gives highest priority to conservation and renewable resources for meeting our future energy needs, rather than attempting to continually increase energy production. In effect, this would be applying the policy of the Pacific Northwest Electric Power and Conservation Act to the entire country.

2. Careful attention should be given by the federal government to coordinating national energy and environmental policies, so that they fully reinforce each other rather than contradict each other as has often been the case in the past. A national energy policy that gives top priority to conservation would automatically eliminate many of the current conflicts between energy production efforts and environmental protection, since reliance on conservation and renewable resources would have virtually no harmful effects on the natural environment. In addition, such an energy policy would preserve scarce fossil fuels and other natural resources, and bring the economy of the country more in balance with the world ecosystem.

3. Consumer needs and concerns should be given
serious consideration in all energy policy formation, since it is ultimately consumers who must alter their patterns of energy use if the country is to reduce its consumption of energy. This would mean including consumer representatives in all energy policy deliberations, taking account of studies of consumer responses to proposed energy policies, and ensuring that energy policies treat all consumers fairly and equitably.

4. Regional energy planning councils similar to the Northwest Power Planning Council should be established in all regions of the United States, for the purpose of constructing comprehensive, long-term energy plans for every region. In addition, a national energy planning council should be established to coordinate the regional plans and integrate them into a unified national energy plan for the entire country.

5. The federal government should provide adequate funds to all the states to enable them to enact an intermediary energy planning and coordination role between the regional councils and local communities.

8.2 Program Recommendations

1. All energy conservation programs should be designed and implemented at the community level, combining the efforts of city and county governments, local utilities, and private energy conservation firms, as well as interested local organizations and concerned citizens.

2. Every community of sufficient size -- defined as metropolitan areas, cities of 100,000 population or more, and counties without a large central city -- should establish a community energy council to coordinate all energy conservation activities in that area. The community council should be composed of relevant public officials, community leaders, and citizen representatives.
3. Community energy conservation programs should deal with all of the various contexts that affect energy use -- technical, economic, legal, sociocultural, and psychological -- so as to maximize opportunities for consumers to conserve energy.

4. Energy conservation programs should make extensive use of informational and persuasive instruments for promoting energy conserving actions by consumers, but should not rely exclusively on those instruments. As far as possible, those communication and persuasion efforts should be conducted through existing community organizations, neighborhood associations, and other channels that will maximize citizen involvement in program design and implementation.

5. Energy conservation program planning should consider the full range of available implementation instruments -- including financial incentives, rate structuring, equitable energy use taxes, construction and performance standards, community reorganization, and energy allocation procedures -- and utilize whichever combinations of these instruments are most appropriate to program objectives, local conditions, and consumer interests.

6. Community energy conservation programs should be organized into integrated packages that provide consumers with all necessary information, advice, services, financial aid, and other assistance they require to take energy conserving actions, thus making possible one-stop shopping for all one's conservation needs.

7. All conservation programs should be continuously monitored and evaluated by trained professionals to ensure that they are actually saving energy, that they are cost effective, and that they have no adverse effects on the natural environment, communities, or individuals.
8. The conservation efforts being undertaken by the members of a community should be well publicized throughout that community, so that other people will become aware of what is being done in the community to conserve energy and the benefits of these activities for individual households and the community as a whole.

8.3 Research Recommendations

This section outlines a proposal for the research that might be conducted in all countries during Phase II of the Multinational Study of Consumer Energy Conservation Policies, and illustrates how that proposed research would be conducted in the United States.

The participants in the multinational study have already agreed that: (1) Phase II research should involve empirical field research dealing with the effects of energy conservation policies and/or programs on consumers; and (2) such research should focus on one or a few communities in each country, so as to be as manageable and comparable as possible. Beyond that, specific details of the Phase II research have not yet been formulated.

Given the diversity of professional orientations and interests among the project participants from various countries, the most appropriate focus of attention for this research would appear to be households. That focus would be compatible with the concerns of the sociologists, social psychologists, psychologists, economists, and others comprising the multinational team.

My recommendation, therefore, is that the Phase II research in all participating countries deal with the effects of national and/or community conservation programs on households as energy management systems. The crucial point here is that households would be analyzed as micro systems that are constantly engaged in internal
communications, decision making, action taking, and feedback processing concerning all aspects of energy consumption. This conception of the household as an energy management system encompasses a social psychological model of individual actors and an economic model of rational consumers, but is broader in scope than either or both of those more traditional models. An energy management model places psychological and economic factors affecting household energy use into a total system that also includes technical factors, legal factors, and sociocultural factors relevant to energy use in the household. In addition, it also considers the internal structure of the household as a dynamic system, including its communication patterns, role definitions, decision making procedures, conflict resolution techniques, change trends, and overall cohesion. The proposed research would therefore investigate how conservation programs from the outside environment impinge upon the household system and how that system responds to those external influences.

The ultimate purpose of the proposed research would be to discover how to formulate energy conservation policies and programs so that they have the maximum possible efforts on households in terms of reducing their total energy consumption while avoiding any adverse impacts on those households.

In the United States, I would like to conduct such a study in the community of Eugene, Oregon, since the households in that community are presently experiencing a wider range of external pressures for conservation than in any other community in the Pacific Northwest. They receive very extensive information about conservation from the local utility, the city government, and the state Department of Energy. The well organized neighborhood associations in Eugene are strongly promoting conservation through activities that involve member participation. The local utility is experimenting with various rate
modifications to encourage conservation. The city and the utility have just initiated a household weatherization program for existing buildings that will become mandatory in a few years, and the state enforces a strict set of energy conservation standards for new construction. The Bonneville Power Authority is conducting its own weatherization and hot water conservation programs in Eugene. BPA, the State of Oregon, and the local utility all provide financial assistance to households to aid them in making conservation improvements. And the city government has taken a number of actions, such as new zoning laws and public transportation improvements, that are aimed at reorganizing the community as a whole to function in a more energy conserving manner.

My research in Eugene would have two major components. The first component would consist of a complete documentation of all the conservation influences impinging on households, which would be facilitated by the fact that I already have working relationships with the persons responsible for conservation in the local utility, the city government, and the Oregon State Department of Energy. The second component would involve distributing written questionnaires to a random sample of households in the community. These questionnaires would explore not only the nature and extent of all conservation programs impinging on the selected households, but also how those households -- operating as energy management systems -- are responding to those external influences in all aspects of their functioning (communicative, role performance, decision making, conflict resolution, change, cohesion, and energy consumption). The outcomes of this proposed study would be (1) a rather thorough understanding of how households in this highly conservation oriented community are responding as energy management systems to all the conservation programs in their surrounding environment; and (2) a set of recommendations for improving those
programs to increase their effectiveness in conserving energy.

8.4 Final Thoughts

Given the stance of the Reagan Administration toward energy conservation as a national policy for the United States, it is obvious that efforts to promote greater conservation must move in two other directions. At the national and regional levels, organizations concerned with conserving energy, promoting solar energy, protecting the environment, and enhancing consumer welfare must become aware of their common interests, coordinate their policy formation and program design efforts, and support one another in all their activities. This is presently occurring in the Pacific Northwest under a coalition organization called the Northwest Conservation Act Coalition, except that it does not yet include any consumer organizations. Formed to support and work with the official Northwest Power Planning Council, the Coalition is composed of some thirty-five energy, environmental, solar, citizen, political, and labor organizations throughout the region. It is committed to "promoting energy conservation and renewable energy resources as the keystone of the Northwest's energy future and a healthy Northwest economy."

At the local level, meanwhile, concerned citizens must organize themselves into neighborhood and community groups that can engage in grass-roots efforts to promote more energy conserving patterns of living. In addition to encouraging home weatherization, these efforts can promote passive and active solar energy, recycling of energy-intensive goods, carpooling and use of mass transit, reduced consumption of energy-intensive goods and services, experimentation with new housing patterns, alternative lifestyles toward "voluntary simplicity," and numerous other changes in current living patterns. Although most individuals will not undertake such changes
by themselves, as part of a local collective effort many people may be ready and anxious to begin contributing to the creation of an "energy self-sustaining society."

If and when serious energy conservation becomes a dominant theme in American society, it will stimulate and reinforce a much broader process of social change, the initial features of which are already evident in the U.S. Energy use is a basic aspect of most economic and social activities, so that as levels and modes of energy consumption shift, this will have ramifications for most other aspects of social life. Thus extensive energy conservation could well provide the entering wedge for a major societal transformation toward a new form of truly post-industrial society in Western nations.

As has been evident throughout this report, the process of promoting energy conservation is much more than just a matter of adopting a new type of technological fix to cope with energy shortages. This process is as much a sociocultural as a technical challenge to industrial societies. Consequently, there is great need for social science research and cooperative social action in regard to all aspects of energy conservation. Because relatively little social science research has thus far been conducted on questions of energy consumption and conservation, the list of topics in this area demanding further social science research is virtually endless. Until we gain more scientific knowledge about energy consumption and conservation, policy makers and program administrators who are searching for ways of promoting consumer energy conservation will be severely hampered. It is therefore imperative that social scientists concerned about energy problems cooperate closely with energy policy makers and program administrators in identifying crucial knowledge needs, conducting useful research on those topics, and applying their findings to practical problems of conserving energy throughout society.
REFERENCES


Appendix A.  SELECTIONS FROM THE NATIONAL ENERGY POLICY PLAN OF THE U.S. DEPARTMENT OF ENERGY
SECURING AMERICA'S ENERGY FUTURE

The National Energy Policy Plan

A Report to the Congress
Required by Title VIII of the Department of Energy Organization Act (Public Law 95-91)

July 1981

U.S. Department of Energy
Washington, D.C. 20585
I. THE FEDERAL ROLE

The Federal Government has one overriding concern in energy during the years ahead. That is to establish sound, stable public policies that will encourage individuals and groups in the private and public sector to produce and use energy resources wisely and efficiently.

Sound public policies must be based on recognition of the Government's and the private sector's respective roles in energy production. The Federal Government's most direct impact on America's energy future arises from its position as the steward of the Outer Continental Shelf and of 762 million acres of publicly controlled land, one-third of the land area of the United States. These lands contain an estimated 85 percent of the Nation's oil, 40 percent of our natural gas, 40 percent of our uranium, 35 percent of our coal, 85 percent of our tar sands, 80 percent of our oil shale, and 50 percent of our geothermal resources. The Federal role in national energy production is to bring these resources into the energy marketplace, while simultaneously protecting the environment.

The Administration is committed to the wise use of our Federal lands and waters. Failure to know our resource potential and to inventory our resources limits this Nation and its ability to produce and use energy resources effectively.

Except for rough estimates, we do not know the full extent of our mineral values, our oil and gas reserves, our oil shale, tar sands, and geothermal capabilities. It is the Administration's policy to inventory the Federal lands and waters to determine the quantities of energy resources so that wise resource decisions can be made.

Quantitative levels for the production, the consumption, or even the importation of energy in its various forms are not objectives in themselves. The American economy will choose the energy consumption for a strong, productive, and secure society in the year 2000 whether it be 80 quads or 100 quads or 120 quads of energy annually. Consumption of energy is not the sole determinant of a strong economy; we could be consuming primary energy resources at any of those same levels and have a weak economy, a less satisfied people, a huge bureaucracy, a damaged environment, and continuing apprehension about our position as the leader of the free world. The differences among these possible "energy futures" will depend in part on a wide variety of events and issues that cannot be predicted today. Fundamentally, however, the best guarantee of maintaining a wholesome balance among competing interests in regard to energy lies in allowing the American people themselves to make free and fully informed choices.

All Americans are involved in making energy policy. When individual choices are made with a maximum of personal understanding and a minimum of governmental restraints, the result is the most appropriate energy policy.

Computers cannot gauge human response to future situations with precision. That is the key explanation of why projections of future energy consumption and production have been so often wrong, although there has also been a general bias against market flexibility in the assumptions of many models. Increased reliance on market decisions offers a continuing national referendum which is a far better means of charting the Nation's energy path than stubborn reliance on government dictates or on a combination of subsidies and regulations. Certain mitigating measures may be required from time to time to avoid unacceptable burdens on one sector of our society or another, but these can best be considered in the context of social, not energy, policy. With these considerations in mind, the Reagan Administration is advancing a national response to our present energy situation which will be stable, resilient, and most likely to have beneficial results.

The President's action to end oil price controls and to dismantle the burdensome regulatory apparatus associated with those controls was a major step in implementing an energy policy focused on market realities. The challenge ahead is to provide a healthy economy and policy environment that enables citizens, businesses, and State and local governments to make rational energy production and consumption decisions—decisions that reflect the true value, in every sense, of all the Nation's resources.

This approach represents a radical departure from the prevailing policy instituted after the first shock of rapid oil price increases in 1973 and 1974. There has been intermittent recognition of the pivotal long-term role that must be played by reinvigorated domestic production, and the previous Administration was moving in its latter months
toward the view that energy prices should sometimes reflect true costs and market realities, and that environmental concerns must be tempered with commonsense. Even so, the regulatory emphasis was overwhelming, and experience suggests that national energy policy should now break cleanly and candidly with that approach.

Past U.S. energy policy relied heavily on Federal intervention, and it attempted (unsuccessfully, for the most part) to protect U.S. consumers from the reality of higher world oil prices. Domestic price controls, which were in place on both crude oil and oil products when global prices increased sharply in 1973, led to gasoline lines and supply uncertainties. Panicky, piecemeal efforts to relieve those uncertainties instantly led to still more complex regulations, including detailed regional allocations, which only added to the confusion. Price controls actually inhibited efficient energy use and discouraged domestic production. The entitlement program also provided multibillion dollar subsidies to oil imports. Government regulation encouraged demand by controlling the average price of oil on the U.S. market and reduced the cost to the buyer of continuing imports. The inevitable result was more oil imports, which increased our vulnerability to damage from disruptions in world oil supplies, such as those occasioned by the Iranian Revolution and its aftermath.

In time, a bipartisan recognition of the sterility of this approach led to legislation that envisioned the eventual decontrol of energy prices. Now that oil price controls have been ended finally through Presidential initiative, the Nation is making good progress toward more intensive and extensive exploration, and domestic production continues to be stable despite earlier fears that its steady decline was imminent. Americans generally are using energy more efficiently in response to market forces.

As a result, oil imports have decreased substantially. Even though efficient displacement of imported oil is an important objective, achieving a low level of U.S. oil imports at any cost is not a major criterion for the Nation's energy security and economic health. Even at its current high price, imported oil in some cases is substantially less expensive than available alternatives. The Nation would be remiss if it did not press the search for less expensive domestic alternatives. Yet its vision would be equally narrow if market forces were distorted through indiscriminate subsidies for alternatives that cost more than imported oil now and offer no short-term to midterm likelihood of being economically competitive. Furthermore, there is an international dimension to the problem of oil vulnerability. Damage to other free world economies inevitably affects the United States as well, so it is important that we cooperate with our partners. We cannot entirely protect ourselves from disruptions in the world energy market by reducing our own dependence on imports and trying to isolate ourselves from everyone else. The United States can best help the global community by remaining the leading economic force and a reliable trade partner.

Part of the effort to ensure energy security consists of cooperation with American partners and a sound economic evaluation of our respective circumstances and the requirements of free world security. The U.S. Government is committed to increasing oil stockpiles against potential disruptions in world markets, and to eliminating controls or other impediments that could discourage the private sector from dealing with disruptions efficiently if they should occur again.

The Administration's reformulation of policies affecting energy is part of the President's comprehensive Program for Economic Recovery, which includes elimination of excessive Federal spending and taxes, regulatory relief, and a sound monetary policy. When fully implemented, the Economic Recovery Program will release the strength of the private sector and ensure a vigorous economic climate in which the Nation's problems, including energy problems, will be solved primarily by the American people themselves—consumers, workers, managers, inventors, and investors.

Public spending for energy-related purposes is secondary to ensuring that the private sector can respond to market realities. Even then, Federal spending should be considered only in those promising areas of energy production and use where the private sector is unlikely to invest. This will not stifle innovation. On the contrary, the history of venture capital shows that risk-taking will always be done privately when financial resources are available—in the hope of greater financial gains. The collective judgment of properly motivated technical innovators, businessmen, and consumers is generally superior to any form of centralized programming. Public spending is appropriate (and will continue) in long-term research with high risks, but potentially high payoffs. In most cases, however, using public funds to subsidize either domestic energy production or conservation buys little additional security and only diverts capital, workers, and initiative from uses that contribute more to society and the economy.

Quite apart from energy matters, another legitimate government concern is the special problem of the poor that arises from increased energy prices. The President has made it clear that funding for programs that aid the truly needy will be protected; but ideally such programs should be administered by agencies that consider people's overall needs instead of one or another disjointed part of those needs, such as heating fuel, gasoline, or electrical energy. Furthermore, allowing prices to fluctuate can be part of a solution to our energy problems
rather than the hard core of these problems. As a practical matter, holding energy prices down is ineffective as a means of helping people on low or fixed incomes; such a policy impedes improvement across the board in both the energy and the social welfare fields. The Administration's Economic Recovery Program deals directly with the burdens of inflation and unemployment that have rested unduly upon the disadvantaged. The Administration is confident that it will succeed.

These are guiding principles. The Administration recognizes that some laws that remain in effect are not completely consistent with them; but there are a number of instances in which we have determined that precipitous change would be undesirable. Over the coming months, the Administration will work with Congress, State and local governments, and the private sector in evolving energy policies that reflect these principles more fully.

II. CONSERVATION

A. A Specific Philosophy

Wise and efficient use of energy resources in this country is a key element of our national response to the world energy situation.

Motivated by rising energy prices, individuals, businesses, and other institutions are undertaking serious efforts to use energy more efficiently, generally substituting capital, labor, and known and new technology to modify energy-use patterns of the recent past. Techniques range from weatherstripping to industrial cogeneration.

Because of the way the marketplace works, freely selected changes are likely to involve fuel switches as well as simple reductions in energy consumption as related to productivity. With careful energy management, it is often possible to do the same job with less energy—and definitely with less of the most expensive forms of energy.

One reason that demand for electricity is expected to rise more rapidly than overall energy demand in the United States during the 1980s and 1990s (see Section VI, Table 1) is that the generation of electricity need not rely on expensive oil. This has potential economic (as well as national security) advantages. Oil is the only energy source for which domestic production is unlikely to offer essential energy self-sufficiency in the near future; and it is the only one for which the market price is not determined primarily within our borders. The increasing shift to cheaper means of generating electricity, such as coal-fired and nuclear powerplants, allows the replacement of more expensive oil in two ways: (1) by replacing it as a utility boiler fuel, and (2) by making electricity economically competitive with oil in many end uses. For example, electric heat pumps can substitute for oil burners at an economic saving under most circumstances.

All these efforts are being accelerated by the Administration's decontrol of oil prices. Furthermore, the most astute conservation measures frequently require investment, with a view to long-term saving; and it will be easier in the future for all Americans—individuals and local institutions as well as small and large businesses—to reach a position where they can make such capital outlays. This should result from the President's tax proposals (including income tax reduction and accelerated depreciation) as well as from the inflation-fighting reductions in the rate of growth for Federal spending and borrowing. In addition, the President's Program for Economic Recovery estimates that tax credits will provide approximately $740 million in support to private conservation efforts during 1981 and an additional $800 million next year.

B. Recent Results

Recent history suggests that the American people are responding to market conditions, even with high interest rates and with some controls and subsidies continuing to affect energy prices.

The ratio between national consumption of primary energy and our gross national product (GNP) is a useful measure of energy conservation in our economy. The amount of energy used for each dollar of real GNP in 1980 was 15 percent less than in 1973.

The importance of short-term changes in energy consumption (for example, over a single year, or even over a 6-month or 1-month period) has been exaggerated too often by "experts" who wished to make a point. Such figures are affected too much by variations in weather and other random factors to be thoroughly reliable clues to a trend. In the case of U.S. reaction to the last sharp price increase by the principal nations from whom we import petroleum, however, the marketplace seems to have sent an unmistakable message. Net oil imports declined from an average of 8 million barrels per day in 1979 to 6.3 million barrels per day in 1980 (while the economy was clearly weak); and during the first 6 months of 1981 they showed a further decline of more than 20 percent from the 1980 level. A large part of the continuing decline came from prompt behavioral
changes in energy use in response to the immediate price change, but another part was almost certainly a result of longer term trends toward more efficient use of energy and the removal of import subsidies.

All types of users and uses are involved in the conservation that has taken place. By the end of 1979, overall fuel consumption by passenger automobiles in the United States was 13 percent below the level that could have been expected if both travel behavior and automobile technology had remained the same as in 1973. In the residential sector, the absolute level of energy consumption per household dropped 14 percent during the same period; and within the commercial sector energy consumption per square foot declined by 18 percent. Industrial energy efficiency (measured in output per unit of energy consumption) rose 12 percent at the same time.

“Energy stores” have opened their doors, offering audits for residences and energy-saving products ranging from insulation to high-efficiency heating systems. More than a dozen companies offer similar services to industry. As a temporary analog for the tax incentives mentioned earlier, the Administration will continue a program of grants to public institutions (such as schools and hospitals) for energy audits and installations to improve energy efficiency. Nonprofit organizations do not have the same response to market forces as profit-seeking groups and do not receive the incentive that tax credits offer homeowners or businesses; but, in time, rising energy costs will make conservation investments compellingly attractive to them also.

In keeping with the Administration’s policy to eliminate unnecessary Federal spending, support will be withdrawn from technology programs where sufficient market incentives exist. Such projects include consumer products, advanced automotive engine development, demonstration of electric and hybrid vehicles, and industrial process efficiency. Many of these projects are indeed valuable, but they do not need Federal funding.

C. The Special Case of the Poor

People with low incomes and few assets find it especially difficult to respond to rising energy costs. Lacking the financial resources to make major home improvements or to buy more fuel-efficient new cars, poor families facing higher fuel bills may have little choice but to curtail their energy consumption—even at the cost of severe discomfort, inconvenience, or threats to health.

This problem must not be overlooked; but it is a broad social problem that does not relate exclusively to energy and should not prevent a national energy and economic recovery program that is designed to help all Americans and restore a sound economy that is most helpful to the poor.

The special burdens placed on the poor by higher energy prices are best addressed by agencies most sensitive to people’s overall income and housing needs. In view of great price variations by region and by fuel form, the means of relief may best be gauged by agencies close to those in need.

The Administration will continue to provide assistance to the neediest households through the Energy and Emergency Assistance Block Grant Program it has proposed to be administered by the Department of Health and Human Services. The Department of Energy’s weatherization program will be incorporated into the Department of Housing and Urban Development’s Community Development Block Grant program.

These block grant funds will be allocated and administered by State and local governments. Decision-makers in continuing close contact with specific problems are best equipped to devise programs and methods of implementing them that will suit particular needs and circumstances. The Administration’s aim is not only to make these efforts more efficient, but to increase their effectiveness as well.
Appendix B. SELECTIONS FROM THE DRAFT REGIONAL CONSERVATION AND ELECTRIC POWER PLAN OF THE NORTHWEST POWER PLANNING COUNCIL
Regional Conservation and Electric Power Plan

Adopted for Review and Comment
Pursuant to section 4(d)1 of the

January 26, 1983

Northwest Power Planning Council
700 S.W. Taylor
Portland, Oregon
97205
Conservation

The key element of the Council's resource portfolio for meeting future energy needs is conservation. This section first describes present electrical consumption for the region's residential, commercial, industrial, and irrigated agricultural sectors. It then assesses potential conservation savings for each and identifies how much conservation from that sector is included in the Council's resource portfolio.

Conservation involves more efficient use of electricity — seeing to it that new homes and commercial and industrial facilities are more electricity efficient; installing more efficient water heaters and appliances; and finding more efficient ways to manufacture products, to perform industrial processes, or to move irrigation water into the fields — using less electricity to get the job done.

Conservation also involves steps to make existing homes and buildings more efficient by adding insulation in walls and ceilings, installing water heater blankets, and otherwise making existing buildings use electricity more efficiently.

If we could ignore cost, there is technology available to reduce our electricity needs drastically.

The Council considered any conservation measure as technically achievable if it could improve the efficiency of electricity use at a cost of 10 cents (or less) per kilowatt-hour. The Council's assessment of the portion of this technically achievable conservation that can be cost-effectively developed took into account four important factors.

First, the Act grants conservation a 10 percent cost advantage over other resources. A conservation measure can cost 10 percent more than the lowest-cost resource and still be cost-effective. Secondly, conservation measures also reduce the need for additional electricity transmission lines and other distribution facilities. Regionally, a conservation action, by reducing the need for these facilities, reduces the costs associated with these facilities by approximately 2.5 percent.

Third, in addition to reducing the need for new transmission and distribution facilities, conservation avoids "line losses." About 7.5 percent of the electricity generated at a power plant is "lost" in transmission to its ultimate point of use. To account for this, the kilowatt-hour savings attributed to a particular conservation action can be increased by 7.5 percent. Alternatively, its cost can be reduced by 7.5 percent so that it can be compared with generating resources on a consistent basis. For purposes of comparison with generating resources, the combined effect of the above factors is to reduce conservation's cost by 20 percent.

Finally, to accurately assess the amount of cost-effective conservation available, the administrative cost of programs needed to secure it must be included. The Council reviewed current utility conservation programs and those operated by other agencies. This review indicated that conservation program administrative costs are in the range of 15 to 25 percent of the direct cost of measures for fully operational programs. The Council, in its cost-effectiveness evaluations of conservation, has assumed a 20 percent administrative cost.
After lengthy study, the Council established 4.0 cents per kilowatt-hour as the cost-effective limit for the direct cost of conservation measures. Ignoring compatibility with the existing hydro system and quantifiable environmental costs and benefits, conservation measures which exceeded this cost (4.0 cents per kilowatt-hour) were not considered economically achievable. That is, they were less economically attractive than other new resources the region could acquire.

Although the amount of conservation available at 4.0 cents per kilowatt-hour is economically achievable, not all of these savings can be realized. Consumer resistance, quality control, and unforeseen technical problems will prevent development of 100 percent of this potential. However, the Council has decided that, using the wide assortment of incentives and regulatory measures the Act makes available, the region's electricity consumers could be persuaded to install a large percentage of the economically achievable conservation. The proportion considered realizable under the plan varies from 56 percent for residential appliances to nearly 100 percent for the industrial and irrigation sectors. In aggregate, the Council's plan, under the high growth forecast, calls for the development of over 75 percent of the conservation that is economically achievable at a cost equal to or less than 4.0 cents per kilowatt-hour.

The amount of technically and economically achievable conservation is directly related to the amount of energy used. This section describes the amount of electricity presently used in each economic sector, the amount that would be used if there were no conservation programs, and the savings made possible by the plan. The conservation available under each of the Council's growth forecasts and a technical discussion of the Council's conservation assessment appear in Appendix K. The supply curves used in this section assume the Council's high growth forecast which is based on record economic growth in the region. If one of the Council's lower growth forecasts should occur, fewer new buildings and new factories would be built — less total energy would be needed, and consequently less could be saved.

Any direct comparison of the Council's conservation assessment with those made by other organizations should take two factors into account. The supply curves used in the plan include all conservation without distinguishing between conservation put into place as a result of specific programs and conservation measures motivated by rising electricity prices. These supply curves are also based on the high penetration rates the Council's plan assumes for each conservation program.

The figures shown do not include any adjustment for line losses. All costs shown are for the direct cost of the measures and do not include program cost, transmission cost savings, or quantifiable environmental costs and benefits.

Residential Sector — Current Use of Electricity

In 1980, the region's residential sector consumed an estimated 5,323 average megawatts of electricity. This represented approximately 34 percent of the region's total consumption. The two largest single residential electricity uses are space and water heating. Space heat consumption in 1980 was 1,597 average megawatts or 30 percent of the residential use. Electricity used for water heating represented an estimated 21 percent of the residential use, or 1,118 average megawatts. The remaining 2,608 average megawatts (49 percent) was consumed by lights and other appliances.
Residential-Sector — Potential and Planned Conservation

Council studies indicate significant cost-effective conservation potential in the residential sector. Under the Council's low and medium-low growth forecasts, residential needs in the year 2000 could be accommodated without using more electricity than in 1980. Even the record population and economic growth rates envisioned by the Council's high growth forecast could double the number of residential customers yet require only one-third more electricity than in 1980.

Three-quarters of the currently identified residential conservation potential is available through more efficient space and water heating. The remainder would come from efficiency improvements in major household appliances, such as refrigerators and freezers, and in lighting. The conservation potential for each of these electricity uses is discussed in the following paragraphs.

Figure 3-39 shows estimated space heating savings available in existing residences at a cost between 1 and 10 cents per kilowatt-hour. These savings can be achieved through improving the insulation levels, adding storm windows, and reducing the air leakage in existing homes and buildings. Of the 770 megawatts of technically achievable space heat conservation shown in figure 3-39, the Council's plan calls for developing 475 megawatts at an average cost of 1.5 cents per kilowatt-hour by the year 2000. This assumes a 33 percent reduction in energy used for space heating.

New residences can be built much more electricity efficiently than homes constructed using current practices. Figure 3-40 shows the space heating conservation potential in new residences under the Council's high growth forecast. The Council's plan calls for implementing model standards to improve the efficiency of new single-family and multi-family structures by 60 percent compared to current construction practice. Figure 3-41 shows how the Council's
standards would affect the annual space heating use of a typical new home in Portland or Seattle. This standard could save 920 megawatts by the year 2000, at an average cost of less than 2 cents per kilowatt-hour.

Figure 3-40. Residential Space Heating (New Homes)

Water heating represents the second largest single residential use. Figure 3-42 shows the potential for improving the efficiency of residential water heating at a cost between 1 and 10 cents per kilowatt-hour. These savings represent better-insulated water heaters, pipe wraps, and lower water temperature. Also included in the estimated technical potential are water heaters that use a heat pump to heat water rather than electric resistance elements. These devices are commercially available from major distributors throughout the region. However, because they are relatively expensive, heat pump water heaters are most economical for households with above-average water use. Therefore, the cost-effectiveness of the savings from heat pumps depends on the number of people in a household.
The Council's high growth resource portfolio includes 890 megawatts of water heating conservation. The average cost of more efficient tanks, pipe wraps, etc., is less than 2 cents per kilowatt-hour. Heat pump water heater savings are expected to cost 3 cents per kilowatt-hour.

Figure 3-41. Average Monthly Space Heating Use

Nearly one-half of residential electricity is consumed by an assortment of appliances. Refrigerators and freezers, cooking and lighting, make up approximately one-half of the electricity used by these appliances. Figure 3-43 compares the average amount of electricity used per household in the region by these appliances with the annual electricity use of the most efficient models currently on the market. Under the Council's high growth forecast, the conservation potential from these more efficient appliances is 895 megawatts, or about 10 percent of the total electricity used by appliances. The Council's plan calls for developing approximately 56 percent of this potential (500 megawatts) by the year 2000.

The Council anticipates that these savings can be achieved by providing information and incentives to consumers. However, during the next two years the Council will monitor the effect of these programs to assess the potential need for model appliance efficiency standards.

Figure 3-44 summarizes the savings anticipated under the plan for different electricity uses under the Council's high growth forecast. Space heating use in existing homes would be one-third more efficient than at present. New homes would use nearly 60 percent less than homes built to current standards. Water heating demands would be reduced by over 35 percent. Refrigerators, freezers, and other appliances would consume 10 percent less than projected at their current efficiencies. Together, these savings are projected to bring about a 26
percent reduction in residential electrical needs compared to residential requirements in the year 2000 without further efficiency improvements. The average cost of these savings is less than 2 cents per kilowatt-hour.

The Council assessed the potential impact that adoption of the State of California's Appliance Standards would have on improving residential appliance efficiency. The California standards were compared to estimated average efficiencies of appliances now sold in the Region. It appears that the current California Standards, adopted in 1979, are being met by the vast majority of appliances now marketed in the Pacific Northwest. The Council Plan calls for the implementation of incentive programs which promote consumer purchases of more

Figure 3-42. Residential Water Heating

*1980 Dollars

Potential not realized due to incomplete market penetration
efficient appliances. During the next two years, the Council will be assessing the impact of these incentive programs as well as the desirability of adopting more stringent appliance standards.

Figure 3-43. Appliance Energy Use and Savings

![Figure 3-43](image)

Figure 3-44. Residential Sector — Planned Conservation

![Figure 3-44](image)
Conservation Program

This section outlines the Council's proposed long-term conservation program goals and objectives. It sets forth the amount, timing, and expected cost of the conservation savings Bonneville should acquire from each sector and, where appropriate, by end use. All costs are in levelized constant 1980 dollars. Finally, it lists specific actions Bonneville should take during the next two years.

Goals

The Council's proposed conservation program focuses on the attainment of six long-term goals:

- Existing and new residential and non-residential buildings in the region will be made as energy-efficient as current technology and life-cycle economics allow;
- Electricity-consuming buildings in the region will be operated in an energy-efficient manner;
- Renewable energy resources, in particular passive solar applications, will be used in new and existing residential and non-residential buildings where economically justified;
- Industrial electric processes, commercial equipment, and household appliances will be as energy-efficient as current technology and life-cycle economics allow;
- Energy-management considerations will be an integral part of the planning and administrative processes of local and state government and the private sector; and
- Legal arrangements will be made to allow government, utilities, and the private sector to share energy-management resources, information, technical expertise, and experience.

Table 3-20 provides the 5-year (1988) and 20-year (2002) conservation acquisition targets for each of the Council's growth forecasts. A review of this table reveals that depending on the need for additional electric energy, the Council forecasts that Bonneville should acquire between 2,120 and 5,300 megawatts of conservation by the year 2002.

During the next five years the residential sector conservation provides approximately 50 percent of these savings, the commercial sector 33 percent, and the industrial sector 10 percent. The remaining 7 percent comes through efficiency improvements in the agricultural sector. The Council's plan calls for Bonneville to diversify its conservation efforts to achieve these relative shares. The pace of Bonneville's current programs should be designed to enhance its ability to effectively finance, develop, test, and/or implement new programs which serve all sectors. Some reduction in the current pace of residential retrofit activities is expected under the Council's plan.
Table 3-20.  
Summary of Conservation Acquisition Plan-by Forecast  
(Average Megawatts, Inclusive of Line Losses)

| Sector End Use       | FORECAST | FORECAST | FORECAST | FORECAST | FORECAST | FORECAST | FORECAST | FORECAST | FORECAST | FORECAST | FORECAST |
|----------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| RESIDENTIAL          |          |          |          |          |          |          |          |          |          |          |          |          |
| Existing Space Heating| 97       | 511      | 55       | 457      | 54       | 446      | 47       | 254      |          |          |          |          |
| New Space Heating    | 119      | 1,011    | 102      | 868      | 75       | 643      | 43       | 368      |          |          |          |          |
| Water Heating        | 121      | 955      | 54       | 805      | 61       | 677      | 44       | 202      |          |          |          |          |
| Other Appliances     | 43       | 563      | 19       | 473      | 17       | 414      | 18       | 188      |          |          |          |          |
| Sector Total         | 380      | 3,042    | 230      | 2,603    | 207      | 2,180    | 152      | 1,012    |          |          |          |          |
| COMMERCIAL           |          |          |          |          |          |          |          |          |          |          |          |          |
| Existing Structures  | 143      | 753      | 78       | 650      | 74       | 618      | 62       | 333      |          |          |          |          |
| New Structures       | 77       | 540      | 57       | 400      | 48       | 332      | 39       | 275      |          |          |          |          |
| Sector Total         | 220      | 1,293    | 135      | 1,050    | 122      | 950      | 101      | 608      |          |          |          |          |
| INDUSTRIAL           |          |          |          |          |          |          |          |          |          |          |          |          |
| Sector Total         | 82       | 548      | 44       | 548      | 44       | 548      | 38       | 301      |          |          |          |          |
| AGRICULTURAL         |          |          |          |          |          |          |          |          |          |          |          |          |
| Existing             | 36       | 323      | 32       | 323      | 32       | 323      | 29       | 184      |          |          |          |          |
| New                  | 17       | 91       | 17       | 91       | 17       | 17       | 15       | 15       |          |          |          |          |
| Sector Total         | 53       | 414      | 49       | 414      | 49       | 414      | 44       | 199      |          |          |          |          |
| TOTAL                | 735      | 5,297    | 458      | 4,615    | 422      | 4,092    | 335      | 2,120    |          |          |          |          |

To achieve the Council’s long-term goals and acquisition targets, an extensive and reliable conservation delivery system must be developed. The Council intends that Bonneville’s principal task over the next two years is to lay the groundwork for this delivery system. During this period, Bonneville, in cooperation with the region’s utilities, government entities, and private sector, should begin to establish the legal arrangements and capabilities necessary to secure planned energy savings in all sectors. This will require the implementation of new conservation programs as well as the modification of existing programs.

The plan identifies some programs that should be implemented regionwide immediately. Others should be phased in or expanded as new resource requirements and the results of pilot and demonstration projects dictate.

These conservation programs are discussed by sector. Where appropriate they are separated into programs for new and existing users, and specific acquisition targets are provided.
Residential Sector — Existing Buildings

The objective of this conservation program is to acquire additional energy through efficiency improvements in existing residential buildings that use electricity for space and water heating.

This program should include these principal features:

- Require, as a condition of receiving financial assistance, the installation of all structurally feasible and regionally cost-effective conservation measures based on a comprehensive audit of the home;
- Permit private contractors to solicit the consumer's business directly, without going through the local utility;
- Provide for local utility or other qualified inspection of the conservation measures before the private contractor may be paid;
- Implement all structurally feasible and regionally cost-effective space heating and water heating conservation measures for each building in one step;
- Provide financial assistance at a level that will achieve the expected energy savings at the least possible cost to Bonneville ratepayers, up to the full cost of the conservation measures, if necessary;
- Provide a low-income program that pays 100% of the actual cost of all conservation measures, or a fixed amount per kilowatt-hour saved equal to the cost-effective limit for new resource acquisitions, for households with an income below $16,000 per year;
- Provide a renter program that pays 100 percent of the actual cost of all conservation measures, or a fixed amount per kilowatt-hour saved equal to the cost-effective limit for new resource acquisitions, for tenant-occupied single-family and multi-family buildings;
- Permit and encourage individual entities (utilities, local and state governments, private entrepreneurs, etc.) to market residential space and water heating savings and market them directly to Bonneville;
- Provide certification of retrofit (or energy-efficient) rental property units; and
- Permit retrofit contractors and other entities, with approval of owner/tenant, to contract directly with the utility (or other entities operating a retrofit program) rather than the individual property owner/manager to deliver energy conservation services at a negotiated cost and delivery schedule.

Two-Year Actions

During the next two years, Bonneville, in consultation with the Council, should:

- Undertake a demonstration program which tests the feasibility, affect on market penetration, and cost-effectiveness of directly contracting with private energy services firms to secure residential conservation; and
- Modify its existing residential programs to incorporate the features and rate of acquisition expressed above.
During the next two years, the Council will:

- Conduct a review of the effect that alternative financial assistance levels have had on participation rates in programs currently offered in the region and elsewhere. The analysis will include an examination of participation by income group;

- Conduct research to assess the effectiveness of alternative conservation financing approaches, including full-cost reimbursement for all residential consumers regardless of income. These projects will assess each alternative's effect on:
  - Desired penetration rates;
  - Administrative and related program costs; and
  - Estimated potential versus actual savings.

- To the extent practicable, these research objectives will be incorporated into programs currently in place or those soon to be implemented, such as the Hood River and Elmhurst projects.

**Expected Cost and Savings**

Through this program, Bonneville should acquire 110 megawatts of space and water heating savings by January 1, 1988. The average cost of these savings is not expected to exceed a levelized cost of 1.6 cents per kilowatt-hour. For individual conservation measures, the marginal cost is not expected to exceed a levelized cost of 4.0 cents per kilowatt-hour. The measures taken should result in an average savings per unit of at least 3,000 kilowatt-hours per year for space heating and at least 1,530 kilowatt-hours per year for water heating.

**Residential Sector — Conversion Standards**

**Model Efficiency Standard for Conversion to Electric Space Heating**

The objective of this standard is to ensure that buildings converted to electric space heating from other fuels meet minimum energy-efficiency requirements. The Council's model standard for conversion of residential buildings to electric heating is described in Appendix J. (Due to its size, this appendix is in a separate volume, which is available on request.) This standard should be adopted by state or local governments or by utilities where legally authorized. Entities who choose not to adopt this standard should prepare an alternative plan that is expected to result in comparable savings. Failure to implement this standard or achieve comparable savings will result in the imposition of a rate surcharge (see Surcharge Methodology, Appendix G).

**Two-Year Actions**

By January 1, 1986, state and local government or utilities where legally authorized should:

- Adopt and enforce the Council's efficiency standard for conversion to electric space heating, or prepare an alternative plan for achieving savings comparable to those that would be achieved through implementation of the Council's efficiency standard for conversion to electric space heat.
During the next two years, Bonneville, in consultation with the Council, should:

- Provide financial and technical support to state and local governments and/or utilities which implement the Council's model efficiency standard for conversion to electric space heat prior to January 1, 1986.

**Expected Cost and Energy Savings**

The Council evaluated the potential conversion of unweatherized oil- and gas-heated homes to electric heat. This assessment revealed that each conversion could cost the region in excess of $8,300 in new resource requirements over the next 20 years. This standard is expected to reduce this cost by more than $3,100 by requiring weatherization prior to conversion to electric heat. This standard is expected to reduce the annual electric space heating needs in an average home that converts by approximately 5,000 kilowatt-hours. Total regional savings will vary depending on how consumers respond to future oil and natural gas prices.

**Residential Sector — New Building Standards**

**Efficiency Standards for New Buildings**

The objective of this standard is to ensure the construction of energy-efficient residential buildings beginning January 1, 1986. The Council's performance standard for the space heating requirements of single-family (up to 4 units) and multi-family (5 units and larger) dwellings is shown below:

<table>
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<tr>
<th>Building Type</th>
<th>Climate Zone</th>
<th>1 (West of Cascades)</th>
<th>2 (E. WA./E. OR and Idaho)</th>
<th>3 (Western Montana)</th>
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</thead>
<tbody>
<tr>
<td>Single-Family</td>
<td>2.0</td>
<td>2.6</td>
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<td></td>
</tr>
<tr>
<td>Multi-Family</td>
<td>1.2</td>
<td>2.3</td>
<td>2.8</td>
<td></td>
</tr>
</tbody>
</table>

The detailed standard and alternative approaches to achieving this standard are given in Appendix J (in a separate volume, available on request).

This efficiency standard may be adopted and enforced by a state and/or local government or by utilities where legally authorized. Those entities who choose not to adopt and enforce this standard should prepare an alternative plan for achieving comparable savings. Failure to implement the standard or achieve comparable savings will result in the imposition of a rate surcharge (see Surcharge Methodology, Appendix G).

**Two-Year Actions**

By January 1, 1986, state and/or local governments should:

- Adopt and enforce the Council's model standard for new buildings; or
- Prepare an alternative plan for achieving savings comparable to those that would be achieved through implementation of the Council's model efficiency
standard for new buildings. This plan should be developed in cooperation with the electrical utility or utilities serving the jurisdiction.

During the next two years, Bonneville, in consultation with the Council, should:

- Develop and initiate a program which reimburses code enforcement agencies for the cost of model standards implementation and inspection. This program should be fully implemented by January 1, 1986;

- Develop, in cooperation with state and local governments, professional societies, trade associations, and other interested parties, a consistent procedure for certifying compliance with the Council's model standards for new buildings. This procedure should be available to all jurisdictions adopting the Council's model standards for new buildings on or before January 1, 1986;

- Develop and implement, in cooperation with state and local governments, trade and professional associations, and other interested parties, an education program regarding the provisions of the Council's model standards for home builders, architects, designers, real estate appraisers, code officials, and lending institutions;

- Develop and implement, in cooperation with local governments, trade and professional associations, and other interested parties, an incentive program which results in at least 55 average megawatts of savings in buildings built between the adoption of the plan and January 1, 1986;

The principal features of this program should include:

- Certification of homes which meet or exceed the Council's efficiency standards by the local utility, local government, and/or independent appraisers;

- A public education and marketing program which emphasizes the energy-savings features and value of the homes achieving the efficiency standards; and

- Efficiency awards to builders of buildings which meet or exceed the Council's model standard, regardless of the type of fuel used for space heating.

- Provide technical and financial assistance to the shelter industry (builders, lenders, appraisers, etc.) for the implementation of an energy-efficiency rating system for new residential buildings. This rating system should be similar to that used by the Environmental Protection Agency to provide consumers with information about automobile fuel efficiency. This system should be fully implemented on or before January 1, 1986;

- Develop and initiate an incentive program for governmental entities adopting and enforcing the Council's model standards for new buildings, prior to their required implementation date. The incentives provided in this program should be similar to those offered under Bonneville's retrofit energy "buy-back" program; and
Pay for the incremental cost above current code for a sample demonstration of homes built to the Council's model efficiency standard. The principal features of this program should include:

- A sample of at least 100 single-family (up to 4 units) and 20 multi-family (5 units and above) buildings which are separately metered for space heating, water heating, and other appliances' energy use. The buildings should be located in proportion to population distribution across the region;

- Measurement of the level of air infiltration for the model homes;

- Occupant data, including the type and number of appliances owned, family size, and other information determined in consultation with the Council; and

- A control group of comparable buildings built to current code or practice.

Expected Cost and Energy Savings

This efficiency standard should produce at least 100 megawatts of space heat savings in new buildings built during the next five years, assuming the Council's medium-high growth rate. The average cost of these savings is not expected to exceed a levelized cost of 1.8 cents per kilowatt-hour. The marginal cost of any individual conservation measure needed to achieve the Council's standard is not expected to exceed a levelized cost of 4.0 cents per kilowatt-hour.

Residential Sector — New Appliances

The objective of this conservation program is to encourage the purchase, either new or as a replacement of an existing unit, of appliances which are energy-efficient. This program's principal features should include:

- An initial focus on refrigerators, freezers, central air conditioners, and space- and water-heating heat pumps;

- Dealer and/or customer incentives based on the amount of the energy saved by the appliance compared to average use by comparable units available on the market;

- Permit manufacturers/distributors to market appliance energy saving directly to Bonneville; and

- Offer financial incentives to entities, including dealers, sufficient to remove older, inefficient refrigerators and freezers from the operating stock.

Two-Year Actions

During the next two years, Bonneville, in consultation with the Council, should:

- Undertake a demonstration program which assesses the feasibility, cost-effectiveness, and effect on market penetration of offering direct
financial incentives to manufacturers, distributors, and/or dealers to encourage the sale of energy-efficient appliances;

- Undertake a demonstration program to assess the feasibility, cost-effectiveness, and effect on market penetration of offering third-party purchasers (e.g., builders, rental property managers, etc.) direct financial incentives to install energy-efficient appliances; and

- Undertake a field research project which assesses the effect of energy-efficient appliances on the space heating requirements of fully weatherized residential buildings and new residential buildings that meet the Council's model standard.

During the next two years, the Council will:

- Assess the impact of incentive programs as well as the desirability of adapting more stringent appliance efficiency standards.

Expected Cost and Energy Savings

Bonneville should acquire 19 megawatts of energy savings from more efficient appliances during the next five years. The average cost of these savings is not expected to exceed a levelized cost of 1.6 cents per kilowatt-hour. The marginal cost of individual appliance conservation savings is not expected to exceed a levelized cost of 4.0 cents per kilowatt-hour.
Appendix C. SELECTIONS FROM THE CONSERVATION SOURCEBOOK OF THE BONNEVILLE POWER ADMINISTRATION
CONSERVATION SOURCEBOOK

Office of Conservation and Direct-Application Renewable Resources
Bonneville Power Administration

January 1983
I. INTRODUCTION

When the Pacific Northwest Electric Power Planning and Conservation Act was passed in December 1980, giving BPA broad new authority in conservation, BPA responded almost immediately by announcing that it would initiate five regionwide conservation programs for consumers and a financial assistance effort for local government energy management planning. Utilities are now operating the five regionwide programs. They provide for residential weatherization, water heater wraps, shower flow restrictors, energy-efficient street and area lighting, and commercial lighting and water heating efficiency.

Since then, BPA has offered a technical assistance program for local governments and small users of electricity, a State-run institutional buildings program, and a low-income component to the Residential Weatherization Program, and will soon offer a commercial buildings audit program. To develop and offer these programs, BPA tackled a number of difficult issues. Programs were selected and planned using a process which has been consistently refined since that date. Budgets were developed and submitted to Congress for approval. Contracts were negotiated and environmental assessments prepared. BPA developed a method to integrate conservation into the resource acquisition process. The task was made even more challenging by the fact that the development of conservation as a resource is a relatively new phenomenon. There was little research or experience to turn to for guidance.

Despite these difficulties BPA has taken major strides in the conservation field. BPA has upgraded conservation in its organization to Office-level status, headed by an Assistant Administrator. Conservation acquisitions are underway through seven regionwide BPA programs and future acquisitions are being furthered through grants and technical assistance to local entities. BPA has just completed a full cycle of its planning process, including public involvement, and has selected options for program design. Additional conservation assessments are being conducted and the information generated is driving comparisons of conservation to other resources for the acquisition process. BPA conservation research, development, and demonstration efforts are providing valuable information for future program design and evaluation.

II. PROGRAM OPERATIONS AND ACHIEVEMENTS

BPA is operating seven regionwide conservation acquisition programs which are offered through utilities and State Energy Offices in the region. The current status of these programs is outlined in the Table I, Conservation Resource Acquisition Status, page 10.

RESIDENTIAL WEATHERIZATION PROGRAM

The BPA Residential Weatherization Program is a 10-year effort to install weatherization measures in existing single- and multi-family residences. BPA is currently offering through its utility customers, both public and private, two financial incentive options for home weatherization installations:

(1) zero-interest deferred repayment loans to consumers (based on actual costs determined through competitive bidding, with an upper limit based on the value to BPA of energy saved), which requires no capital outlays by utilities; and
2) a buy-back or rebate mechanism whereby BPA reimburses participating utilities at a fixed rate (29.2c) per annual kilowatthour of estimated savings from measures installed in residences, or the cost of the job, whichever is less.

Under the first option, BPA provides the utility with a packaged program, including design and implementation detail. Under the second option, the utility is responsible for designing and administering its own program, subject to basic program requirements such as reporting, financial auditing, and other administrative monitoring by BPA. BPA provides consultation and technical assistance as needed.

Under both financial options, BPA requires utilities to (1) use a BPA or BPA-approved heat loss methodology for estimating the energy savings expected from installation of approved measures, (2) insulate homes to BPA specifications, (3) inspect each reimbursable job and certify proper completion, and (4) submit financial and statistical reports as required by BPA.

Measures offered under the program to qualified residences include ceiling and attic insulation, floor insulation, insulation of basement and unfinished walls, storm doors and windows or thermal panes, weatherstripping, caulking, duct insulation, water pipe insulation, dehumidifiers, clock thermostats, and outlet and switchplate gaskets. Water heater insulation blankets and shower flow restrictors are offered in coordination with specific BPA programs for these measures.

Anti-air-infiltration ("house tightening") measures--storm doors and storm windows, weatherstripping, caulking and outlet and switchplate gaskets--are restricted to residences in which major sources of indoor air pollutants are absent. Upon completion of the Residential Weatherization Environmental Impact Statement in mid-1983, BPA will decide upon making these measures more widely available.

WATER HEATER WRAP PROGRAM

The Water Heater Wrap Program provides reimbursement to utilities for wrapping residential electric water heaters. Utilities may purchase the wrap materials and hire and train installation personnel, or they may contract for any or all portions of the program. Water heater tanks can be wrapped during a separate visit to that home or, if preferred, they can be wrapped at the time a home energy analysis ("energy audit") is performed. This enables the implementors to use the wrap as a homeowner incentive for getting an energy analysis.

This program will soon be incorporated into the Hot Water Efficiency Program (described in Section III), along with the Shower Flow Restrictor Program. All currently available water heating measures, as well as future additions, will then be offered to implementing entities under one contract.

Contracts were first offered to utilities August 14, 1981 as a separate program under the Home Energy Efficiency Program. An amended contract was offered when this one expired (September 8, 1982).

SHOWER FLOW RESTRICTOR PROGRAM

BPA reimburses utilities for distributing shower flow restrictors to their residential consumers. Utilities purchase the restrictors and can distribute them by mail, over the counter, or at the time that the water heater is wrapped or a home energy analysis is performed.
This program is now being incorporated, with the Water Heater Wrap Program, into the Hot Water Efficiency Program. This will allow BPA to offer all currently available water heating measures under one contract. It also allows for the addition of new water heating measures in the future.

The Shower Flow Restrictor Program was initially offered as a separate program and was considered a part of the Home Energy Efficiency Program. Its contract was offered August 14, 1981. An amended contract was offered when this one expired September 8, 1982.

STREET AND AREA LIGHTING EFFICIENCY IMPROVEMENT PROGRAM

In September, 1981, BPA began a 5-year program to provide incentives to encourage conversion to more energy-efficient street and area lighting, while maintaining existing illumination levels. The program applies to existing street and area lighting systems that can be converted to high-pressure sodium vapor, low-pressure sodium vapor, or metal halide luminaires. The program is voluntary. BPA pays utilities supplying electricity for street and area lighting for the material costs of converting to more energy-efficient lamps, plus a fixed installation cost, with the total not to exceed a maximum amount as specified in the conservation agreement.

The following table lists reimbursement rates for this program.

LOW-INCOME WEATHERIZATION

BPA's goal is to reach as many low-income consumers with weatherization services as possible. In this period of increasing electricity rates, the low-income ratepayers will be most affected, and their bills can be decreased by conservation measures. Based on discussions with State agencies and utilities over the past year, BPA has decided to offer the States a weatherization program wherever a BPA utility customer is not yet pursuing a specific marketing program to reach low-income consumers.

The low-income weatherization program will offer the same BPA financial assistance as the current Regionwide Weatherization program, with the important addition of an aggressive marketing program especially targeted to attract participation of low-income consumers, and the availability of additional financial assistance from the U. S. Department of Energy to assure that total assistance is sufficient to cover total cost of measures selected for installation in low-income homes.

The program will employ an exclusive utility option to operate a low-income component of its existing weatherization service. To preserve the option, a utility must commit to implementing the low-income component during the 1982-83 heating season. The utility must identify specific program features effective for reaching and servicing low-income population of its service territory, and submit a separate budget that reflects a substantial effort to weatherize homes in the low-income sector. Utilities will be encouraged to use the local Community Action-Program (CAP) agencies to carry out all or part of the program, recognizing the CAP agency experience and capability of delivering weatherization services under the U. S. DOE program for the low-income population. Utilities were asked to declare by September 15, 1982, whether they intended to offer a low-income program. Where utilities chosen to take on this additional responsibility, BPA offered the program contract to the four States to provide aggressive coverage of the low-income sector in the utilities' service areas.
| Residential Weatherization | 77 | 17,548 | 9.91 | 11/81 |
| Shower Flow Restrictors    | 59 | 1,349,660 | 7.81 | 8/81 |
| Water Heater Wraps         | 94 | 423,089 | 19.1 | 8/81 |
| Street and Area Lighting   | 72 | 74,839 | 4.03 | 8/81 |
| Commercial Lighting and Water Heating | 56 | Detailed | 1.35 | 8/81 |
| - Shower Flow Restrictors  | 32,007 | 333,000 |
| - Water Heater Wraps       | 13,267 | 215,000 |
| - Relamps                  | 151,835 | 4,628,118 |

**TABLE I**

**CONSERVATION RESOURCE ACQUISITION STATUS**

1-25-83

**CURRENT STATUS**

<table>
<thead>
<tr>
<th>PROGRAM GOAL</th>
<th>PARTICIPATING PROGRAM DELIVERERS</th>
<th>RETROFITS ACCOMPLISHED</th>
<th>ANNUAL ENERGY (AVE) SAVINGS (MW)</th>
<th>PERCENT PROGRAM PENETRATION</th>
<th>DATE OF PROGRAM OFFERING</th>
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<td>Residential Weatherization</td>
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<td>151,835</td>
<td>4,628,118</td>
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</table>
Appendix D. CONSERVATION AND RENEWABLE RESOURCE PROGRAMS
CONDUCTED BY THE OREGON DEPARTMENT OF ENERGY
The Department of Energy has five Divisions, each providing services to individuals, businesses and local governments. Those Divisions are:

**CONSERVATION DIVISION** consists of eight programs designed to assist all segments of the population in implementing more efficient uses of energy.

**Administrator:** Jim Thompson, (503) 378-8445

- The Weatherization Program: 1) provides technical assistance and information on home energy conservation and incentive programs; 2) administers oil-heated home energy audit and 6-1/2 percent interest weatherization loan program; 3) monitors participation in all state and utility weatherization programs; 4) is responsible for preparing voluntary weatherization standards; and 5) reports to the Legislature on the new publicly-owned utility weatherization programs.

**Manager:** Deanna Mueller-Crispin, (503) 378-8722

- The Schools and Hospitals/Institutional Buildings Grants Program offers financial and technical assistance for energy conservation activities and to promote the use of renewable resources in schools, hospitals, local government buildings, and public care institutions. The program is in two phases, energy audits and the implementation of energy conservation measures identified by the audits. Only schools and hospitals are eligible for the second phase, once the first phase is completed. Funding for the program is provided by 50 percent federal matching funds.

**Manager:** Jon Christensen, (503) 378-4163

- The Conservation Clearinghouse for Business and Industry assists government, commercial and industrial energy users by distributing information about energy conservation strategies, techniques and barriers. An information service has been established, and workshops, seminars and conferences are conducted to provide a format for discussion of energy economics and energy-efficient business operations. A quarterly newsletter is published and distributed to commercial facilities throughout the state.

**Manager:** Saralynn Baker, (503) 378-6044

- The Energy Extension Service provides direct energy conservation service to small energy users, emphasizing help for small businesses, homebuilders, and renewable resource assistance to individuals. Six Extension Agents throughout the state provide energy information, technical assistance and education.

**Manager:** Owen Osborne, Oregon State University, (503) 754-3004

- The Small Scale Energy Loan Program provides long-term low-interest loans to individuals, small businesses employing less than 100, non-profit cooperatives and municipal corporations for the purpose of developing projects using solar, wind, geothermal, hydro, biomass, agricultural residues, waste heat and solid wastes to produce energy. State general obligation bonds are sold to finance the loans.

**Manager:** C. David White, (503) 378-3637
The Contingency Planning Program is responsible for the state-wide emergency plan which would be implemented in the event of a petroleum shortage affecting essential services.
Manager: Geoff Ferrill, (503) 373-1034

The State Energy Management Program (SEMP) is responsible for the implementation of a gubernatorial directive to all state agencies requiring a 20 percent reduction of energy usage in state-owned buildings. An advisory committee with representatives of the agencies involved assists in the monitoring of energy usage and offers advice regarding incorporation of conservation measures. The Department provides technical assistance to the agencies and training for energy managers and maintenance staff, and administers a revolving fund for energy conservation projects in state buildings.
Manager: Robert Newbold, (503) 373-1035

The Local Government and Land Use Planning Program assists local governments in the implementation of energy conservation measures on the local government level, and in meeting the Energy Goals included in the State Land Use Planning Goals and Guidelines, which is legislation requiring all state cities and counties to prepare a Land Use Plan for adoption by the Land Conservation and Development Commission.
Managers: Dave Hupp, (503) 378-8327 and Henry Markus, (503) 378-2856

RENEWABLE RESOURCES DIVISION is charged with the responsibility to develop alternate, renewable sources of energy in the state. This is accomplished through programs of education, technical assistance, and tax credits.
Administrator: David Philbrick, (503) 378-6063

The Alternate Energy Tax Credit Program provides a 25 percent tax credit on an investment up to $4,000 for the development of residential and commercial solar, wind, geothermal and small hydroelectric energy projects. Alternate energy systems must meet specific criteria to qualify for tax credits and applicants must seek ODOE certification before a system is installed. ODOE staff reviews and assesses systems and certifies those which qualify for tax credits.
Manager: John Kaufmann, (503) 378-5268

The Business and Industry Tax Credit Program provides a 35 percent tax credit up to an investment of $10,000,000 for the development of alternate energy systems, including solar, wind, geothermal, hydro, conservation, waste heat recovery and recycling in commercial installations. The tax credit may be taken over a five-year period. Systems must meet criteria established by the state to qualify for the tax credit.
Manager: Gregg Marsh, (503) 378-6195

The Resource Development Program assists individuals, businesses, industries and commercial installations in the development of renewable energy resources by providing written material and references to available technical expertise, and conducting workshops and seminars regarding the use of alternate forms of energy.
Manager: David Philbrick, (503) 378-6063

Assistance to Private Power Producers provides technical assistance to individuals, industries and municipalities on the rates, interconnection requirements and laws pertaining to the sale of electricity to local utilities.
Manager: Don Bain, (503) 378-6715
Appendix E. DESCRIPTIONS OF ALL ENERGY CONSERVATION PROGRAMS BEING CONDUCTED IN SEATTLE, WASHINGTON
SPONSOR

Organization

Ballard Community Service Center, Ballard Neighbor-to-Neighbor Program, and Northwest Senior Center, in cooperation with Seattle City Light, Seattle Water Department, the Mayor's Office for Senior Citizens, the Department of Human Resources and the American Red Cross. 2309 NW Market Street, Seattle, Washington 98107.

Contact

Barbara Mausalff, 625-5035

Purpose

Help low-income residents in the Ballard area, from the Bay to First Avenue N.W.

Public Involvement-in Program Planning

A steering committee was formed to help decide policy. Members represent various agencies, churches or just interested citizens. Meet monthly. Committee members help with a variety of jobs, including fund-raising and advertising.

GOALS AND OBJECTIVES

Goals

Help maintain low-income, often disabled older citizens in their homes by delivering energy assistance information to them. Help them reduce their energy use and maintain and improve their personal comfort. Reach citizens who might otherwise not know about or understand these energy programs.

Stress community participation at the local level, by having Energy Corps volunteers deliver information and assist clients with paperwork and simple conservation devices.

Objectives

Deliver information on a variety of city and federal programs offering financial assistance with energy bills and conservation services to 300 elderly Ballard residents.

Train Energy Corps volunteers to help residents by explaining programs, arranging outreach visits by staff, assisting clients with paperwork and installing simple conservation devices such as shower fl or restrictors. Volunteers will also help arrange for water heater jackets, energy audits and home weatherization.

Increase energy awareness of volunteers, their friends and families.

Target Population

Low-income elderly, both those who rent a home or apartment and those who own their homes.
Time Frame
The program started May 1982.

Expected Energy Savings
Unknown.

Expected Cost
Money from other budgets is covering cost of salaries. Several thousand dollars, in-kind donations, donated services from involved agencies and volunteers.

Areas of Energy Use
Space and water heating, water use, household appliances.

CONTEXTS AFFECTED

Technical
The technical context is affected by the use of flow restrictors and referrals for water heater jackets.

Personal
May discuss energy use and possible life style changes, conservation techniques and energy knowledge.

IMPLEMENTATION INSTRUMENTS

Communication
The program is stressing this approach in order to reach clients. An inter-agency outreach approach has been established with groups such as the Department of Social and Health Services, senior centers and churches. They are being provided with information about the program and refer clients to the program. The program will have radio spots in the fall and is working on a brochure. Much personal contact, phone calls and word-of-mouth advertising is being done.

Participation is being stressed. Community groups are involved, as are citizens in the community who can act as volunteers. It is a means of encouraging neighbors to help neighbors. It will teach volunteers and involved groups more about conservation and energy use at the same time.

Financial
The services of the Energy Corps are offered free to clients. Depending on income and heat source, clients may have weatherization such as insulation, caulking and weatherstripping done free, or they may be eligible for low- or zero-interest loans. Clients are also eligible for free water jackets and flow restrictors. They may qualify for energy assistance and discounts on utility bills.
PROGRAM EVALUATION

Formal Evaluation
None

Objectives Achieved
Too early to tell. Interviewed on July 29, 1982. Started with 17 volunteers.

Objectives Not Achieved
Too early to tell.

Other Program Benefits
Increased participation in the community; both groups and individual volunteers working together towards a common good.

Problems with the Program
Not enough money to fund staff and needed supplies.

Overall Judgment
Too early to say.
Purpose.

Seattle City Light is a customer-owned utility and a department of the City of Seattle. Its mandate is to provide electric energy for the citizens of Seattle in the residential, commercial and industrial sectors.

Public Involvement in Program Planning

None

GOALS AND OBJECTIVES

Goals

Reduce energy use in the residential sector by wrapping water heaters with insulating blankets and turning water temperatures down to 120°F.

Stress community participation in implementation of the program in order to increase involvement in conservation actions.

1982 Objectives

Complete 50,000 electric tank wraps by September 1982 and turn down water temperatures at the same time.

Contract with Conbella Associates, a vocation-rehabilitation firm, to direct the program. Their initial objective was to wrap 37,000 heaters by September, but they expect to complete 44,500 wraps. They will contract with various non-profit community groups to do the actual installation of specified numbers of wraps.

Seattle City Light employees will also install heater blankets when making home energy checks or called to a home for appliance repair. They expect to do 5,500 wraps.

Educate consumers as to the energy savings and financial benefits of tank wraps.

Save enough energy to serve 1,400 additional single-family homes.

Establish a community participation process at the grass roots level and increase the conservation awareness of members of participating groups, their friends and neighbors.

1983 Objectives

Conbella will complete 68,000 tank wraps, and SCL 6,000, for a total of 74,000 wraps.

Continue other objectives listed above.
Target Population
Residential customers with electric water heaters. This includes condominiums and apartments.

Time Frame
Planning for the program took place from June 1981 to October 1982. The program was originally set to continue to September 1, 1982, but it was been extended to September 1983.

Expected Energy Savings
Program is expected to save 430 kwh per wrap per year. The total estimated energy savings by the program from its start until September 1982 is 3 MWs, or enough electricity to serve 1,400 electric homes.

Expected Cost
The program is financed by BPA, which reimburses SCL $32.00 for each wrap. SCL pays Conbella $29.32 plus $1.16 tax for each wrap installed, giving SCL a profit of $.85 for each wrap.

The 1982 budget is $1,600,000 for the tank wraps and $117,660 for customer rebates, for a total of $1,717,660. Rebates are paid to customers who paid for wraps before the programs.

Areas of Energy Use Affected
Household appliances -- water heaters.

CONTEXTS AFFECTED
Technical
The program affects the technical context by improving the efficiency of household water heaters and by turning down the water heater temperature.

Personal
People will have to get used to having lower temperature hot water. Advertising for the program and contacts by community subcontractors may help change individuals' energy knowledge, understanding and awareness of present energy use patterns and levels, knowledge of possible energy conserving actions, knowledge of the costs and benefits of using water heater wraps and setbacks.

IMPLEMENTATION INSTRUMENTS
Communication
The program has stressed this approach by distributing information explaining ways of reducing energy consumption and what to expect from those conservation actions. The types of information approaches used so far are telephone solicitation, door-hangers, brochures with bills, PSA's, ads on Metro buses, and referrals by community agencies. Tank wraps are also discussed during home energy checks and are wrapped during home service calls if requested. SCL's HELP loan program also requires a tank wrap.
Participation
Involvement of community groups has been a factor in the success of the program. Groups respond to the chance to make money for each referral made or wrap installed. Use of community groups also hopefully induces members to have wraps put on their heaters, as they are exposed to and influenced by other people who believe in conservation.

Financial
SCL offers these services free to customers, thus providing a financial incentive for participation. Financial incentives are also available to participating groups.

PROGRAM EVALUATION

Formal Evaluation
None

Objectives Achieved
By September 1982 the program expects to have completed 7,500 more heater wraps than initially planned by that date.
Community groups have earned $120,000 thus far by participating in the program, and many of their members have become involved in conservation actions.

Objectives Not Achieved
None

Other Program Benefits
Improved image of Seattle City Light in the community.
Participation with community groups.

Problems with the Program
Complaints within the utility that wraps are not being installed correctly by community groups, especially at first.
Customer confusion about what is Conbella. Some customers ask that SCL install the wrap.
Missed appointments by installers and customers. Missed appointments by contractors causes negative feelings toward SCL.
The Home Energy Check program is doing fewer wraps, which makes the audits less efficient. This is especially true in homes heated with oil or gas, so that it is not cost effective to audit them.
The program is inefficient in that it is completing only service per home visit.
Lags occur in the time from first call to Conbella to installation.
Some customers do not qualify for the rebate, which creates negative feelings toward SCL.
Some customers object to having the service called free, because they feel they pay for it in their electricity rates.

Overall Judgment of the Program
Excellent.
COMMUNITY OUTREACH

SPONSOR

Organization
Seattle City Light, 1015 3rd Avenue, Seattle, Washington 98104

Contact
Mattie Bailey, 625-3508

Purpose
Seattle City Light is a customer-owned utility and a department of the City of Seattle. Its mandate is to provide electric energy for the citizens of Seattle in the residential, commercial and industrial sectors.

Public Involvement in Program Planning
None

GOALS AND OBJECTIVES

Goals
Provide information and heighten awareness of Seattle City Light's conservation programs and conservation measures in general. Focus on residential sector.

Make sure information is readily accessible and highly visible through a variety of outreach techniques.

Encourage/persuade Seattle City Light customers to save energy.

1982 Objectives
Contact the community through 50 speaking engagements and 20 display or workshop events.

Provide ready customer access to information on conservation programs and methods through a centralized information center in the customer service lobby (Seattle City Light building), conservation information phone line, displays, workshops, speaking engagements, and media and community organization contacts.

Reevaluate the value, utilization and appropriate location of the conservation information phone line.

Maintain speakers bureau.

Target Population
Focus is on residential sector but also provide information to industrial and commercial sectors.

Time Frame
Consumer education department was established in 1981. It is an on-going program.

Expected Energy Savings
Unable to predict.
**Expected Cost**

1981 Budget $70,925.00
1982 Budget $139,000.00

**Areas of Energy Use Affected**

Space heating, household appliances and consumer purchasing. Weatherization is emphasized, including caulking, window treatment, insulation, etc.

**CONTEXTS AFFECTED**

**Technical**

The program attempts to affect the technical context by teaching people about Seattle City Light conservation programs, which can affect their dwelling units through construction, weatherization and use of efficient appliances.

**Economic**

The program provides information about rates, price and rate structure, billing procedures, availability of energy efficient equipment and the economics of different fuels.

**Personal**

Provide information about and discuss the energy situation and costs/benefits of conservation measures. Increase energy knowledge and conservation experience.

**IMPLEMENTATION INSTRUMENTS**

**Communication**

Use a variety of informational techniques, including persuasion and participation. Put on energy displays and demonstrations/workshops. Pug on fashion shows emphasizing energy decor for home and body. Appear at home show, fairs and other fun places. Putting together an "Energy Zoo" to handout materials at parades, shopping malls and other recreation areas.

Worked with Seattle Tenants Union to teach weatherization techniques to apartment dwellers.

Work with other community energy programs, providing expertise, supplies and printed material.

Put on programs for Seattle City Light employees.

Provide information over the conservation phone line, which gets 130 calls/week on average. Provide information to oil and gas customers also.

**Financial**

The services offered by the program are free.

Explain costs and benefits of conservation programs.
PROGRAM EVALUATION

Formal Evaluation

Don't have an extensive evaluation procedure. Do follow-up on workshops and presentations. Set goals and evaluate against them.

Objectives Achieved

Very difficult to measure how much conservation is achieved due to the programs. Meeting most goals and objectives in terms of numbers.

Objectives Not Achieved

Not getting as many requests from target groups for workshops as anticipated, based on advertising done.

Other Program Benefits

Helps Seattle City Light image.
Programs show customers that Seattle City Light is concerned about conservation.

Problems with the Program

Seasonal nature of demand for conservation programs.
Difficult to measure benefits, energy savings due to the program.

Overall Judgment of the Program

Doing well in terms of the overall goal of providing information to the public about Seattle City Light conservation programs.
"EASY MONEY" ENERGY CAMPAIGN

SPONSOR

Organization
Metrocenter YMCA, 909 4th Avenue, Seattle, Washington

Contact
Gundborg Sanvik, 382-5013

Purpose
Metrocenter's purpose is to give people the tools needed to constructively address widespread social change. It specializes in the mobilization of resources — human, technical and financial — to address Seattle's problems at the local level. Energy is one of the areas Metrocenter is focusing on.

Public Involvement in Program Planning
People at Metrocenter discussed the idea with a range of representatives from community groups, businesses, government agencies and the media. An Executive Committee of 25 was put together for the project in April 1982. The Committee has been very active. Subcommittees were formed and are helping the staff come up with ideas for the Executive Committee.

The program will have approximately 50 co-sponsors from local government, business, community groups, schools, social agencies and service clubs.

GOALS AND OBJECTIVES

Goals
Involve many local groups to sponsor a 4-6 week campaign to save energy.

Mobilize large numbers of people in the Seattle area to take energy saving measures during a set period of time.

Help people make their homes more comfortable by completing weatherization measures.

Help people save money by saving energy.

Objectives
Reach people, particularly those who have put off doing basic weatherization measures.

Get people to caulk windows, weatherstrip doors, and insulate electrical outlets. These measures were chosen because they are the easiest to do, cost the least, and save the most energy.

Provide information on what-to-do and how-to-do-it.

Organize volunteers to help elderly and disabled do the energy saving measures.
Offer discounts on materials to people participating through hardware stores.
Provide free materials to low-income people so they can participate.

Target Population
Residential -- homes, apartments and condominiums. People who have procrastinated about weatherization measures; low-income people.

Time Frame
Metrocenter has been interested in this ACTION program for several years. Funded in 1982; Executive Committee began in April 1982. Campaign will run from September 11 to October 3, 1982.

Expected Energy Savings
Unknown.

Expected Cost
Received grant of $30,000 from the ACTION agency. Separate grant of $12,000 to administer the low-income component of the program. $60,000 grant for low-income kits. Donated production of spots for radio and TV worth approximately $150,000.

Areas of Energy Use Affected
Space conditioning for homes and apartments.

CONTEXTS AFFECTED
Technical
Actions will affect the thermal properties of dwelling units.

Personal
Citizens will receive information which should increase their energy knowledge and awareness of use patterns, knowledge of possible energy conserving actions and the costs and benefits of such actions.

IMPLEMENTATION INSTRUMENTS
Communication
A number of means to encourage people to participate will be used. Dissemination of information has first priority. Bill stuffers will be sent out by Seattle City Light, Washington Natural Gas and the Oil Heat Institute. There will be coverage in newspapers and in church and community newsletters, as well as mass distribution of flyers. Employers will use in-house communication methods, and workshops will be held on the premises. A large scale media effort built around a TV campaign will be launched. The TV effort will have 10 and 30 second spots and will have longer visual instruction showing people how to do the work. There will also be radio coverage and personal contacts with businesses and organizations.

Participation will include celebrities showing how to do the measures on TV. Volunteers are being enlisted from community organizations and from businesses to help the disabled. Workshops will be held at community and senior centers, libraries, and churches to provide hand-on training. It is hoped that the involvement of community
groups will induce their members to participate as well as influence others in the community.

Financial
Discounts will be offered on materials.
Free materials will be offered to low-income people—2,000 free kits for low-income, 500 of the 2,000 specifically for senior citizens.

PROGRAM EVALUATION

Formal Evaluation
Building evaluation criteria into the project. Statistics will be collected on who is attending, income levels, etc. A random sample will be drawn to find out who followed through, how they heard about the project, etc. Puget Power will help with this. Also hoping to get a grant from BPA.

Objectives Achieved
Program not yet completed.

Objectives Not Achieved
Information not yet available.

Other Program Benefits
Information not yet available.

Overall Judgment of the Program
The ACTION agency has worked with 40 small cities in similar campaigns with good results, but there has never been a city of this size involved. Seattle will thus act as a model of what can be done with larger cities.
ECOTOPE GROUP

SPONSOR

Organization

Contact
Kevin O'Connell, 322-3753

Purpose
Ecotope Group is the non-profit arm of Ecotope, Inc. It publishes technical papers and gives seminars and workshops about solar, energy conservation, and other energy technologies.

Public Involvement in Program Planning
None

GOALS AND OBJECTIVES

Goals
Perform research, demonstrate energy efficient ideas and educate those involved with building in the commercial and residential sectors.

Publish materials on solar, methane, conservation and other energy efficient technologies to increase knowledge and thereby affect people's energy use.

Objectives
Publish educational materials (see attached).
Provide workshops and seminars.
Hands-on experience.
Consulting services for energy efficient building.

Target Population
Builders, architects, developers, contractors and individual homeowners. Residential and commercial sectors.

Time Frame
Ecotope was established in 1972.

Expected Energy Savings
No way of knowing at present what kinds of energy savings have occurred because of Ecotope programs.

Expected Cost
Not available. Ecotope pretty much pays for itself from sale of publications and fees from training seminars, etc.
Areas of Energy Use Affected

Space conditioning, energy efficient appliances, consumer purchasing.
Emphasize weatherization, building energy efficient structures, passive and active solar.

CONTEXTS AFFECTED

Technical
Start with dwelling unit construction when possible; affect size, insulation, siting, windows, etc. Also get into most efficient fuel type and equipment and solar applications.

Economic
Provide information on the availability and efficiency of equipment, fuels and fuel sources.

Sociocultural
Not as radical as before. Original focus was to change cultural ethics about energy. Strong sociopolitical commitments to change. More of an advocacy group before; now much more business-oriented. Meeting a need.

Personal
Do still provide information and increase their clients' energy knowledge, perceptions of the energy situation, conservation knowledge and experience.

IMPLEMENTATION INSTRUMENTS

Communication
Information is an important component. A certain amount of marketing is also required. Use mailing lists of community groups for training workshops, etc. Also personal contacts with many community organizations. Use press releases, word-of-mouth, appearances, displays at some community events. Furnish information, have library available for all clients.

Participation is stressed through workshops and seminars and through the exposure of clients to people who believe in and have experience with conservation.

Financial
Show clients savings available for the different energy efficient weatherization components, fuels, equipment, etc.

PROGRAM EVALUATION

Formal Evaluation
Do an evaluation after each of training programs, which have proved to be only partially helpful.

Objectives Achieved
Feel they do an excellent job of providing information to interested people. People come to them when they want help or information in the energy area.
Other Program Benefits
Unknown.

Problems with the Program
Sometimes hard to get material down to the layman level.
Always some people dissatisfied with their actual energy savings.

Overall Judgment of the Program
Ecotope Group is doing a very good job in terms of providing technically accurate and up-to-date energy information.
EDUCATION OUTREACH

SPONSOR

Organization
Seattle City Light, 1015 Third Avenue, Seattle, Washington 98104

Contact
Pat Robertson, 625-3543

Purpose
Seattle City Light is a customer-owned utility and a department of the City of Seattle. Its mandate is to provide electrical energy for the citizens of Seattle in the residential, commercial and industrial sectors.

Public Involvement in Program Planning
None

GOALS AND OBJECTIVES

Goals
Teach conservation by providing Seattle-area schools with speakers, materials and teacher-training in energy and conservation.

Save energy.

1981 Objectives
Provide information over the phone.
Disseminate energy-related material to 150 teachers in the City Light service area.
Present two in-service teacher training sessions.
Give 150 classroom presentations (5,000 students reached).
Contract with Sunrise House Education Program to give 60 tours of Sunrise House (1,500 students).
Create and coordinate an energy conservation contest for high school students in Seattle City Light service area.
Increase the number of in-city field trip locations for educators to include Project Weathervane, Lake Union Steamplant, Sunrise House and South Substation.
Distribute energy education materials and coordinate pilot-testing with 50 teachers and approximately 1,000 students, grades 2-6.
Publish four issues of Conservation Education Quarterly and disseminate.
Coordinate Skagit School Tours for 13 schools (1,200 students).
Public Education Program (PIPE) -- arrange and coordinate tours and placement within Seattle City Light.
EDUCATION OUTREACH - 2

**1982 Objectives**

- Develop energy curriculum with a Northwest focus.
- Continue to pilot-test and distribute appropriate materials to local educators.
- Develop and present programs and tours for local schools, youth clubs and groups.
- Provide workshops.
- Distribute newsletter.
- Contact school-age groups through classroom presentations, tours and assembly programs (7,500 students).
- Conduct teacher workshops.
- Supply materials to teachers.

**Target Population**

- Teachers, school-age kids.

**Time Frame**

- This is an on-going program.

**Expected Energy Savings**

- Unknown.

**Expected Costs**

- 1982: $77,008 budget.

**Areas of Energy Use Affected**

- Space heating, household appliances including water heaters, consumer purchasing, weatherization, and life cycle costs of energy measures.

**CONTEXTS AFFECTED**

**Technical**

- The program affects the technical context only by teaching people about Seattle City Light programs (weatherization, water heaters, etc.) and the ways in which these measures can increase energy efficiency.

**Economic**

- Provide some information about rates, rate structures, costs of new energy.

**Personal**

- Discuss life style changes, energy knowledge, understanding and awareness of energy use, possible conservation actions and the costs and benefits of these actions.
IMPLEMENTATION INSTRUMENTS

Communication
The primary focus of the program is to present information in a manner that can be utilized by educators and children.
Information is disseminated through speakers, written materials, teacher training, workshops, classroom presentations, movies, teaching materials and tours.

Persuasion
Some of the materials used contain messages with strong psychological components to help induce people to conserve.

Participation
Participation, though workshops and tours, is encouraged by asking teachers to use conservation materials in their classrooms and students to incorporate what they learn in their homes.

PROGRAM EVALUATION

Formal Evaluation
No overall evaluation, but will sometimes evaluate a particular program.

Objectives Achieved
Met 1981 goals. Have met 1982 goals so far. Have to look at total impacts over the long term.

Other Program Benefits
Creates a positive image. People see Seattle City Light as a helping organization.
Provides an opportunity to change misconceptions educators have about Seattle City Light, rate issues, etc.

Problems with the Program
None.

Overall Judgment of the Program
Very good in terms of its overall goals of energy education.
ENERGY CRISIS INTERVENTION PROGRAM

SPONSOR

Organization
South King County Multi-Service Center and Northeast King County Multi-Service Center

Contact
Ellen Gephardt, 485-6521 (Northeast)
Janie Barber, 824-9181 (Southeast)

Purpose
Both agencies are private, non-profit community service agencies which assist low-income residents. They provide services to senior citizens and provide community and emergency services.

Public Involvement in Program Planning
At Northeast, a program advisory committee was set up, with four energy vendors and five low-income members. The committee talked about a variety of projects, recommended and prioritized ideas. This program came from their suggestions.
Also worked with Puget Power in setting up the program.

GOALS AND OBJECTIVES

Goals
Save energy.
Teach and help low-income renters to weatherize their homes and apartments and increase awareness of conservation measures.
Increase personal comfort.
Help clients avoid the need for energy assistance through energy conservation.
Involve communities in conserving energy.

Objectives
Use volunteers to make home visits (Master Conservers trained by Puget Power and Washington Energy Extension Service), complete some weatherization measures and show renters how to do others (see attached checklist).
Help renters put on water heater blankets and set back temperature on water heaters. Show them how to caulk and weatherstrip, how to construct storm windows and put on exterior wall gaskets (see attached list).
ENERGY CRISIS INTERVENTION PROGRAM - 2

Obtain donated materials from Puget Power and other community sources. Put on workshops to provide hands-on experience.

Target Population
Low-income renters in both homes and apartments who meet federal guidelines. Clients who have previously received energy assistance.

Time Frame
The Northeast program started in April 1982, while the Southeast one started in July 1982.

Expected Energy Savings
Information not available.

Expected Cost
Funds come from the Windfall Profits Tax and are funneled through the Crisis Intervention Program.

Areas of Energy Use Affected
Space heat and thermal efficiency, as well as household appliances.

CONTEXTS AFFECTED

Technical
The programs affect the technical context by improving thermal efficiency of residential units and by improving the efficiency of household water heaters and turning down water heater temperature.

Personal
Involvement of members of the community may increase the energy awareness of others. Volunteers discuss the energy situation and provide information which may help increase clients' energy knowledge, understanding and awareness of present use patterns, energy conserving actions, and costs and benefits of these actions.

IMPLEMENTATION INSTRUMENTS

Communication
The programs used information to make eligible persons aware of the program. Have used flyers and newspaper ads. Letters were sent to persons who received emergency energy assistance last year. Staff visited food banks and talked to people in line. Contacts with community groups such as senior centers.

Persuasion
Persuasion has been used some with persons who formerly received energy assistance.

Participation
Participation is an important facet of the program. Clients are being exposed to new experiences, in this case conservation activities, by other members of the community. In addition, using the conservation skills of trained volunteers will hopefully reinforce these attitudes.
in the volunteers and increase the conservation messages they give to others.

Have put on some workshops, have more scheduled.

Financial

Services are provided free to clients, thus providing a financial incentive for participation. Reduced energy needs should also act as an incentive.

PROGRAM EVALUATION

Formal Evaluation

Monthly reports involving number of units completed.

Objectives Achieved

Volunteers are doing an excellent job. Work on units has been more thorough than originally planned (spending 4-8 hours per unit).

Puget Power has donated weatherization supplies.

Objectives Not Achieved

Northeast program has found the program going slower than planned, in terms of number of units completed.

Sometimes hard to get volunteers and clients' time schedules coordinated.

Work on units taking longer than projected because volunteers are doing more than planned.

Other Program Benefits

Increased sense of community.

Good use of conservation knowledge of volunteers.

Make clients more self-reliant by teaching them how to do the conservation measures.

Problems with the Program

Slow work due to the many problems some of the units had.

Hard to motivate people to weatherize when the weather is nice.

In Southeast, there are whites, blacks, Asians and Hispanics. Have a translator and interpreter, but it is a harder population to deal with.

Apartments are the worst in terms of needing weatherizations. Landlords are often not even local.

Must do projects that harm or permanently change rental property.

Overall Judgment of the Program

Good potential. Need to check back and see how well they are accomplishing their goals, i.e., number of units completed.
HEATKEEPER PROGRAM

SPONSOR

Organization
Washington Natural Gas, 815 Mercer Street, Seattle, Washington 98111

Contact
Joan Nelson, 622-6767

Purpose
Furnish natural gas to customers throughout the state of Washington.

Public Involvement in Program Planning
None

GOALS AND OBJECTIVES

Goals
Promote energy conservation.
Promote use of natural gas for space and water heating in the residential sector.

Objectives
Help realtors sell energy efficient natural gas homes.
Have builder reps from Washington Natural Gas work with developers to build natural gas homes.
Real estate reps hold open houses for real estate brokers for all heat-keeper homes. Put up signs, fix lunch, etc.
Make homes energy efficient by installing:
--energy efficient natural gas furnace with no pilot light, using 7% less gas;
--automatic thermostats with night setback;
--energy-efficient natural gas water heater which uses 20% less energy;
--insulation in ceiling and sidewalls;
--double-glazed windows.

Target Population
Builders of residential homes who can use natural gas.

Time Frame
The program started in 1976-1977.

Expected Energy Savings
See attached.
Have found that more energy efficient homes require smaller equipment.
HEATKEEPER PROGRAM - 2

Expected Cost
Budget information not available. Average additional cost per house, $100.00 each for energy efficient range, washer/dryer, insulation and water heater. The additional cost of the thermostat is approximately $50.00

CONTEXTS AFFECTED

Technical
The program focuses on the dwelling unit. Conservation measures such as insulation, double-glazed windows and an efficient furnace and appliances are installed during building.

Economic
The economic context is affected through two approaches:
1. Product availability. Help developers obtain energy-efficient natural gas furnaces and appliances. Stress the availability of this fuel source.
2. Advertise the energy efficiency of the houses and the natural gas features in them.

Personal
Stress energy conservation features and advantages to builders; furnish information on costs and benefits; increase knowledge of energy sources and supplies and energy situation.

IMPLEMENTATION INSTRUMENTS

Communication
Stress both information and persuasion. Information is aimed at both builders and at homebuyers. Ads are placed in newspapers and magazines, such as Sunset, and on radio and Television. Pamphlets are distributed, and builders reps keep in touch with builders on a regular basis. The real estate rep gives four to six presentations a month to realtors to explain advantages of the HeatKeeper homes. Provide agents with information to give to perspective clients.

PROGRAM EVALUATION

Formal Evaluation
Evaluate in terms of annual goals and objectives.

Objectives Achieved
Program very successful last two to three years, due to the on-going efforts of the builder reps, real estate relations, etc. Accumulative effect.

Although fewer homes are being built this year, holding more open houses, both in the Seattle and Tacoma areas. Been very good for the utility's image.
HEATKEEPER PROGRAM - 3

Objectives Not Achieved

Housing downturn has limited number of HeatKeeper homes built this year.

Problems with the Program

Some builders have expressed skepticism about the benefits of the program for them.

Overall Judgment of the Program

Washington Natural Gas feels the program has been very successful in getting developers to build homes using natural gas and in helping to sell the homes.
SPONSOR

Organization
Seattle City Light, 1015 3rd Avenue, Seattle, Washington 98104

Contact
Shawn McDonald, 625-3231

Purpose
Seattle City Light is a customer-owned utility and a department of the City of Seattle. Its mandate is to provide electrical energy for the citizens of Seattle in the residential, commercial and industrial sectors.

Public Involvement in Program Planning
Only public participation has been through City Council review.

GOALS AND OBJECTIVES

Goals
Produce energy savings that are cost-effective to the Pacific Northwest and to the utility.
Reduce residential energy consumption through in-home energy audits which provide an analysis of potential energy savings for a variety of conservation measures.
Increase customers' awareness of the types of conservation actions that may be taken within their homes.

Objectives
To offer and conduct residential audits and provide conservation recommendations to customers.
Wrap hot water tanks and set back hot water tank thermostats.
Facilitate implementation of recommended conservation measures by customers through installation and sales (at cost) of weatherization materials.
Have the audited customers take action on the energy-conserving suggestions made at the time of the audit.
Reduce electrical consumption in the audited homes.
(See attached 1981 and 1982 objectives.)

Target Population
Residential, including condominiums.
Emphasis on electrical customers.

Time Frame
Planning began in 1977 and lasted approximately a year. The program started in April 1978 with funding from a Department of Energy Cooperative Agreement. There is no cut-off date.
Expected Energy Savings

The average annual energy savings for the program (1978-1980) per participating electric heat home are estimated at 1,534 kwh (5.7% reduction); for non-electric heat homes the average savings are estimated at 516 kwh (3.8% reduction). Total program savings are estimated at 7,750,720 kwh, or average capacity savings of 884 kw (see Table 2 attached). Average peak capacity savings are 1,648 kw. Projected savings of 536 kw/year on average.

Expected Cost

Total expenditures for the program, 1978-1980, were $1,539,683. Cost of an audit in 1981 was $94.00 per house. Using heat loss calculations, each measure was cost effective, but cost effective for electrically heated homes only, not oil or natural gas. The analysis shows a positive net value to the region for all participant homes.

Areas of Energy Use Affected

Space conditioning, household appliances, consumer purchases. Weatherization measures, including tank wraps and flow restrictors.

CONTEXTS AFFECTED

Technical

At least 50% of the actions recommended affect the customers' dwelling unit through weatherization measures such as insulation and caulking. Water heaters are also a target for more efficient use.

Personal

Fifty percent of the program is educational. The program is designed to increase customers' awareness of types of conservation actions, and the costs and benefits of these actions, and to expose them to conservation actions and make them aware of current energy use.

IMPLEMENTATION INSTRUMENTS

Communication

Use all three communication approaches: information, persuasion, and participation. The conservation telephone number of bills gets the most response. Also using TV ads, some radio spots and brochures. The SCL outreach coordinator meets with community groups to explain the program. Word-of-mouth is now bringing in referrals.

Participation

Participation is encouraged by demonstration workshops at private homes where neighbors are invited to see an audit demonstrated and to discuss conservation measures. The program also puts on do-it-yourself workshops demonstrating how to make storm windows.

Financial

Auditors provide information on tax advantages. They also discuss financial incentives, such as low-interest loans, energy savings and free services. The audit itself is free. Also explain the effect of energy savings on rates.
PROGRAM EVALUATION

Formal Evaluation

A formal evaluation was completed by the Evaluation Unit of SCL in October 1981.

Program objectives are developed annually for each succeeding year of program operations. Program benchmark numbers are determined, and progress is measured by comparing actual results to these objectives yearly.

Objectives Achieved

1979 Activities: The program objective of 5,000 audits was achieved.

1981 Activities:

72% of the customers who received an audit found it "extremely useful."

89% of customers who had an audit thought the program definitely or probably helped them save energy.

The four water heating conservation actions were taken more frequently by the audited group than by the control group.

<table>
<thead>
<tr>
<th>Action</th>
<th>Audited</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set back tank temperatures</td>
<td>93.3%</td>
<td>56.6%</td>
</tr>
<tr>
<td>Wrapped tank</td>
<td>62.0%</td>
<td>21.7%</td>
</tr>
<tr>
<td>Installed flow restrictors</td>
<td>45.3%</td>
<td>27.0%</td>
</tr>
<tr>
<td>Insulated hot water pipes</td>
<td>32.7%</td>
<td>16.1%</td>
</tr>
</tbody>
</table>

Those customers who received audits were significantly more likely to plan to take additional conservation actions. A significantly larger percentage of audited customers planned to add attic, floor and basement ceiling insulation and storm windows. The control group customers were more likely to plan not to take these actions. (See Table I)

Objectives Not Achieved

1980 audit objectives were not met. 4,769 audits were completed instead of the 7,500 targeted (36% short).

1980 hot water conservation actions were not met.

1980 installation and sale of items fell short of objectives due to the smaller number of audits conducted.

Other Program Benefits

Satisfied customers feel more positive about SCL.

Helping area economy by encouraging conservation purchases.

Auditors have created a really positive impression.

Problems with the Program

Some work not being done correctly. Need to increase education of contractors.

1980 audit objectives were not met because of staffing problems.

Oil and gas customer audits are not cost effective.

Organizational and management problems occur because of the seasonality of requests for audits.

Overall Judgment of the Program

Good.
HOME ENERGY CHECKUP AND WEATHERIZATION PROGRAM

SPONSOR

Organization
Puget Sound Power and Light, Puget Power Building, Bellevue, Washington 98009

Contact
Fred Porter, Debra Gohrke, 454-6363

Purpose
Puget Power and Light's mandate is to provide electrical energy to residential, commercial and industrial customers in its service area.

Public Involvement in Program Planning
None. Now have a very active citizens' committee.

GOALS AND OBJECTIVES

Goals
Reduce load growth of the utility.
Help customers permanently reduce their energy consumption.

Objectives
Complete energy audits (see attached for more detail).
Complete solar access surveys.
Provide customers with water heater insulation kits.
Persuade customers to obtain weatherization loans to finance cost-effective weatherization improvements.
Provide customers with electrical outlet gaskets.
Present information on the solar water heating program.

Target Population
All residential customers. Senior citizens get preferential treatment.

Time Frame
The Home Energy Checkup Program began November 1978. It was expanded in January 1982, although weatherstripping and caulking were discontinued on January 6, 1982. The loan program also started in 1978. Heat pumps and the solar water heater pilot program began January 6, 1982.

Expected Energy Savings
Average estimated savings per house are 5454 kwh, or 8575 kw degree day adjusted.
Estimated kwh conserved through the audit and wrap programs as of April 1982 are 199,309,000.
Water heater insulation kits: 672 kwh per unit per year; 121,187 by the end of 1981.
Electrical outlet gaskets: 18 kwh/year/outlet.

**Expected Cost**

About 40¢/customer/month for the programs. An average cost of $1,000/home.

**Areas of Energy Use Affected**

Space conditioning, mainly space heating, as well as household appliances, particularly water heaters. Also discuss consumer purchasing.

**CONTEXTS AFFECTED**

**Technical**

The program affects the technical context by improving the thermal efficiency of homes. Weatherization measures limit heat loss and water heater wraps, and heat pumps also reduce energy use.

**Economic**

Energy rates are discussed, including current price levels, rates of change necessary due to new generation, and other factors.

The product availability of energy efficient heating equipment, including heat pumps and solar water heaters, is mentioned.

**Personal**

Program personnel discuss life style changes only if asked. Will break bill down into space heat and other use areas. Get into electric maintenance versus heat costs. Address some energy issues and conservation measures in the material prepared for the audit. Discuss costs and benefits of different measures.

**IMPLEMENTATION INSTRUMENTS**

**Communication**

Puget Power began to reduce load promotional advertising in 1966. Started advertising energy conservation in 1973; put on heavy advertising campaigns in the media in late winter and spring. Use bill stuffers and traveling displays. May try direct mail. Use radio and TV ads and present "how to" workshops.

**Persuasion**

Much of Puget Power's advertising uses persuasive messages. The utility is very explicit about the need to increase energy conservation; thus advertising contains messages intended to sway people's beliefs and actions.

**Participation**

Participation is encouraged by the audits in that the audits expose people to situations in which they can observe conservation activities which may be new to them.

**Financial**

Puget Power offers the energy audit at no charge to customers. The loan and grant program also has built-in financial incentives (see attached).
HOME ENERGY CHECKUP AND WEATHERIZATION PROGRAM - 3

PROGRAM EVALUATION

Formal Evaluation

Intercomm provides an analysis of energy savings for the utility. A yearly audit is conducted. The utility reviews programs in terms of number of audits conducted, loans finalized, etc.

Objectives Achieved

Have generally met goals in terms of number of audits completed.

Loan program has improved since auditors were given sales training.

The solar water heater program has been very successful (see attached).

The heat pump program is doing very well and meeting its goals.

From 1979 to 1982, annual consumption for space heat customers dropped 15.1% or 3115 kwh.

Average weatherized homes (1,672 square feet) are saving on average 8,575 kwh/year degree day adjusted.

Actual energy savings being experienced in Puget's program are 157% of that estimated at time of audit.

Energy saved as of 4th quarter 1981:

- Total estimated electricity savings from all conservation programs
  - 195,000 MWH/Yr
- Estimated electricity savings from commercial and outdoor lighting contracts signed is an additional
  - 5,530 MWH
- The amount of electricity saved will serve an additional 13,359 average residential customers (based on 15,000 kwh average use per year)
- The WHIK Program alone has saved enough electricity to meet the annual water heating needs of more than 20,000 customers.

- Water heater insulation kits (WHIK) - units installed: 182,000

Residential Conservation Program

- Number of audit analyses completed
  - 30,000
- (includes single family and apartment complexes)
- Number of loans made
  - 12,000
- Dollars loaned
  - $14,100,000

Summary of Residential Program activities to April 1982:

- Home energy checkups completed 34,000
- Weatherization loans and grants issued 14,000
- Total Financing $16,365,000
- WHIKs installed 191,000
- Estimated kwh conserved 199,309,000 kwh
Objectives Not Achieved
Would like to increase number of weatherization loans.

Other Program Benefits
Good public relations for the utility.
Very beneficial for electric heat customers.
Improves personal comfort of customers.
Program helps area economically because it keeps contractors busy and increases sale of weatherization materials.

Problems with the Program
Conservation programs met resistance and questions within the utility when they started; produced slowdowns initially.
Home energy checkup program is very seasonal, which makes it difficult to run efficiently. Have waiting lists part of the year.
Some problems have occurred because of slow payment to contractors.
Some contractors have not done the work correctly the first time.
Gas and oil heat customers feel they're getting gypped because they are not eligible for most programs.

Overall Judgment of the Program
Very good. After spending $14 million on home insulation programs, Puget Power estimates if has saved enough electricity to power 13,400 homes.
HOME ENERGY LOAN PROGRAM

SPONSOR
Organization
Seattle City Light, 1015 Third Avenue, Seattle, Washington 98104
Contact
Buzz Barban', 625-3648
Purpose
Seattle City Light is a customer-owned utility and a department of the City of Seattle. Its mandate is to provide electric energy for the citizens of Seattle in the residential, commercial and industrial sectors.

Public Involvement in Program Planning
Public is involved through the City Council review process. A formal advisory committee was formed in June, 1982. It is composed of contractors, manufacturers, SCL, BPA, and FTC personnel. Also invited representatives from other utilities.

GOALS AND OBJECTIVES

Goals
Save energy in the residential sector in the SCL service area.
Weatherize 26,700 homes by 1990 if there is a mandatory requirement, 16,000 if there is not.
Assist customers to weatherize by offering grants and zero or low-interest loans for contractor-installed weatherization (up to four units).
Assist low-income residents.

Objectives
Weatherize 3,000 homes by the end of 1982 (this has been reduced to 2,000).
Complete 3,000 inspections.
Develop a thermobile program for review by City Council.
Increase staff to complete audits and handle increased paperwork.
Convert the tracking system to the Univac 9080 to improve data collection, storage and accessibility.
Reduce paperwork problems in processing loans.
Inspect all work so that it meets specified standards.
Weatherization is financed by zero interest, ten-year loans on a five-year deferred, five-year payback schedule or by a zero interest loan with 30% discount for immediate payback. Homes must be electrically heated; there are no income requirements. The customer
chooses the contractor(s) from a list of City Light-approved contractors. The average HELP loan is expected to be $1700; $5500 is the maximum amount loaned. Attic, wall and ceiling insulation, weatherstripping and caulking, duct and pipe wrap, water tank wrap and setback and storm windows (up to $5.50 per square foot) are available. Work and materials must meet Seattle City Light specifications.

Target Population
Low-income. All residential customers in the SCL service area.

Time Frame
The utility began providing financial incentives for conservation in 1978, with a financing program for attic and floor insulation in electrically-heated homes. This was initiated upon the issuance of an Attorney General's opinion that such lending for conservation measures was not a violation of the State Constitution's prohibition of lending of credit. In November 1979, voters of the state approved SJR 120, giving public utilities the clear authority to make loans for residential conservation measures.

On February 9, 1981, the Seattle City Council passed Ordinance 109675 which authorized the Comprehensive Residential Weatherization Program (CRWP); it was signed by Mayor Royer on February 19, 1981. It is a three-phase program that will run for 9 years.

Expected Energy Savings
This information will be available October 29, 1982 in a SCL evaluation.

Expected Cost
1982 Budget: $6,731,668 (estimated; expected to be cut about one-third).$1.7 million of 1982 budget for administration, $460,000 for advertising.
(Paper shows $10.7 million budget; correct figures will be in evaluation.)

Areas of Energy Use Affected
Space conditioning, mainly space heating, and household appliances (water heaters).

CONTEXTS AFFECTED
Technical
The program affects the energy context by increasing the thermal efficiency of homes through weatherization measures and by improving the efficiency of water heaters.

Personal
Auditors discuss energy use, possible conservation measures, and costs and benefits of these measures. They increase clients' conservation experience by going to their homes, explaining and installing some conservation aids.
HOME ENERGY LOAN PROGRAM - 3

IMPLEMENTATION INSTRUMENTS

Communication
Information about the program has been widely distributed. Staff work with SCL outreach program. Information has appeared on TV, radio and newspapers, and is explained to those who call in on the conservation phone. Pamphlets have been distributed.

Participation
Some use of participation has been tried through block parties where an audit is conducted and explained, and loans are also discussed.

Financial
Incentives are a part of the program because SCL offers the energy audit at no cost. Financial incentives are also available through the loan program.

PROGRAM EVALUATION

Formal Evaluation
Just completed. Will be released October 29, 1982.

Objectives Achieved
Not many. See evaluation when available.

Objectives Not Achieved
Reduced number of homes to be weatherized from 3,000 to 2,000.
Have not met goals for approving loans (see evaluation when available).

Other Program Benefits
Increase personal comfort level.
Recycle money into the economy, especially to insulation and storm window dealers.

Problems with the Program
Has taken much too long to process loans.
Understaffed.
Customers take too long returning contracts.
Leins a problem; sometimes homeowners aren't legal owners.
Contractors' work has been a real problem. Two out of three jobs were being rejected initially. Corrections often took up to 60 days.
Need more inspectors.
Taking too long to get initial work done.
Taking too long to pay contractors (see attached).
Will be discussed more in evaluation.

Overall Judgment of the Program
Poor so far.
HOUSING REHABILITATION PROGRAM

SPONSOR

Organization
Central Area Public Development Association (CAPDA), 2002 E. Union, Seattle, Washington 98122

Contact
Cliff Hooper, 322-2010

Purpose
Build or rehabilitate low- and moderate-income residential units in the Central Area.

Public Involvement in Program Planning
CAPDA is the result of planning by members of the community. Members of various organizations spent 1½ years researching and analyzing housing problems in the Central Area. CAPDA has a council of elected members and a Board of Directors who represent different organizations in the city. General program meetings are held, and Board meetings are open to the public. Block coffee meetings and workshops are held to discuss program goals, problems, etc.

GOALS AND OBJECTIVES

Goals
Assist homeowners in preserving, restoring, maintaining and improving housing stock in the Central Area.
Provide housing rehabilitation services to ensure health, safety and energy conservation.
Help with and encourage long-term maintenance of existing housing stock.
Modernize and upgrade homes; cosmetic work.

Objectives
Weatherize homes.
Provide self-help maintenance and weatherization workshop.
Resolve credit, title and other legal problems regarding housing.
Provide low-interest home rehab loans to low-income homeowners in the Central Area.
Inspect homes to determine scope of work.

Target Population
Low-income homeowners and property owners in the Central Area of Seattle.
Housing Rehabilitation Program - 2

Time Frame
The program started by providing weatherization workshops and housing rehabilitation services as the Mann/Minor NHRP. The current expanded program started in July 1981 and is funded by Seattle Housing Authority and the Department of Community Development.

Expected Energy Savings
Information not available.

Expected Cost
Average rehabilitation cost is $10,734.00.
1981 budget was $150,580.00 (see attached).

Areas of Energy Use Affected
Thermal efficiency, heating, household appliances such as water heaters.

Contexts Affected

Technical
The program affects the technical context by improving the thermal efficiency of the dwelling unit through construction, insulation and other conservation measures. Space heating is improved through more efficient furnaces, and type and efficiency of water heaters are addressed.

Personal
Discuss energy use and the energy situation. Presents conservation measures, costs and benefits; provides conservation experiences. Tries to develop energy consciousness, getting people to change their behavior.

Implementation Instruments

Communication
The rehabilitation program utilizes a number of informational strategies. These include block coffee meetings, workshops on weatherization and energy conservation, newsletters, articles in local papers, handouts, radio and TV spots and presentations at community meetings and events. Some programs stress participation in addition to furnishing information. They emphasize new experiences around conservation and the use of community members and groups to influence and educate other members of the community.

Program Evaluation

Formal Evaluation
Evaluate total program, but not the weatherization component alone.

Objectives Achieved
Contexts have been affected and some goals achieved. Workshops have been effective.

Some energy conservation has been achieved with each rehabilitation project.
**Objectives Not Achieved**

Budget cuts mean many people do not receive enough money to complete all the work that should be done.

**Other Program Benefits**

Improved value of homes in the area.

Improved property values of whole Central Area.

Aided in creating positive community feelings and more community participation.

**Problems with the Program**

Not enough money to do all the work that needs to be done.

Some problems with contractors.

**Overall Judgment of the Program**
INNER CITY SELF-HELP PROGRAM

SPONSOR

Organization
Central Area Motivation Program, 722-18th Avenue, Seattle, Washington 98122

Contact
Kathy Chun, 324-0500

Purpose
Help people become more self-sufficient in regard to housing and food. Furnish the resources to help people meet their goals.

Public Involvement in Program Planning
Public not involved in initial planning, but there is public involvement in the on-going program. A steering committee, composed of clients and staff, helps with policy decisions and program development.

GOALS AND OBJECTIVES

Goals
Main focus is on energy conservation and home repairs and maintenance. Help people remain in their homes; maintain the housing stock in the area.
Increase personal comfort levels.

Objectives
Provide housing and energy advice. Home inspections will furnish information, advice, and resources on energy conservation, home repairs and price estimates.
Hold housing workshops and classes. Show clients how to fix up, maintain and weatherize houses and apartments.
Provide some free weatherization materials when workshops are held at clients' homes.
Continue and increase Rebound Building Material Salvage Program. (The program recycles building materials received from the community and sells them at low cost to clients; e.g., insulating window shutters, thermopane.)
Continue and increase tool bank use.
Continue and increase labor exchange. Work with other community energy programs, e.g., Easy Money Campaign.
(Other objectives do not affect conservation.)

Target Population
Low income residents of the Central Area, homeowners and renters.
INNER CITY SELF-HELP PROGRAM - 2

Time Frame
Set up current program in 1981 with assistance of the Neighborhood Technology Program.

Expected Energy Savings
No information available.

Expected Costs
1981 Budget: $98,000, from Neighborhood Technology Program
1982 Budget: $86,000, from Community Development Block Grant Funds.

Areas of Energy Use Affected
Space conditioning, household appliances (mainly water heating), consumer purchasing. Weatherization, low-cost measures, home repair, chimney cleaning and repair.

CONTEXTS AFFECTED

Technical
Dwelling units are affected through repair and maintenance of the structure, construction measures, insulation and other weatherization measures. Repairs and maintenance to furnaces and chimneys is also included.

Legal
Only affect the legal context by providing information about city codes, including city energy codes.

Personal
Some discussion of energy use. Provide knowledge about energy conservation measures, costs and benefits of these measures.

IMPLEMENTATION INSTRUMENTS

Communication
Both information and participation are stressed.
The program produces a monthly newsletter detailing available activities. Develop brochure, give presentations to community groups, receive referrals from other agencies and have displays at fairs and festivals in the Central Area. News releases are also used. Trying to limit program advertising to the Central Area.
Participation takes place through the labor exchange, tool bank, housing workshops and classes, and the home inspection program.

Financial
Most services are free. Other programs furnish low-cost materials.

PROGRAM EVALUATION

Formal Evaluation
Contract with the City requires yearly accounting of goals and objectives. Completed one survey to determine clients' needs.
Objectives Achieved
Uncertain. Making progress. DHR evaluation found reaching some goals, but many questions about outreach effectiveness.

Objectives Not Achieved
Uncertain. See above.

Other Program Benefits
Encouraging people to be more self-reliant and help themselves.
Build community interaction.
Help people obtain goals at reduced prices.

Problems with the Program
Demand for services is very seasonal.
Many moderate income folks don't want free help.
"Tampering" with people's homes is sometimes a problem. They don't like other people in their homes.
Biggest problem is need for more effective outreach. Need to make the community more aware of the program.
Many people are intimidated by "government" programs.
It takes a long time to get people through the process.

Overall Evaluation of the Program
Seems good. Need more evaluation.
KING COUNTY HOUSING REHABILITATION

SPONSOR

Organization
King County Housing and Community Development Division, 1718 Smith Tower Building, 506 Second Avenue, Seattle, Washington 98104

Contact
Nikki Parrott, 344-7605

Purpose
Facilitate community development and housing in unincorporated areas of King County and 25 jurisdictions. Work with all communities except Bellevue, Bozar and Seattle.

Public Involvement in Program Planning
Hold public hearings. Formal replies from banks about loans.

GOALS AND OBJECTIVES

Goals
Facilitate the rehabilitation of homes in unincorporated King County and 25 communities.
Maintain current housing stock.
Help people remain in residential units by completing repairs.
Provide loans to help cover cost of work.
Conserve energy through weatherization and repair.

1982 Objectives
Approve 100 loans of up to $15,000 under the AMPL Program (Affordable Monthly Loan Payment).
Rehabilitate 140 homes through the Housing Repair Program.
Repair housing to improve health and safety of residents.
Make homes more energy efficient.
Preserve housing through painting and general home repairs.
Provide for other improvements when possible. (See attached for program description.)

Target Population
Low-income, minority and elderly.

Time Frame
The AMPL program started in 1980.
Housing repair program started in 1976.

Expected Energy Savings
Information not available.
KING COUNTY HOUSING REHABILITATION - 2

Expected Cost

1982 AMDL Budget: $500,000 block grant funds; $6,700,000 private funds.
1982 Housing Repair Budget: $900,000.

Areas of Energy Use Affected

Program affects space conditioning, mainly space heating. May be some discussion affecting consumer purchasing. Weatherization includes insulation, storm windows, weatherstripping and caulking.

CONTEXTS AFFECTED

Technical

The programs affect the technical context by repairing or affecting clients' dwelling units and their thermal properties, e.g., repairs of windows and walls, insulation, etc.

Heating equipment is affected through furnace and chimney repair, improving efficiency: Household appliances can be replaced, such as more efficient water heaters.

Personal

The program doesn't emphasize lifestyle changes, but information is presented that highlights energy use, costs and benefits of weatherization measures, understanding of energy systems and possible energy conserving actions.

IMPLEMENTATION INSTRUMENTS

Communication

Information is available in pamphlets which are widely distributed. Advertising appears in various publications, but they don't have to advertise much for the housing repair program as there are already 30-40 persons on the waiting list. Have Housing Hotline number and numbers at Senior Centers.

AMPL Program has brochures, posters and articles in community papers. Put up posters, information in public libraries, day care centers, community centers, etc.

Speakers are available to talk about both programs to interested groups.

Financial

The Housing Repair Program offers financial incentives through no-interest, no-payment loans. The $7500 loan can be deferred until the house is sold.

PROGRAM EVALUATION

Formal Evaluation

Monitored by HUD, which requires the agency to track the number of applications processed, jobs completed, etc.
Objectives Achieved

Pretty much on target for 1982. In June, 50 loans completed through the AMPL Program. Home Repair Program has been slow this year because of private money constraints.

Objectives Not Achieved

Year not over.

Other Program Benefits

Allows low and moderate income persons to remain in their homes with more comfort.

Helps business community because of increased trade in the community.

Problems with the Program

Some problems with contractors work.

Federal grants always a worry in terms of program continuity.

Not as many people can afford the AMPL program because of payment requirements.

Waiting list for the Housing Repair Program.

Not as much money available for the Housing Repair Program this year.

Overall Judgment of the Program

Good.
LOW INCOME WEATHERIZATION PROGRAM (LIWP)

SPONSOR

Organization
City of Seattle. Administered by the Department of Human Resources, 400 Yesler Building, Seattle, WA.

Contact
Priscilla Call, 625-5430

Purpose
The City of Seattle developed a Comprehensive Residential Weatherization Program (CRWP) to help the citizens of Seattle conserve energy. The LIWP is the low-income component of CRWP, and is divided into three sections:

--Low-Income Electric Program (LIEP)
--Low-Income Weatherization Assistance (LIWA)
--Urban Development Action Grants (UDAG)
(See attached)

The Home Energy Loan Program (HELP) is available for all City Light customers who are not low-income and whose primary heat source is electricity.

Public Involvement in Program Planning

Many community groups were briefed during the planning process, both community and business groups. Talked to many social service agencies during the planning period. Sent mailings to a number of individuals and groups about the proposed program and the city council hearings.

GOALS AND OBJECTIVES

Goals
Energy conservation from all fuel sources in the residential sector. Financial assistance for weatherization of low-income households. Reduce energy costs for low income persons, thereby increasing resources. Assure reliability of SCL energy supply. Weatherize all residential structures of 1-4 units by 1990.

Objectives
Determine financial eligibility of clients. Perform energy audits. Place work orders. Complete inspections of work. Screen contractors. Require specific conservation measures to be completed for each client:

Mandatory Measures:
o attic insulation to R-30, unless R-19 or better is already installed;
LOW INCOME WEATHERIZATION PROGRAM (LIWP) - 2

- underfloor insulation to R-19 unless R-9 or better is already in place;
- electric hot water heater tank insulation to R-5 and tank thermostat set back to 130°F. or less;
- heating duct insulation to R-6 if accessible and in unheated areas;
- water and steam pipe insulation if accessible and in unheated areas;

Optional Measures:
- wall insulation to R-11
- R-19 underfloor insulation in basements;
- Caulking and weatherstripping; and
- smoke detectors.

Clients are required to have home repairs if such repairs are necessary to ensure the value of the weatherization measures. Up to $250.00.

Units to be completed per year: 1981 750 1982 2000 1983 3000 1984 3000 1985 3000

1982 Objectives: 400 UDAG units, 600 oil and gas customers, and 1000 electric heat customers.

Target Population
1. Low income households in Seattle with primary emphasis on electrically heated households and secondary emphasis on gas or oil heated units;
2. All households not included above in which the primary heat is electric or in which at least 35% energy savings from weatherization is electric.
3. All households not included in the above categories in which the heat source is primarily natural gas or oil.

Time Frame
In April 1980, the Mayor created a Weatherization Task Force to review Seattle’s existing and proposed Weatherization policies and programs, and to develop a comprehensive residential weatherization policy and program for the City. Resolution 26496 adopted comprehensive residential weatherization policies for the City and described a comprehensive Residential Weatherization Program for implementing them. (See Evaluation)

Expected Energy Savings
CRWP (includes HELP) energy savings by 2002 = 14.0 Average MW (29,415 customers).

Expected Cost
1981 Budget of $6 million.
LOW INCOME WEATHERIZATION PROGRAM (LIWP) - 3

1982 Budget of $4.1 million for all three components.
Approximately $1,591.00 has been spent per resident.

Areas of Energy Used Affected
Space conditioning, primarily heat, and household appliances (water heaters).

CONTEXTS AFFECTED

Technical
The program affects the technical context by improving the thermal efficiency of residences. This is accomplished by requiring specific weatherization measures, and by improving the efficiency of water heaters. The program has set specifications for products used in weatherizing, particularly for the voluntary measures. Thermal efficiency is also improved by requiring needed repairs.

Personal
Auditors discuss energy use, possible conservation measures, and costs and benefits of these measures. Discussions by auditors and contractors may change perceptions of the energy situation.

IMPLEMENTATION INSTRUMENTS

Communication
(See page 16 Evaluation)
The information number of SCL bills has produced the most calls about the program. Staff meet with community groups and organizations to explain the program. Brochures and bill stuffers are distributed widely and were the second greatest source of calls. TV and radio advertisements are used as well as articles in community newspapers. Weatherization outreach workers meet with customers in their offices and at clients' homes if they are handicapped.

Persuasion
Efforts are being made to persuade customers to practice conservation. Both information and auditors promote energy conservation and try to change beliefs, attitudes and actions.

Participation
Clients are exposed to situations in which they observe conservation activities through visits by auditors and contractors.

Financial
Services are offered free. Reduced energy costs should also provide a financial incentive.

PROGRAM EVALUATION

Formal Evaluation
Just completed. (See Attached LIWP Evaluation and LIEP Evaluation)

Objectives Achieved
Met 86% of goal in terms of units weatherized.
The 1981 eligibility contractors met 103% of their contract goals for determining eligibility of LIEP and LIWAP applicants.

Estimated tasks per house and costs per measure and residence were quite accurate.

Weatherized over 1250 homes in the first 15 months.

A random sample of 50 1981 program participants indicated a high level of client satisfaction. Over 90% were satisfied with the quality of work, many said their homes were more comfortable and nearly 100% said they would participate again.

Set up new Outreach Program which has been very successful in meeting its goals.

**Objectives Not Achieved**

Did not reach total goal in terms of units weatherized.

Need more targeted outreach.

As of June 30, 1982 only 37% of 1982 units passed first inspection.

UDAG program performed below levels originally anticipated, only 76% of their goal.

In the first six months of 1982, the eligibility contractor (SeaMar) determined only 753 applicants eligible for the program (40% of their contractual performance standard of 1,880).

Completion of audits for 1981 was 54% of the plan (See pg. 23).

Overall, contractors met only 73% of their contractual goal for the DOE program and 78% of their goal for the electric program in 1981. Combined performance was at 41% of the CRWP objectives for oil/gas homes and 79% for electric homes.

**Other Program Benefits**

Provides good PR for the city when program is running well.

Good business for local contractors and suppliers of weatherization materials.

**Problems with the Program**

Not enough staff.

Sea Mar was unable to continue eligibility function and completed very few applications making the program lag in projected goals.

Because of the small number of homes which passed the first inspection the inspection process lengthened creating backlogs and cash flow problems for contractors.

Neither SCL nor DHR was assigned responsibility for targeted outreach, therefore SCL outreach focused only on electric heat customers in the upper income levels.
Delays in the inspection and rework process have caused inconvenience to participants.

Wide difference of opinion concerning the legitimacy of standards and failed inspections between contractors and city personnel.

During 1981 the high rate of dual inspections by SCL and DHR created a number of difficulties. Much of this was ameliorated in 1982.

Most contractors hired inexperienced persons and trained them on the job.

Problems with the audit log and tracking of units on hold for work.

No consistent policy for distribution of work orders to contractors.

A number of deficiencies in the tracking systems used by program contractors (See page 68).

Need for an automated data system because of the size and complexity of this program.

The difficulty in convincing potential UDAG applicants to participate in the program (See page 62).

The seasonal nature of the program caused backlogs.

Overall Judgment of the Program
Fair, but improving.
MINOR HOME REPAIR SKILLS EXCHANGE

SPONSOR

Organization
Duwamish Peninsula Community Council, a community-based non-profit group. 9639 18th Avenue SW, Seattle, Washington 98106

Contact
Craig Couch, 672-5002

Purpose
Help members improve their ability to perform their own housing repair projects.

Public Involvement in Program Planning
Have regular meetings with exchange members to determine how they think program goals are being met, and what they would like to do in the future.

GOALS AND OBJECTIVES

Goals
Help maintain housing stock in West and South Seattle.
Help senior citizens and low-income individuals remain in their homes.
Teach repair and weatherization skills.
Help citizens reduce energy costs and increase personal comfort levels.

Objectives
Teach classes on repairs and weatherization measures.
Obtain free services and supplies from local businesses.
Maintain an extensive tool and printed materials library.
Put on "hands-on" workshop for clients.
Operate and facilitate the skills exchange part of the program.

Target Population
Senior citizens and low-income residents in the South End.

Time Frame
Started in 1980 and is on-going.

Expected Energy Savings
Information not available.
Expected Cost
1982 budget is $44,000, financed by Block Grant funds and HUD. Receive free supplies and donated services. Some private grants.

Areas of Energy Use Affected
Space conditioning, mainly space heat, and household appliances (water heaters).

CONTEXTS AFFECTED

Technical
The program affects the technical context by affecting the thermal properties of dwelling units through repairs of windows, holes in walls, insulation, etc. Heating equipment is affected through furnace and chimney repair and maintenance. Jackets are placed on water heaters.

Personal
The program provides information and expertise on energy use, conservation measures, and the costs and benefits of these measures. Life style changes are discussed, as well as different ways to save on energy costs.

IMPLEMENTATION INSTRUMENTS

Communication
The program provides information to the community about the services provided. Staff have gone door-to-door explaining the program. Monthly feature articles appear in area newspapers. Flyers have also been distributed. Lots of word-of-mouth advertising by program participants takes place.

Participation
Participation is essential to the success of the program. People are exposed to situations in which they can observe new activities, and they are influenced by others in the community who are participating in the program through the workshops, classes and labor exchanges.

Financial
The services are provided free as are many of the supplies. Reduced energy use should also act as a financial incentive.

PROGRAM EVALUATION

Formal Evaluation
Have monthly and yearly goals, and send monthly reports to the City of Seattle, Community Development Block Grant Monitor.

Objectives Achieved
Was unable to get this information. Director feels the program is doing well, with demand for services increasing all the time. Contractors and others provide many services free of charge.
Obtained free supplies for clients, e.g., caulking, putty, insulation.
Clients are learning how to complete home repairs and weatherization measures.
Excellent rapport with contractors; they screen them carefully.

Objectives Not Achieved
Unknown.

Other Program Benefits
Increases sense of community.
Involves members of business community, contractors, etc.
Increases business in the area for contractors and suppliers of materials.

Problems with the Program
Underfunded.

Overall Judgment
According to the Director, the program is doing very well.
MODERNIZATION/WEATHERIZATION PROGRAM

SPONSOR

Organization
Seattle Housing Authority (SHA), 120 6th Avenue North, Seattle, Washington

Contact
Theresa Murphy, 223-4449

Purpose
SHA was formed as a public corporation in 1939, to provide safe, decent, and affordable public housing to low income families, the elderly and the disabled in Seattle. SHA owns and rents 8700 units.

Public Involvement in Program Planning
Public participation is required in order to obtain funding. Have to explain work plan and solicit community input at public meetings. Before modernization starts, a prototype unit is completed and opened to the public for comment. In addition, all SHA housing communities have community councils. They can bring complaints/concerns to SHA. However, residents had no say in the weatherization that took place.

GOALS AND OBJECTIVES

Goals
Modernize the four "garden community" housing areas.
Weatherize these units.
Convert 6000 units from master metering to individual billing.
Save energy.

Target Population
Low income families, the elderly and disabled.

Time Frame

Expected Energy Savings
Information not available for weatherization/rehabilitation.
Projected energy savings of 15% by converting to individual metering and direct billing (based on HUD studies).

Expected Cost
Weatherization figures aren't available. Average cost per unit for modernization and weatherization is approximately $15,150.00.
Areas of Energy Use Affected
Space heating and household appliances such as more efficient water heaters, furnaces and new kitchen appliances. Weatherization measures include insulated glass and complete insulation. Conversion to individual meters.

CONTEXTS AFFECTED
Technical
This program affects the technical context of dwelling units by improving their thermal efficiency through new roofs, weatherization (including energy efficient windows), efficient furnaces and kitchen appliances.

Economic
The economic context is affected by converting from master metering to single billing.

Personal
Some discussion of the energy situations and life style changes occurs.

IMPLEMENTATION INSTRUMENTS
Communication
SHA provides some energy information through a newsletter and flyers. The units are inspected once a year, and conservation is also discussed at that time.

Regulatory
SHA has established weatherization standards which must be implemented as garden community housing units are modernized. Individual metering also mandated by SHA.

PROGRAM EVALUATION
Formal Evaluation
Evaluation required for funding.

Objectives Achieved
Conversion of 6000 units to direct billing.
Completed weatherization of Rainier Vista apartments (496 units).
Completed weatherization of 206 Yesler Terrace units; working on 250 more.
Modernized 469 units since 1973 at a cost of $10 million.
Installed attic insulation in High Point units (554).
Will complete weatherization at Holly Park this year.

Objectives Not Achieved
Achieving goals as planned.

Other Program Benefits
Increased levels of personal comfort.
Problems with the Program

Some inconvenience during remodeling.
Some problems with housing being too "tight." Have had some mildew problems.
Some energy losses due to misuse of kitchen fans.

Overall Judgment of the Program

Doing a good job. Energy savings should be significant.
NEIGHBORHOOD HOUSING REHABILITATION PROGRAM

SPONSOR

Organization
Seattle Housing Authority (SHA), 120 6th Ave. No., Seattle, Washington

Contact
Daphne Gahn, 223-4411

Purpose
SHA's mandate is to provide public housing within the Seattle city limits for low income, elderly and disabled persons. The City of Seattle, via the Department of Community Development, contracts with SHA to rehabilitate a certain number of units per year.

Public Involvement in Program Planning
Initial program planning involved heavy public participation. Neighborhood corporations such as Central Area PDA have been created by the efforts of grassroots organizations that developed through community clubs. For areas outside neighborhood corporations, there is involvement on an informal basis, plus City Council review.

GOALS AND OBJECTIVES

Goals
Make homes safe and secure for moderate and low-income families. Provide rehabilitation assistance and financing at terms the homeowner can afford.

Objectives
Complete all work necessary to bring property into code compliance, including the Seattle Energy Code (Priority 1).
Complete long-term maintenance work items, such as roof, insulation, etc., which will appreciably assist in reducing future maintenance and operating costs (Priority 2).
Complete modernization/upgrading which will improve the livability of the structure and increase its value (Priority 3).
Complete work that is primarily cosmetic (limited to 10% or less of total rehabilitation costs) (Priority 4).

Target Population
Low-income homeowners in Seattle, except the Central Area which is covered by the Central Area PDA program.

Time Frame
The City of Seattle contracted with SHA to implement the rehabilitation program in January 1975. The program is on-going.
Expected Energy Savings

Information not available.

Expected Cost

Can't break out weatherization costs (1982 budget expenses are attached). SHA uses its block grant money as collateral for the NHRP loans.

Areas of Energy Use Affected

Thermal efficiency, space heating, household appliances (water heaters), weatherization measures; repair of furnaces, chimneys, fireplaces.

CONTEXTS AFFECTED

Technical

This program affects the technical context in several ways. Major rehabilitation work increases the overall energy efficiency of the dwelling unit. Weatherization increases thermal efficiency, as does work on heating systems, chimneys, etc. Increasing the efficiency of water heaters is also included.

Personal

Discusses behavior changes that can save energy. Presents conservation measures, along with their costs and benefits, at weatherization seminars and workshops.

IMPLEMENTATION INSTRUMENTS

Communication

The program focuses on the dissemination of information to inform about program eligibility and priorities. Gives weatherization seminars and workshops. Uses TV ads and PSA's. Some outreach to communities by SHA personnel.

Financial

Offers low- or no-interest loans.

Homeowners will save energy and money due to rehabilitation work.

Regulatory

Enforces code compliance.

PROGRAM EVALUATION

Formal Evaluation

Must establish work plan and goals each year.

Objectives Achieved

During 1981, 51 repair jobs were completed at a cost of $753,175.

Since 1975, 800 homes have been rehabilitated.

The Mt. Baker Cooperative completed work in its target area in 1980 and rehabilitated 150 homes.

Central Area PDA is continuing to work on homes in the Central Area.
Objectives Not Achieved

The Southeast Area Housing and Revitalization Project closed in October 1981 because of administrative and budget problems. SHA established a southeast field office to continue the project.

Number of homes in the program is down. Homeowners are unable to make the loan payments, and SHA has not been able to give out as many loans.

Other Program Benefits

Increases community participation and pride.

Improves the property values of whole areas.

Problems with the Program

Some problems with quality of work done by contractors, but weatherization has not caused particular problems.

Other problems include: too much paperwork; too long to process forms and start work (average of 6 months); difficulties with title clearance; quality of work.

Dealing with the corporations (where block grant funds are invested) and banks who actually give the loans has often been difficult. Have different expectations.

Overall Judgment of the Program
NEIGHBORHOOD PRIDE

SPONSOR
Organization
Madison-Jackson Economic Development Corporation, 1825 S. Jackson St., #103, Seattle, Washington 98144
Contact
Grita Wilson, 324-0115
Purpose

Public Involvement in Program Planning
Have a 20-member board of directors which is very active in determining policy and implementing the programs. Several subcommittees have been formed, and local input is solicited. The board helps with publicity, funding sources, prize money and ideas.

GOALS AND OBJECTIVES
Goals
Improve housing, businesses and churches in the Madison area neighborhood.
Encourage people to remain and invest in their home and community.
Increase business by improving the livability of the area.

Objectives
Provide incentives for residents in the Madison area neighborhoods to improve the physical condition and appearance of their homes and yards.
Award 41 prices based on efforts and improvement, not the amount of money spent (see attached for amounts). Categories are: exterior, landscaping, best well-maintained outside appearance; innovative energy.
Offer workshops to entrants in the areas of energy, finance, landscaping and beautification.
Provide discounts from local merchants for building and yard supplies.
Energy was added this year to encourage energy efficiency.
Publish newsletter.

Target Population
All homeowners, churches and businesses in the Madison area, which is the area between 19th and 32nd, east to west, and between E. Union and E. Roy/Mercer on the north and south. Renters may also enter.
NEIGHBORHOOD PRIDE - 2

Time Frame
Program started in 1977. Have had a Neighborhood Pride contest every year, except last year. Each contest runs 6-9 months.

Expected Energy Savings
Unknown.

Expected Cost
Official budget for program, administrative costs, etc., is $25,000-$30,000. All private funds.

Areas of Energy Use Affected
Space heating, household appliances, fireplaces, water heaters, furnace improvements, house repair. Anything from wood stoves to solar to caulking and thermal windows.

CONTEXTS AFFECTED

Technical
Emphasize changes to the dwelling unit, including exterior improvement, which can conserve energy, as well as all types of weatherization measures. Also includes wood stove and furnace additions and improvements.

Sociocultural
Working through community power structure and networks, e.g., local businesses and churches, to help promote change. Energy was added this year to encourage conservation, but it is not the main goal.

Personal
Provide some energy knowledge by working through programs such as Blanket Seattle and CAMP. The newsletter always contains some conservation articles. Energy workshops will try to increase perceptions of the energy situation and increase energy knowledge.

IMPLEMENTATION INSTRUMENTS

Communication
Advertise the contest widely by the use of a newsletter and flyers, booth at Safety Fair, program on KOMO-TV, meetings with community groups and work with local churches.

Participation
Influence people to change their behavior because of interpersonal influences in the local social setting. This is one reason the area eligible for the contest has been reduced. Influence of business community on participants -- hoping to change behavior by offering monetary and social rewards.

Financial
Services offered free. Discounts for some materials. Cash prizes.
PROGRAM EVALUATION

Formal Evaluation

Set goals each year. Board members evaluate the program.

Objectives Achieved

In 1979, had 150 entrants; in 1980, only 100. Felt the 1980 decline was due to the economy. This year, with a reduced area, have 50 contestants already (July), their goal. The contest will accept entrants until September.

Feel that changes have occurred in the neighborhood.

Feel it has helped improve neighborhoods and encouraged people to remain in the area.

Get several people from one neighborhood entering, more each year, or same people entering different categories.

Objectives Not Achieved

None

Other Program Benefits

Don't know.

Problems with the Program

Dealing with a larger area caused problems because most of the interest came from higher income areas, such as Mt. Baker. Weren't reaching the neighborhoods in the Central Area that they wanted.

Always some discontent from those who don't win.

Need more money for staff in order to increase and improve the program.

Overall Judgment of the Program

Good. Effect on conservation is unknown at this point.
NORTHEND HOME IMPROVEMENT PROGRAM

SPONSOR

Organization
Sponsored by Fremont Public Association, one of Seattle's oldest and most comprehensive community service agencies.

Contact
Linda Cies, 634-2222

Purpose
This program is a neighborhood-sponsored effort which gives advisory assistance to help residents repair and renovate their homes.

Public Involvement in Program Planning
Have a steering committee which has been very active. The committee is self-selected and meets on a monthly basis. They designed the current program with the help of staff.

GOALS AND OBJECTIVES

Goals
Maintain housing stock in the North End.
Help senior citizens in the North End remain in their homes.
Help reduce energy costs and increase comfort levels.

Objectives
Home visits by the housing repair advisor to help homeowners plan repairs. Prepare confidential report for clients including cost estimates for use as a repair planning guide; 20 per month.
Handyman/Contractor Services - Refer residents who need help with home repair or remodeling to reliable contractors.
Repair Information and Referral - Refer clients to financial program for help with home repair, weatherization and energy assistance; 10-20 per month.
Home Repair/Weatherization Workshops - Provide classes in permit procedures, minor repairs, weatherization, chimney and furnace cleaning, maintenance, heat loss theory and more. Classes put on by Washington Energy Extension Service and contractors. Objective is 12, hope to do 24; 12 on facets of weatherization, 12 on repairs.
Repair Information and Referral - Provide information and refer clients to public agencies and financial institutions that can help with grants and loans for home rehabilitation and repairs.

Target Population
Senior citizens and low-income residents in the North End.
Time Frame
The program is three years old and there are no plans to terminate services.

Expected Energy Savings
Information not available.

Expected Cost
Can't break out cost of weatherization components. Financed by Block Grant funds and some private grants.

Areas of Energy Use Affected
Space conditioning, mainly space heat, and household appliances including water heaters.

CONTEXTS AFFECTED

Technical
The program affects the technical context by affecting the thermal properties of dwelling units, e.g., repairs of windows, holes in walls and insulation. Heating equipment is affected through furnace and chimney repair and maintenance, increasing efficiency.

Personal
The program provides information and expertise on energy and conservation measures, costs and benefits, life style changes and ways to save on energy costs.

IMPLEMENTATION INSTRUMENTS

Communication
The program is providing information to the community about the services provided. These include brochures, public service announcements, newspaper items, word-of-mouth, articles in community papers, and their own newsletter. Many seniors watch TV, so have TV ads. Get information about program to other agencies.

Participation
Participation is encourage by providing workshops for clients so they can do all or some of the work themselves.

Financial
All of the services provided by the Northend Home Improvement Program are free.

PROGRAM EVALUATION

Formal Evaluation
Have monthly and yearly goals. Send monthly and annual reports to the City of Seattle, Community Development Block Grant Monitor. Also send reports to private donors every other month.

Objectives Achieved
Have been pretty much meeting program goals of 20 inspections per month, 15 household repairs per month and 10-20 referrals to other programs. Goal for workshops is 12, but want to give 24.
Objectives Not Achieved

Don't know yet.

Other Program Benefits

Has improved image of city government. Has provided work for local contractors.

Problems with the Program

Some contractor problems -- work not done well. Generally a contractor not on their list.

Hard to teach some people how to deal with contractors to make sure work is done properly.

Some senior citizens don't like having strangers in their homes.

Overall Judgment

Good. Feel the program has made changes in the target groups and that objectives are being reached.
NORTH END HOUSING REHAB COOPERATIVE

SPONSOR

Organization
Department of Community Development, Office of Housing, City of Seattle, Seattle, Washington.

Contact
Jim Kreuger, 789-4993

Purpose
The North End Housing Rehab Cooperative is the only self-help housing group in the Seattle area. The main purpose of the program is to help north end Seattle residents remain in their residences.

Public Involvement in Program Planning
The Cooperative has a Board of Directors with seven at-large members. Any north end community council may appoint a member (have four now). There are three active Coop committees: one for financial and budget issues, another involved in valuation of services, and a third for planning an auction to supplement the budget.

GOALS AND OBJECTIVES

Goals
Maintain living spaces of north end residences, both homes and rental units. Make housing units more energy efficient, and by so doing, extend the dwellers' resources.

1982 Objectives
Goals will be achieved through the following:
1. Housing inspections. Inspectors visit, look at problems and give advice on repair procedures. (190)
2. Tool library. Members may sign out tools and books. (356)
3. Labor exchanges. Coop members can barter skills through the coop labor exchange. (44)
4. Classes. The Coop teaches how to plan and do repairs, from plumbing and roof to energy conservation and re-roofing. (14) (4 weatherization classes in 1982; 3 in 1982)
5. Workshops. On-the-job experience doing repairs and weatherization techniques. (19)
6. Walk-in/Phone Advice. Staff will provide advice on housing problems. (380 hours)
7. Newsletter. (6,720)
8. Handouts. (12)
Target Population
Residential customers. 51% of services must go to those with low and moderate incomes who live in the north end (area north of the ship canal, south of 145th Street, and between Puget Sound and Lake Washington).

Time Frame
The program started three years ago; no planned termination date.

Expected Energy Savings
Unknown

Expected Costs
1982 budget - $52,600. Community Development Block Grant funds. $5,000 grant to paint 2-14 houses in the Loyal Heights/Whittier Heights area.

Areas of Energy Use
Space conditioning, consumer purchasing.

CONTEXTS AFFECTED

Technical
The program affects the technical context by helping teach about and actually implementing weatherization techniques, such as caulking, insulation and storm windows.

The program also affects the technical context by teaching and implementing repair techniques that also increase energy efficiency, such as furnace repair and maintenance, chimney maintenance and repair, window and roof repair, etc.

Personal
Program information may help change members' energy knowledge, understanding and awareness of their present use patterns and how they can change; increase knowledge of energy conserving actions and knowledge of the costs and benefits of different weatherization products and techniques.

IMPLEMENTATION INSTRUMENTS

Communication
The program has used a variety of informational approaches, such as a newsletter, flyers, the Seattle Times, brochures and word-of-mouth advertising.

Participation has been stressed. The membership "fee" is an annual charge of two hours of labor. The program emphasizes new experiences and learning situations for influencing behavior. Members are exposed to conservation and energy ideas, neighborhood-level workshops and residential inspections, and it is hoped this type of participation will also reduce energy use and increase weatherization activities.
Financial

The program offers these services free to members. Members save a great deal on labor and tool costs. Product pricing is discussed, and education is provided in this area.

PROGRAM EVALUATION

Formal Evaluation

Evaluate each year for the City of Seattle. Submit monthly progress reports.

Objectives Achieved

As of June, tool borrowing, inspections, labor exchanges and new memberships were the categories requiring the greatest amount of staff time.

In 1981 the Coop met or exceeded all the goals established, with the exception of the handouts category (see attached). Approximately $175,000 to $200,000 worth of tools, services, etc., were provided.

By June 1982, tool borrowing was ahead of goals, with labor exchange nearly at goal and inspections well ahead of projections.

Objectives Not Achieved

Program not over for year, so don't know.

Other Program Benefits

Has facilitated/improved community rapport and participation. Helps people remain and/or become independent.

Problems with the Program

Not enough staff, so can't enlarge the program as much as possible. Also cannot do much advertising because of small staff.

Need more tools, but have to buy from regular funds. Can't afford what they need. Need more and different selection of tools.

Members would like longer hours, such as evenings and weekends. Would make services much more accessible.

Members want the newsletter to be more educational.

The skill level of all members needs to be defined in order to facilitate labor exchanges.

Overall Judgment

Program doing very well.
SPONSOR

Organization
Seattle City Light, 1015 3rd Avenue, Seattle, Washington 98104.

Contact
Farley Green, 625-3112

Purpose
Seattle City Light is a customer-owned utility and a department of the
City of Seattle. Its mandate is to provide electrical energy for the
citizens of Seattle in the residential, commercial and industrial sectors.

Public Involvement in Program Planning

Not much. Only public involvement has been with the New Electric Service
Policy Citizens Committee, which has made some recommendations about
marketing.

An advisory group is just being set up to advise on public information
and marketing. It will be composed of contractors, consumer protection
groups and Seattle City Light personnel.

GOALS AND OBJECTIVES

Goals
Education the consumer about conservation.
Get customers to participate in Seattle City Light programs.
Obtain a certain level of participation in each Seattle City Light
conservation program.

Objectives
Set up and maintain a conservation phone number to answer consumer
questions about Seattle City Light programs.
Coordinate and provide advertising for Seattle City Light conserva-
tion programs.
Produce pamphlets/brochures.
Produce and distribute news releases.
Furnish speakers for community groups.
Help other organizations with their energy programs. (Have one full-
time person who works on community outreach for the residential sector.)
Put together exhibits, booths for appearances at fairs, home shows, etc.

Target Population
Mainly residential electric heat customers, although doing some work
with the commercial and industrial sectors.
Particularly targeting elderly and low-income for outreach programs.
Time Frame

Been working with conservation programs since mid-1970's.
Enlarged the program last year. Will be much more intensive. Planning is on-going.

Expected Energy Savings

Information not available.

Expected Cost

1982 budget is $738,000. Includes staff, benefits, advertising, printing. Paid advertising is the biggest budget item.

Areas of Energy Use Affected

Space conditioning - weatherization.
Efficient household appliances, including water heaters.
Some information on consumer purchasing.

CONTEXTS AFFECTED

Technical

This program affects the technical context by providing information on making dwelling units more efficient through better construction, insulation, weatherization measures and heating mechanisms; household appliances are also discussed.

Personal

Discuss the regional energy situation, and life style changes that can increase personal comfort and are easy to do. Give information about energy use, levels, costs and benefits.

IMPLEMENTATION INSTRUMENTS

Communication - Information

The main approach. Provide all types of information, including brochures, pamphlets, flyers, bill stuffers, press releases for newspapers, newsletters and the radio. Advertise on the buses. Speak at community meetings and provide community outreach services to explain programs and promote residential conservation. Prepare exhibits for fairs, etc. Inform people about energy problems and how to reduce energy consumption.

Persuasion

Some persuasive techniques used to promote energy conservation. Some advertising contains strong messages designed to sway people's attitudes and actions.

Financial

Discuss the financial advantages and incentives for each program. Some programs offer free services to everyone, some only to low-income customers.
PROGRAM EVALUATION

Formal Evaluation

Some programs have been evaluated; most haven't. Are working on an on-going evaluation program.

The Seattle City Light Evaluation Team reviewed residential conservation publications last year. They found that they were not duplicating and that, in general, the publications were effective.

Objectives Achieved

Yes. Want to reach more elderly and low-income customers. Overall awareness of Seattle City Light conservation programs is high. Met goal contacting.

Objectives Not Achieved

None, in particular.

Other Program Benefits

Creates more positive image for Seattle City Light.

People like to hear about the programs -- a public service.

Increases amount of conservation business in the community.

Problems with the Program

Hard to organize needs of so many programs, both in and out of Seattle City Light.

Have to prioritize programs -- can't deal with all equally. Seattle City Light is pushing electric energy savings this year. Folks with other fuel sources sometimes get angry because they are paying taxes, yet aren't eligible for some benefits.

Some negative comments concerning use of public money for advertising.

Overall Judgment of the Program

In general, seems to be effective.
RESIDENTIAL HOT WATER PROJECT

SPONSOR

Organization
Seattle City Light, 1015 3rd Avenue, Seattle, Washington 98104

Contact
Loretta Jacobson, 625-3000

Purpose of Organization
Seattle City Light is a customer-owned utility and a department of the City of Seattle. Its mandate is to provide electrical energy for the citizens of Seattle.

Public Involvement in Program Planning
Designed by Seattle City Light. City Council will review and hold public hearings.

GOALS AND OBJECTIVES

Goals
Save energy in the residential sector by applying conservation measures to water heating.

Develop an incentive program, targeted for the time of replacement, to encourage homeowners to participate in the residential hot water project.

Objectives
Install an efficient tank (R-10 insulation built in) set at 130 degrees F, wrapped with an R-10 blanket plus a bottom board and thermal trap in customers' homes; or

Install a super-efficient tank (R-20 built in), set at 130 degrees F (no insulating wrap), plus a bottom board and thermal trap -- at time of replacement.

Pay rebates for these conservation measures of approximately $89.00 for the efficient tank installations and $109.00 for the super-efficient model (both values in January 1982 dollars).

Target Population
Residential sector, single-family households in detached homes.

Time Frame
Planning began November 1981. Seattle City Light plans to have the program on-board by January 1983.

Expected Energy Savings
10 Mw average over 20 years, or projected average energy savings per installation of 1,154 kw/year for 13 years, at which time full market penetration should be achieved.
RESIDENTIAL HOT WATER PROJECT - 2

Expected Cost
Incremental costs to install a super-efficient tank, bottom board and thermal trap are estimated to be $156.49 in 1982 dollars. An annual real escalation cost of 1.265% is assumed. For the efficient tank package, cost is estimated at $72.43 in 1982 dollars. See attached for total program costs to the utility.

Areas of Energy Use Affected
Household appliance - water heaters.

CONTEXTS AFFECTED

Technical
The program affects the technical context by encouraging households to install more efficient water heaters, as well as install bottom boards and thermal traps.

Economic
The program will affect the economic context in several ways. Conserving, or lowering energy use, in lieu of new generation, should slow the rate of change in energy rates. Product availability will change. As the program goes into effect, the availability of efficient water heaters will increase, while the cost of buying an efficient water heater will, in effect, be lowered because of the rebate.

Personal
Energy knowledge may increase due to program advertising, such as increased understanding of energy use patterns, knowledge of energy conservation measures, and familiarity with the costs and benefits of such actions.

IMPLEMENTATION INSTRUMENTS

Communication
Distribution of information to explain the program will be stressed. Radio and television PSA's will be used, as well as flyers and bill stuffers, press releases, etc. Displays will be set up at retail outlets. Workshops will be given for dealers and sales staff.

Financial
Cash rebates will be given, as well as free water heater wraps. Lower energy bills will also act as an incentive.

PROGRAM EVALUATION
Program not yet in effect.
RESIDENTIAL NATURAL GAS CONSERVATION PROGRAM

SPONSOR

Organization
Washington Natural Gas, 815 Mercer Street, Seattle, Washington 98111

Contact
R. Miller Adams, Manager, Administrative Services, Codes, Claims and Safety, 622-6767

Purpose
Serve natural gas customers in Washington State.

Public Involvement in Program Planning
None.

GOALS AND OBJECTIVES

Goals
Help eligible customers save energy.
Provide a customer service.
Meet customer needs for conservation information.
Reduce customers' energy costs.
Meet mandates set up by Washington Utilities and Transportation Commission (WUTC).

Objectives
Train auditors to perform residential energy audits.
Perform Program Audits - An energy audit in which the estimates of costs and potential savings associated with the performance of program practices and the installation of program measures are based on information collected by the utility auditor, on-site at the eligible customer's residence. The results of such audit are delivered to the eligible customers.

The utility shall perform audit within 98 days of the request for an inspection, unless a timely visit to the customer's residence cannot be arranged. The utility shall inform the Commission in writing when demand of other scheduling difficulties prevent routine scheduling within the 90 day period.

Program audits shall be in writing and include:
(a) The results of a heat loss analysis;
(b) A list of energy conservation measures recommended by the utility;
(c) Energy saving estimates, in dollars and/or percentages for each recommended energy conservation measure;
(d) An estimate of the payback period, using current gas prices, for the energy conservation measures recommended; and
(e) Notification the Federal Energy Tax Credits may be available.
The results of a program audit shall be presented to the customer at the conclusion of the auditor's inspection or within fourteen days after the audit has been performed, if the audit results cannot be provided at that time.

Target Population
All residential customers who use gas as their primary fuel for space heating. Residential includes buildings with up to four units.

Time Frame

Current program started in February 1982, as mandated by WUTC guidelines.

Expected Energy Savings
Information not available.

Expected Cost
Not public information.

Areas of Energy Use Affected
Space heating, household appliances and water heating. Low or no-cost weatherization measures, as well as measures that require a contractor. (See attached.)

CONTEXTS AFFECTED

Technical
Concentrate on technical characteristics of people's homes, such as thermal efficiency, effectiveness of appliances, etc.

Personal
Discuss conservation measures, costs and benefits. Increase customers' knowledge of energy, fuel sources, etc.

IMPLEMENTATION INSTRUMENTS

Communication
Information is the primary implementation tool. Sending out program announcements with bills; 10,000/month until 1986 (see attached).

Financial
The energy audit is free.

PROGRAM EVALUATION

Formal Evaluation
Report required by WUTC every six months (see attached).

Objectives Achieved
Just began, so can't really judge.

Sent out 42,520 notices, received 520 requests for audits.

Completed 485 audits by end of June. Waiting time is only 4-5 days.
Other Program Benefits

Positive in terms of company image. The auditer jobs are considered very desirable. Good for program image.

Objectives Not Achieved

Response rate of only .01% as of June 1982.

Problems with the Program

Washington Natural Gas not marketing the program aggressively because the utility is not in the position of having to conserve or build new generating facilities.

Problems getting support from utility departments, e.g., use of department personnel. Couldn't hire extra staff for the program.

Some customers want more information than can be provided with the current phone-computer set-up. Have to get back to them.

Overall Judgment of the Program

Good product, but serving a very small percentage of Washington Natural Gas customers.
RETAIL MERCHANDISING

SPONSOR
Organization
Washington Natural Gas, 815 Mercer Street, Seattle, Washington 98111
Contact
Don Gessel, 622-6767
Purpose
Serve natural gas customers in Washington State.
Public Involvement in Program Planning
None

GOALS AND OBJECTIVES

Goals
Help customers use energy more efficiently.
Sell weatherization materials and energy efficient appliances and furnaces at a profit.
Provide a customer service. Retain natural gas customers and meet customer needs.

Objectives
Provide information on weatherization materials and appliances available through the utility.
Advertise aggressively to make customers aware of the program.
Show customers how they can save money by investing in conservation measures.
Sell, finance and arrange installation of appliances, furnaces and weatherization materials. Guarantee work and materials.

Target Population
All residential natural gas customers.

Time Frame
Marketing of energy efficient measures for the home began in 1973.
An on-going program.

Expected Energy Savings
Haven't projected.

Expected Costs
Not available.

Areas of Energy Use Affected
Space conditioning, household appliances including water heaters, and consumer purchasing. Many weatherization measures.
CONTEXTS AFFECTED

Technical
The program focuses on measures that directly affect the amount of energy used in the home, including efficiency of furnaces and water heaters, weatherization measures and home appliances.

Economic
Product advertising stresses energy efficiency. Have an aggressive advertising campaign.

Washington Natural Gas stresses the availability of energy efficient natural gas equipment and weatherization materials, as well as the availability of fuel.

Really stress the economics of conservation. Demonstrate benefits to the customers in terms of energy and money saved, payback period, etc.

Personal
Discuss energy issues, cost and benefits of conservation measures, and ways of saving, thereby increasing customers' energy knowledge.

IMPLEMENTATION INSTRUMENTS

Communication
The program focuses on dispersal of information in a variety of ways. Television ads and radio spots are used, as well as printed advertising in the media, on return envelopes and bill stuffers. Also put on exhibits at home shows and fairs.

Sales campaigns are used, particularly to balance out the seasonal nature of the conservation business. Have sales with accompanying advertising in summer, e.g., on windows; switch to furnaces in winter.

Use persuasion as part of their campaigns. Train the sales staff to persuade and convince customers of the benefits of conservation products.

Financial
The only incentive is that Washington Natural Gas arranges the financing. Sometimes have sales with reduced prices and interest.

Washington Natural Gas feels the "market" works, and conservation programs need not be free to be effective.

PROGRAM EVALUATION

Formal Evaluation
Have an evaluation procedure.

Objectives Achieved
Washington Natural Gas feels this program is very effective.

11,000 energy efficient units were installed by end of June 1982. This figure does not include the builder program or leased appliances.
Leased 3900 appliances this year. (This has been a slow year.) On average, Washington Natural Gas leases 6200 to 6300 appliances per year. 2,000 thermal windows were installed as of June 1982. (Total figures are confidential.)

**Objectives Not Achieved**

This year has been slower than some years due to the generally depressed economy.

**Other Program Benefits**

Good public relations for the company. Good for the company financially. Sold approximately $15 million in energy efficient products last year.

Helps the economy.

**Problems with the Program**

Some problems with contractors. When work is not done correctly, customers get upset.

**Overall Judgment of the Program**

Washington Natural Gas feels the program is very effective, both at saving energy and making a profit.
SEATTLE ENERGY CODE

SPONSOR

Organization
Seattle Department of Construction and Land Use, Municipal Building, 600 4th Avenue, Seattle, Washington 98104

Contact
John Hogan, 625-2293

Purpose
This is a department of the City of Seattle which oversees all building in the Seattle area, including residential zoning, building permits, housing and construction codes, etc.

Public Involvement in Program Planning
A technical advisory committee was formed and has been very helpful. The City Council held extensive public hearings for the first Energy Code, effective February 20, 1980. A four-month review will be held by the City Council for the revised Energy Code.

GOALS AND OBJECTIVES

Goals
Set minimum energy efficiency standards for new buildings and structures in the Seattle area.
Achieve more efficient use of energy (Seattle Ordinance 108500).

Objectives
Develop public awareness of energy conservation which will result in the use of energy efficient systems and technology and a reduction of energy waste.
Establish acceptable and appropriate standards for building design and construction which, while not assuring that optimal energy efficiency is attained for every building, will apply and be beneficial to all new buildings and achieve a high level of energy conservation.
Permit alternative methods of meeting Code requirements in order to allow and encourage innovative design.
Encourage the use of solar and other new technologies which may result in future energy efficiency and increased use of non-depletable energy sources.
Establish a framework of design parameters which will be supplemented with design specifications and instructions in a manual for untrained persons, and in rules and regulations interpreting the Code.
Implement the Code through the Seattle Department of Construction and Land Use in a manner that will be convenient and expeditious to those seeking permits.
Provide regular review and monitoring of the Code and its administration, to make it responsive to technological developments and change.

Enact an energy fee which will cover only the costs of administration and enforcement of the Code and be paid by those persons requiring building permits as described in the Code.

Target Population

Everybody in Seattle: architects, engineers, builders, designers, and individual homeowners. Anyone building or altering existing structures.

Time Frame


Expected Energy Savings

Projected 85 Mw's electrical energy saved from 1980 to 1990 (old estimate). New Code should reduce electrical use by 5-6% in the commercial sector.

Expected Cost

For revision, currently on-going, a budget of approximately $100,000. The new Code should make administration easier, but the need to train inspectors and to have more checks of energy features in residential units would increase the costs of the program.

Areas of Energy Use Affected

Space conditioning (HVAC), heating and cooling in commercial buildings. Equipment must meet certain efficiency standards, e.g., commercial water heaters. Limits on amount of lighting equipment and types of bulbs. Standards for low-rise residential and design requirements for envelopes around buildings.

CONTEXTS AFFECTED

Technical

The program affects the technical context by affecting dwelling units and other buildings through specifying energy efficient space conditioning, water heaters, design requirements and envelope considerations.

Legal

The efficiency standards are part of the City's legal code -- people must comply.

Personal

More energy efficient building codes may impact perceptions of the energy situation and increase energy knowledge and conservation experience.
IMPLEMENTATION INSTRUMENTS

Communication
Information and participation are both part of the program. Information has been provided through City Council hearings as well as extensive public education, e.g., articles in newspapers and contacts with builders, developers, etc. Participation is a legal requirement.

Financial
The energy standards offer indirect incentives because they help save energy and therefore money. They provide a direct incentive because a civil fine of $500,00 per day can be levied for non-compliance.

Regulatory
The Code defines legally enforceable energy efficiency standards.

PROGRAM EVALUATION

Formal Evaluation
An evaluation is currently being completed. Administrative fees and implementation are being assessed. Some of the questions being asked are: How easy is the Code to use and understand? Does it cover all important areas?

Objectives Achieved
Seattle's Energy Code is considered one of the nation's most effective. Implementation has gone well so far. Contexts were affected, but the revised Energy Code should have an even stronger impact. People have been complying.

Objectives Not Achieved
The degree of inspection needed to ensure that work is done correctly is not being achieved.

Other Program Benefits
The public education process and establishment of the technical advisory group helped the city's public image by increasing understanding of the program.

Problems with the Program
Some people feel there should be no regulation of this nature.
Some people feel the regulations are too strict.
There is a need to improve the third phase of the program -- inspection. Need to spend more time training inspectors, as it takes time for them to change and incorporate the energy standards into their reviews, particularly for the residential sector.
Inspectors need to inspect residential units more often to check on energy features such as insulation, but this increases the cost of the program.
Need more inspectors to staff program adequately.

Overall Judgment of the Program
Very good.
SELF-HELP STORM WINDOW PROGRAM

SPONSOR

Organization
Phinney Neighborhood Association, 6532 Phinney Ave. N., Seattle, Washington 98103

Contact
Ed Medeiros, 783-7378

Purpose
To maintain the unique character of the Phinney Neighborhood and to assist its residents in enhancing the quality of their lives.

Public Involvement in Program Planning
Initial planning was done by a single area resident. After a grant was received, volunteers became an important part of the program in terms of planning and building the storm windows.

GOALS AND OBJECTIVES

Goals
Save energy.
Save money on energy bills.
Increase personal comfort, particularly for senior citizens.
Provide a service to the community.
Become financially self-sustaining.

Objectives
Purchase materials for the windows.
Explain the program at orientation meetings.
Raise funds to cover costs of making storm windows for low-income clients.
Persuade companies to donate materials or sell them to the program at reduced cost.
Prepare materials and assist homeowners in assembling 1,000 windows by March 1982.
Hold 60 workshops by March 1982.

Target Population
Low and moderate income homeowners, including the elderly, in the Phinney Ridge area. Have now opened the program to a much larger geographical area.

Time Frame
Plan was formulated in the spring of 1980. A grant from the Neighborhood Technology Coalition was awarded on June 1, 1980 to establish the program. The program is starting its third year as a non-profit business and will continue as long as financially possible.
Expected Energy Savings

Energy savings have not been projected.

Expected Cost

The estimated cost of running the program for this season (8 months) is $28,865.00.

Areas of Energy Use Affected

Space heating, thermal efficiency of homes. A weatherization measure.

CONTEXTS AFFECTED

Technical

The program affects the technical context by improving the thermal efficiency of homes by reducing heat loss through windows.

Personal

Discussion during orientation may increase individuals' energy knowledge, understanding and awareness of energy use and conservation measures. The costs and benefits of the storm windows are discussed.

IMPLEMENTATION INSTRUMENTS

Communication

Information is given to participants in the program. Advertising the program to the community was done initially but is no longer necessary. Word-of-mouth advertising is currently adequate to keep the program going. Brochures, posters, newsletters and newspaper articles have been used, as well as presentations to other weatherization and home improvement programs in the North End.

Participation

Involvement of members of the community has been an important factor in the success of the program. Friendships, community pride, and satisfaction with the windows has influenced others to participate in the program. Many people who belong to PNA have participated in the program and vice versa. Many people appear to participate because they have been exposed to and influenced by other people who believe in this program.

Financial

The program is free to low-income clients. Homeowners whose income exceeded 80% of the median income in Washington State paid only the cost of materials. This season, 50% of clients will pay for supplies plus an additional amount based on $3.00/square foot.

PROGRAM EVALUATION

Formal Evaluation

Yearly report for the Department of Community Development.
Objectives Achieved
The program was awarded a 1981 Ben Franklin Award at City Fair for outstanding community activity.
The program has been designated a model weatherization program for the City of Seattle.
Completed 1,807 storm windows for 123 households during the first two seasons (more than the goals set for March 1982).
Produced a good quality product in an efficient manner.
Windows reduced draft and noise, and reduced heating costs.

Objectives Not Achieved
None

Other Program Benefits
Increased sense of community-promoted friendship.
Increased neighborhood pride.

Problems with the Program
Could have used more volunteers when program started.
A very small percent of clients haven't paid.
Not attracting as many senior citizens as originally. Would like to work with more older homeowners.

Overall Evaluation of the Program
Very good.
WASHINGTON ENERGY EXTENSION SERVICE

SPONSOR

Organization

Contact
Stan Price, 626-6225

Purpose
Provide consumer information about three major areas of energy use -- wood, solar and home energy conservation.

Public Involvement in Program Planning
A number of advisory committees were set up to help design the program. A state-wide advisory board is composed of utility, Indian and business representatives, as well as energy activists. This is an on-going committee which works with the State Energy Office.

GOALS AND OBJECTIVES

Goals
Educate people about energy use. Provide consumer information about practical energy technologies for homeowners, residential sector.

Objectives
Teach classes on home energy conservation/weatherization.
Teach classes on use of wood energy.
Teach classes on solar energy.
Publish and distribute Energy Calendars, listing free programs and classes.
Publish free pamphlets on weatherization, wood heat and solar topics.

Target Population
Trying to reach all segments of the residential sector. Trying to reach more low-income groups.

Time Frame

Expected Energy Savings
Not available.

Expected Cost
1982 budget is $200,000 for the Seattle office.
Areas of Energy Use Affected

Space conditioning, household appliances and consumer purchasing. Gets into all phases of weatherization, heating devices such as wood heat and heat pumps, hot water conservation, purchasing firewood and other materials; plus passive solar space and water heating.

CONTEXTS AFFECTED

Technical

Educates about the technical characteristics of people's living conditions such as the size, construction, insulation and thermal properties of housing. Provides information about space heating equipment, type of fuel, nature of different systems and functional efficiency. Discusses efficiency of hot water heaters.

Personal

Provides some information on lifestyle, housing preferences such as earth shelter homes, consumption levels and energy knowledge, including knowledge of energy systems, energy use patterns, possible energy conserving actions, costs and benefits, etc.

IMPLEMENTATION INSTRUMENTS

Communication

Information about classes is published in the Energy Calendar. The calendar is free and available at a number of places, including city libraries. Articles about classes also appear in newspapers and newsletters. Press releases are also sent to radio stations. A mobile display unit visits downtown buildings for a week at a time.

Participation is part of the class experience. Some classes include hands-on experience.

Financial

Classes are free.

PROGRAM EVALUATION

Formal Evaluation

Classes are evaluated using a standard evaluation form. This is done regularly. An overall evaluation of the program is completed every year or two.

Objectives Achieved

Meeting objectives, but would like to reach a broader spectrum within the residential sector.

Objectives Not Achieved

Information not available.

Other Program Benefits

Positive public image of government helping people. Increases comfort level of people who follow through with what they have
learned. Saves money and energy. Puts money into the community as people purchase items needed to complete energy-related projects.

Problems with the Program

Budget problems -- changing funding sources, not enough money.
The switch from WSU and the Cooperative Extension Service to Seattle University was very disruptive.

Staff have been leaving and offering competitive services and information.

Having trouble reaching low-income segments of the residential population.

Overall Judgment of the Program

Good.
WEATHERIZATION OUTREACH

SPONSOR

Organization
City of Seattle, Department of Human Resources, 400 Yesler Building,
Seattle, Washington 98104

Contact
Billie Young, 625-4746

Purpose
A department of the City of Seattle.

Public Involvement in Program Planning
None

GOALS AND OBJECTIVES

Goals
Save electricity in the Seattle area.
Help people save money on their heating bills.
Increase personal comfort levels in homes.

Objectives
Provide free weatherization for low-income homeowners who heat electrically
(includes insulation, caulking, weatherstripping and water heater wraps).
Provide no interest loans for other families with electrically
heated homes.
Provide free weatherization for low-income homeowners and renters
who heat with gas or oil.
Provide a combination of low-interest loans and free weatherizations
for homeowners and renters with eligible incomes who heat with gas
or oil.
Explain tax credits for loans.
Explain depreciation to landlords.
Arrange for free home energy checks through Department of Human Resources.
Establish intake stations at Greenwood Community Service Center,
Southeast Community Service Center, and White Center CSC.
Process 2000 applications.
Print and distribute flyers and brochures.
Develop marketing plan, emphasizing orientations to neighborhood
and other community groups.
Make home visits to handicapped.
Target Population
Elderly, handicapped, minorities, families with very young children (under 5 years).

Time Frame
Program started in 1981. Outreach and processing of applications were handled by SeaMar. This arrangement did not work out, and DHR took over both responsibilities on June 1, 1982.

Expected Energy Savings
Information not available.

Expected Cost

Areas of Energy Use Affected
Space heating, household appliances (water heaters). Basic weatherization, except storm windows.

CONTEXTS AFFECTED

Technical
Dwelling units are affected through use of weatherization measures and water heater wraps, which increase the efficiency of heating systems.

Sociocultural
Community outreach hopes to influence people to participate in the weatherization program by informing the community power structure and interest organizations about the program, so they can inform and encourage others to participate.

Personal
Advertising and community outreach will increase energy knowledge some. Individual contacts by outreach staff will also emphasize knowledge about possible energy conserving actions, energy use and increase exposure to conservation measures.

IMPLEMENTATION INSTRUMENTS

Communication
The program is stressing dissemination of information. Outreach includes presentations to senior citizen centers, employee groups, hospitals, banks, home health agencies, Head Start and PTA groups, and participation in fairs and parades. Flyers and brochures are being distributed to many community groups as well.

Financial
These services are offered free of charge to many. Low-interest loans are also available, thus providing a financial incentive for participating.
WEATHERIZATION OUTREACH - 3

PROGRAM EVALUATION

Formal Evaluation
Program just started. Do have monthly and annual objectives, in terms of applications, etc.

Objectives Achieved
Doing very well as of July 31, 1982 (see attached), the first month of operation since DHR took over.

Objectives Not Achieved
Original goals while contracted with SeaMar were not met. Too early to say if goals not met under the new DHR program.

Problems with the Program
People find it hard to believe the electric program is true -- that it is free.
Have not determined how to reduce the number of "no shows."
Want to get a higher percentage of people to follow through and complete all forms.
Need to process applications more quickly.

Overall Judgment of the Program
Too soon to tell, but looks promising.
Appendix F. SUMMARY OF EVALUATION OF THE SEATTLE CITY LIGHT HOME ENERGY AUDIT PROGRAM
A RAND NOTE

AN APPRAISAL OF EVALUATIONS OF UTILITY-SPONSORED PROGRAMS FOR RESIDENTIAL ENERGY CONSERVATION

Sara R. Pease

November 1982

N-1925-DOE

Prepared for

The U.S. Department of Energy
SEATTLE CITY LIGHT COMPANY (SCL)

Probably the most careful and comprehensive of the eight evaluations examined was that conducted in 1979 by the Battelle Human Affairs Research Centers for Seattle City Light Company. In 1977, the City Council ordered the utility to reduce energy demand by 20 percent within 15 years and, in response, SCL sponsored over 40 pilot conservation programs. In 1978, SCL initiated the experimental Neighborhood Energy Conservation program to test the potential for the promotion of conservation through personal contacts and community organizations. The Seattle evaluation sought to answer the following questions about the pilot program:

- Did the program significantly increase consumer knowledge and concern about energy conservation?
- Which of the program's three information packages was the most successful in persuading participants to request a home energy audit?
- Did the information packages and audits persuade participants to adopt or install energy measures in their homes?
- Did program participants actually save more energy than if they had not been exposed to any aspect of the SCL program?

As Table 1 shows, the Seattle study attempted to address all five components of the RCS model.

These multiple evaluation goals necessitated a fairly complicated study design and a variety of data. Therefore, data and information were collected at six points during the study:

- A preprogram questionnaire, administered in April 1978, gathered baseline data on the energy knowledge, attitudes, and practices of participants and non-participants.

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- A workshop critique, distributed after the energy workshops, tested participant satisfaction with the workshop and its effectiveness in conveying energy information.
- A postprogram interview, conducted in October 1978, asked for respondents' attitudes toward the Seattle City Light program and any conservation actions taken as a result.
- A postprogram questionnaire, administered in October 1978, repeated questions regarding conservation knowledge and practices asked in the preprogram questionnaire.
- A final interview, conducted in July 1979, determined what energy actions respondents had adopted in the year after the program exposure.
- Fuel consumption was recorded for each household.

These data are discussed below in the context of the study. Because of the complicated evaluation design used, the various aspects of the study—marketing, installation of energy measures, and fuel consumption changes—are treated separately.

Marketing

The SCL program was conducted in three neighborhoods that were carefully chosen to be comparable in terms of the socioeconomic mix of the residents and the proportion of homeowners (renters were excluded from the study). Each neighborhood received a different energy information package.

Neighborhood I received a promotional campaign in which information about the SCL Home Energy Audit program was disseminated through handbills, announcements in churches, and public meetings and articles in local newsletters. In Neighborhood II, SCL conducted energy workshops at the homes of selected participants. At the workshops, an SCL representative described the program, conducted a walk-through audit of the host's home, and distributed literature about conservation. Neighborhood III received both the promotional campaign and the workshops.
Before the program began, ten blocks in each neighborhood were selected for evaluation. Ten blocks in each neighborhood, chosen as controls, received neither information package.

To determine whether the information packages significantly increased participants' knowledge and concern about energy conservation, a preprogram questionnaire was administered in April 1978 to all residents in the selected blocks. The mail-in questionnaire asked residents about their demographic and domicile characteristics, their knowledge of home conservation techniques, and their familiarity with the SCL program. Six months later, a second mail-in questionnaire was administered to all those who answered the first, both those exposed to the program (participants) and those who had received no exposure (controls). To measure improvement as a result of the information packages, the postprogram questionnaire repeated the 15 questions from the preprogram interview testing attitudes and knowledge. In addition, questions were added about the respondent's willingness to invest in conservation measures, maximum acceptable pay-back period, the desirability of a special financing program, etc.

The evaluation found that over 90 percent of those answering the initial questionnaire favored conservation and had a positive opinion of SCL. The evaluators concluded that participants, especially those receiving workshops and home energy audits, improved their knowledge of conservation techniques somewhat more than those who had not been exposed to the information packages. 8

The Seattle study was probably subject to the same self-selection bias as were the PG&E-EUS and Gulf States studies. Persons interested enough to return the mail-in energy questionnaires may be assumed to have known more about energy issues. Thus, the Seattle study may have overestimated the impact of its information program.

Installation

The extended study period (April 1978—July 1979) of the Seattle evaluation constituted an advantage that allowed evaluators to determine both the conservation measures actually installed as a result of the program and the long-term conservation practices adopted by the participants. Data on the number and kinds of energy measures either adopted or installed in the observed homes was gathered at three points.

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8 Ibid., pp. 47-51.
A preprogram interview asked about past conservation measures or practices. Six months later, in a postprogram interview, participants and controls were asked to list all conservation measures adopted by the household during the preceding two years, the date of each action, and the extent to which the SCL program influenced the action. In the final interview, one year later, respondents were asked to describe all the conservation actions they had taken in the previous year.

To compare these three observation points, a conservation action index was constructed by weighting all the actions taken by a household at each observation point by the relative energy savings potential of each measure. For example, attic insulation counted three points and reduced showering time counted one point. The first index measured all conservation actions taken before May 1978 (preprogram), the second measured those taken between May and November 1978 (short-term, postprogram), and the third measured those taken between July 1978 and July 1979 (long-term, postprogram). The evaluators then compared the three indexes for each household to determine if its conservation activity increased during the study period.

The evaluation found that, indeed, program participants had higher index scores, and thus conserved more energy, than nonparticipants. Further, the highest indexes were scored by Neighborhood III participants, who received both information packages and the home energy audit. Moreover, audited participants scored two to three times higher on the third index—indicating long-term activity—than all other households. This suggests that they either followed conservation actions more consistently during the year or invested in devices such as insulation or storm windows that were more heavily weighted in the index.  

Although these findings seem to indicate that the program induced participants to install or adopt conservation measures, this conclusion may not be warranted. First, the evaluators themselves acknowledged a discrepancy between the first and second indexes. In the initial questionnaire in which the conservation actions were listed for the respondents, the majority said that they "almost always" did such things as turning down thermostats. Yet, in the

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9Ibid., pp. 55-58.
second interview, in which respondents were asked to list their conservation actions with no prompting by the interviewer, respondents often failed to name many of the actions reportedly followed earlier. Therefore, either the first index exaggerated the practices that were followed and/or the second index understated these actions owing to the respondents' forgetfulness. Both are probably true. Finally, it was found during the fuel consumption analysis that high activity scores did not necessarily correspond to large energy savings, as shown on Table 3. While the Battelle evaluators could offer no explanation for this finding, they suggested that either the weights did not accurately estimate the energy-saving potential of the conservation measures or that the reported action information was incorrect or incomplete.

Fuel Consumption

Battelle's analysis of the changes in fuel consumption was conducted in two phases. Because of budget restrictions, the first phase monitored the fuel use of a small sample of homes over a short period. Later, SCL funded a more extensive study in which Battelle observed the fuel consumption of about 100 homes for over a year.

In Phase I, a sample of all-electric homes was chosen from the 157 respondents who remained in the study through the July 1979 follow-up interview and who authorized the release of their utility records. Of the 30 households, 17 had no program exposure, nine had received home energy audits, and the remaining four had some exposure but no audit. These distinctions were made because the evaluators also wished to determine if the different information packages resulted in varying rates of energy savings.

The method for calculating the change in fuel consumption was relatively simple. The evaluators first established a preprogram pattern of energy use for each household. Based on this pattern, the evaluators predicted what the postprogram consumption would be if no conservation measures, beyond those undertaken prior to the program, had been adopted or installed. If actual household consumption fell significantly below the predicted level, that energy savings could be attributed to the program, all other factors held constant.
### Table 3

**ENERGY ACTION SCORES AND FUEL CONSUMPTION RESULTS FOR THE SEATTLE CITY LIGHT STUDY**

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<th>Treatment Homes</th>
<th>Control Homes</th>
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<tbody>
<tr>
<td></td>
<td>Mean Action Index Score</td>
<td>% Change in Fuel Consumption</td>
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<tr>
<td><strong>PHASE I</strong></td>
<td></td>
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</tr>
<tr>
<td>All-electric homes</td>
<td>1.5</td>
<td>-6.2</td>
</tr>
<tr>
<td><strong>PHASE II</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All-electric homes</td>
<td>5.7</td>
<td>-8.6</td>
</tr>
<tr>
<td>Natural gas homes</td>
<td>6.5</td>
<td>-2.1 (gas)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-1.3 (elec.)</td>
</tr>
<tr>
<td>Heating oil homes</td>
<td>7.1 (oil)</td>
<td>-16.5 (oil)</td>
</tr>
<tr>
<td></td>
<td>6.7 (elec.)</td>
<td>-4.5 (elec.)</td>
</tr>
</tbody>
</table>


*Discrepancies in Ns and separated action index scores for dual fuel homes are due to missing or insufficient information on one of the fuels.*
As stated before, however, many factors may affect fuel consumption, and the Seattle study attempted to control for as many as possible. Household and demographic characteristics were obtained in the preprogram questionnaire and updated in the postprogram interview and questionnaire. The control group of 17 unexposed homes was used to control for such external forces as energy prices.

Changes in temperature were controlled by means of a weather adjustment in the fuel consumption equation. Since a particularly harsh or mild season or, in this case, the change of season could make predicted conditions (and, therefore, predicted consumption levels) incompatible with actual conditions, it was necessary to also predict how each household responded to weather changes. After a relatively stable period of energy use (which varied from 4 to 24 months but always ended in May 1978) was identified for each household, the fuel consumption records were matched with weather data. A linear equation was then used to determine the rate at which electricity use responded to temperature and daylight changes. This rate was expressed as fuel used per heating or cooling degree day.  

By applying this rate to the preprogram fuel usage pattern, the evaluators were able to base their predictions on the actual weather conditions during the monitored period (September to October 1979). As shown in Table 3, the fuel consumption analysis found that households that participated in the SCL program showed measurable, but small, energy savings over the control households, on average saving 4.4 percent more than the control homes.  

Phase I had two methodological problems. First, because of budget constraints, the postprogram consumption was monitored for only a two-month period, hardly long enough to demonstrate a stable, lowered level of electricity consumption. Further, these were autumn months when little, if any, space heating was needed. Therefore, this observation period would not measure the energy savings that would result from insulation or the installation of storm windows. Since, as the study states, these measures have the highest energy-saving potential of all conservation actions, it is possible that the results significantly understated the actual savings that could be attributed to the program. The second problem, that of the

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10 Degree day units were defined as the difference between a reference point, in this case 65 degrees, and the daily median temperature.
small sample size, was one already recognized by the evaluators.

The Phase II study corrected many of these problems, but raised others. In this phase, the number of sampled homes increased to over 100, with about equal numbers using electricity, oil, and natural gas as the primary heating fuel. Further, the postprogram observation period stretched from May 1978 to July 1979. Finally, only homes that received home energy checks were kept in the treatment group. The methodology did not vary significantly from that used in Phase I, but it was found that a linear regression equation did not accurately reflect the rate at which oil and natural gas consumption responded to changes in weather. Therefore, a non-linear regression equation was used instead.

The evaluation found measurable energy savings among all fuel users, as Table 3 shows. However, the evaluators attached a caveat to the finding that oil users in the treatment group saved an average of 16.5 percent for a net savings of 12.9 percent over the control group. Incomplete data, oil deliveries that varied in frequency from two months to one year, and the lack of a metered reading made the magnitude of this impressive energy saving suspect. Further, although the evaluators attempted to validate their findings as they did in Phase I—that is, by reinterviewing the homeowners to screen for major household or demographic changes—the information in Phase II was deemed unreliable and was discarded. Therefore, Phase II did not control for a number of major changes during the year that could have affected fuel consumption.

Recommendations

On the basis of this evaluation, it was concluded that voluntary energy conservation could be successfully promoted if residents received personal contact and specific conservation suggestions as in home energy audits. Therefore, Battelle recommended that the Home Energy Check program be continued and expanded, with the energy workshops as its primary means of promotion. Finally, it was suggested that, during the home energy audits, emphasis should be placed on measures that are relatively inexpensive, easy to install, and have a maximum pay-back period of five years.

After a point, the colder the outside temperature, the more heating fuel was used per heating degree day, perhaps because relatively more fuel "goes up the chimney." See Ibid., p. 83.
Appendix G. SUMMARY OF SOCIAL IMPACTS OF A SOFT ENERGY PATH CLAIMED BY AMORY LOVINS
Table 1 Social impacts claimed by Amory Lovins for soft as compared to hard energy systems

1. **GENERAL SYSTEM IMPACTS:**
   1. Smaller scale of social organization. (SEP: 100, 104)
   2. More social diversity. (ARE: 507; SEP: 103, 149, 152, 157)
   3. Less social complexity. (SEP: 162)
   4. More manageability. (ARE: 484; SEP: 152, 162, 479; SC: 166)
   6. Less vulnerability to natural events, mechanical failure, human error, malice, or political intent. (ARE: 479, 484, 488; SEP: 11, 139, 152)
   7. Less disruptive consequences from unit failure. (SEP: 488)
   8. More sense of neighborhood, community. (SEP: 100, 140; SC: 1403)

2. **SOCIO-POLITICAL IMPACTS:**
   1. Governance and Decision-Making Impacts:
      1. Less centralization, concentration in energy decision-making, control. (ARE: 479, 480, 488, 504; SEP: 23, 105, 149; SC: 767)
      2. More public participation and democracy in energy decision-making. (ARE: 479, 480; SEP: 23, 105, 149; SC: 158)
      3. Less bureaucratization of the energy system. (ARE: 504; SC: 1015)
      4. More individual management and control of the energy system. (ARE: 488, 504; SEP: 150, 151, 152; SC: 181, 678)
      5. More local autonomy in energy decision-making, control. (SEP: 149, 154)
   2. More political responsibility/accountability in energy decisions. (ARE: 488; SEP: 156, 157)
      1. Less deception of the public. (SEP: 156)
      2. Less distrust of government. (SEP: 156)
      3. More reversibility of energy decisions. (ARE: 488; SEP: 152)
      4. Small, less disruptive mistakes. (ARE: 484, 488)

2. **Conflict and Equity Impacts:**
   1. More social and political stability. (ARE: 484, 485, 488; SC: 157, 1439)
      1. Less violence, terrorism, sabotage, around energy systems. (ARE: 488; SEP: 10, 158; SC: 1439)
      2. Less distrust, dissent, and suspicion, suppression, repression and intolerance and associated paramilitary-garrison state infrastructure around the energy system. (SEP: 6, 105, 156; SC: 1439)
   2. More consensus about the desirable characteristics of the energy system. (ARE: 504; SC: 158)
      1. Less elite-technocrat vs. layperson conflict over the energy supply. (SC: 158)
      2. Less central-authority vs. local-authority conflict over the energy system. (SC: 157)
      3. Less inter-regional conflicts over energy distribution and control. (SC: 157)
      4. Less conflicts over energy supply siting. (ARE: 488; SC: 157)
3. More social equity. (ARE:508; SEP:10)
   1. Less concentration and monopolization of technical knowledge, and materials. (ARE:479, 488; SC:767)
   2. More individual autonomy and participation in energy system. (ARE:488, 490, 509; SEP:100, 140, 150, 151, 152; SC:678)
   3. More allocation of costs and benefits of the energy system to the same people. (ARE:487; SEP:152)
   4. Less exploitation of the rural sectors by the urban elites. (SEP:105, 154, 155; SC:166)
   5. More benefits to diverse social groups. (ARE:507; SEP:156)
   6. More intranational and international and intergenerational equity in the distribution of energy costs and benefits. (SEP:11; SC:166)

3. International impacts:
   1. More rational international development. (SEP:10; SC:166)
      1. More relevance to the needs of poor countries. (ARE:488; SC:166)
      2. Less export of inflation from rich to poor countries. (SEP:11)
   2. More international stability, order, peace. (ARE:509; SEP:11, 23, 147, 158; SC:166, 1439)
      1. More national independence of energy supply. (SEP:10)
      3. Less incentives and means for nuclear weapon proliferation. (ARE:508, 509)
      4. Less international distrust and suspicion. (SEP:10)
      5. Less international anarchy. (SEP:11)
      6. Less international repression. (SEP:10)

4. Demographic impacts:
   1. Less centralization of the population. (ARE:508)
      1. Less rural to urban migration. (ARE:508)
      2. Less restless, rootless spatial mobility. (SEP:164)
      3. Smaller preferred family size. (ARE:508)

3. Economic impacts:
   1. Production impacts:
      1. Less economic concentration. (ARE:488, 509; SEP:10, 156; SC:767)
      1. More local production for local needs and uses. (SEP:140; SC:165, 166, 1403)
      4. More use of local natural resources, materials. (SC:165, 166)
      5. More retention of local wealth. (SC:1403)
      2. More amenable to mass production. (SC:165)
         1. Faster deployment rate. (ARE:480, 496)
      3. More use of market mechanisms. (ARE:504)
         1. More economic competitiveness. (ARE:488; SC:767)
         2. Less inflationary. (SEP:9)
      4. More amenable to long-run marginal cost pricing. (ARE:504)
2. **Labor Force Impacts:**

1. More readily available, easily learned skills used in the energy system. (SEP:9; SC:165)
   1. More jobs created faster per dollar invested. (ARE:504; SEP:9, 164; SC:165)
   2. Less training costs for labor force. (ARE:484)
   3. Less skilled jobs. (ARE:484)
   4. Less specialized jobs. (ARE:484)

2. Better jobs. (ARE:508)
   1. More lasting jobs. (SEP:9)
   3. Less vulnerability to organized labor's demands. (ARE:484, 487; SEP:10)

3. **Operating Impacts:**

1. More technological diversity. (ARE:504)
   2. Fewer modes and risks of technological failure. (ARE:484, 506; SEP:139)
   3. More or equal ease of repair. (ARE:484; SEP:139)
   4. Less downtime due to technological failure. (ARE:484)
   5. Less stringent maintenance standards required. (ARE:484)

4. **Consumer Impacts:**

1. More focus on meeting basic human needs. (ARE:508; SC:166)
   2. Less poverty. (SEP:10, 11)
   3. More goods and services produced. (ARE:479)
   4. More consumer choices. (SEP:151)
   5. Higher quality goods and services produced. (SEP:151)
   6. More consumer satisfaction with goods and services. (SEP:151)
   7. More satisfaction, joy, inward growth from a minimum of consumption. (SEP:162)
   8. More manufacture, installation and maintenance by energy end-users. (ARE:490, 509; SEP:151)

4. **Lifestyle and Quality of Life Impacts:**

1. Fewer lifestyle changes. (ARE:482)
   2. More spiritual, humane values, inward growth and higher quality of life. (SEP:23, 162, 164; SC:158)
   3. More individual understanding of and access to energy system. (ARE:484, 488, 490, 491, 504; SEP:150, 151, 162; SC:678)
   1. More personal involvement in the energy system and less alienation. (ARE:488, 490; SEP:6, 105, 150, 151, 152; SC:678)
   4. More joy, fun, and excitement in energy system. (ARE:488; SEP:23, 158; SC:181)

5. **Environmental Impacts:**

1. Less environmental, health, and safety risks. (ARE:487, 488, 506; SEP:10, 152)
   3. Less risky, more flexible residual management processes. (ARE:487; SEP:152; SC:1015)
Appendix H. STATISTICS ON UNITED STATES ENERGY CONSUMPTION
Table H-1

POPULATION AND HOUSEHOLDS IN THE UNITED STATES, 1973-1980

<table>
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</thead>
<tbody>
<tr>
<td>Total Population (Millions)</td>
<td>211.4</td>
<td>213.3</td>
<td>215.5</td>
<td>217.6</td>
<td>219.8</td>
<td>222.1</td>
<td>224.6</td>
<td>226.5</td>
</tr>
<tr>
<td>Households (Millions)</td>
<td>68.3</td>
<td>69.9</td>
<td>71.1</td>
<td>72.9</td>
<td>74.1</td>
<td>76.0</td>
<td>77.3</td>
<td>79.1</td>
</tr>
<tr>
<td>Household Size&lt;sup&gt;a&lt;/sup&gt; (Mean persons)</td>
<td>2.94</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<sup>a</sup>Excludes persons not living in households.

Source: Statistical Abstract of the United States
Table H-2

CHARACTERISTICS OF UNITED STATES HOUSEHOLDS, 1979

1. Percent of all dwelling units that are single-family, owner-occupied houses: 65%.

2. Percent of all dwelling units with modern heating: 99%.

3. Percent of dwelling units using different types of primary fuels:
   - Natural gas = 55%
   - Oil = 25%
   - Electricity = 16%
   - Coal = 1%
   - Wood = 1%
   - Other = 1%
   - None = 1%

4. Percent of dwelling units with different kinds of major appliances:
   - Refrigerator = 100%
   - Stove = 70%
   - Freezer = 45%
   - Clothes washer = 77%
   - Clothes dryer = 62%
   - Dishwasher = 43%
   - Television = 100%

5. Average amount of energy consumed annually by major appliances, in KWH:
   - Hot water heater = 4800
   - Refrigerator/freezer (frostless) = 2200
   - Freezer (frostless) = 1800
   - Stove with oven = 700
   - Dishwasher (including hot water) = 2100
   - Clothes washer (including hot water) = 2500
   - Clothes dryer = 1000
   - Room air conditioner (1000 hours of operation) = 900
   - Television (color) = 300
   - Attic fan = 300
   - Dehumidifier = 400

Source: Statistical Abstract of the United States
Table H-3

TOTAL UNITED STATES ENERGY CONSUMPTION BY SECTOR, 1973-1980
In Quadrillion \(10^{15}\) BTUs (Quads)

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Industrial and Agricultural Sector</td>
<td>29.5</td>
<td>28.8</td>
<td>26.5</td>
<td>28.2</td>
<td>29.0</td>
<td>29.4</td>
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<td>Residential Sector</td>
<td>14.9</td>
<td>14.6</td>
<td>14.6</td>
<td>15.5</td>
<td>15.7</td>
<td>15.8</td>
<td>17.0</td>
<td>16.8</td>
</tr>
<tr>
<td>Commercial Sector</td>
<td>11.7</td>
<td>11.4</td>
<td>11.4</td>
<td>11.7</td>
<td>11.9</td>
<td>12.4</td>
<td>10.5</td>
<td>10.5</td>
</tr>
<tr>
<td>Transportation Sector</td>
<td>18.5</td>
<td>18.0</td>
<td>18.2</td>
<td>19.1</td>
<td>19.7</td>
<td>20.6</td>
<td>20.0</td>
<td>18.6</td>
</tr>
<tr>
<td>Total Country</td>
<td>74.6</td>
<td>72.8</td>
<td>70.7</td>
<td>74.5</td>
<td>76.3</td>
<td>78.2</td>
<td>79.0</td>
<td>76.2</td>
</tr>
</tbody>
</table>

Note: The industrial and agricultural, residential, and commercial sectors all include a proportional share of electrical generating and line losses, as determined by the U.S. Department of Energy.

Table H-4
TOTAL UNITED STATES ENERGY CONSUMPTION BY TYPE, 1973-1980
In Quadrillion \(10^{15}\) BTUs (Quads)

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</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>19.9</td>
<td>20.3</td>
<td>20.3</td>
<td>21.4</td>
<td>22.4</td>
<td>23.6</td>
<td>24.3</td>
<td>24.7</td>
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<tr>
<td>Oil</td>
<td>31.1</td>
<td>29.9</td>
<td>29.5</td>
<td>31.8</td>
<td>33.2</td>
<td>34.1</td>
<td>33.7</td>
<td>31.3</td>
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<tr>
<td>Gas</td>
<td>18.7</td>
<td>18.2</td>
<td>16.7</td>
<td>17.3</td>
<td>16.6</td>
<td>16.6</td>
<td>17.1</td>
<td>16.8</td>
</tr>
<tr>
<td>Coal</td>
<td>4.3</td>
<td>4.1</td>
<td>3.8</td>
<td>3.8</td>
<td>3.5</td>
<td>3.5</td>
<td>3.7</td>
<td>3.4</td>
</tr>
<tr>
<td>Other</td>
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<td>0.4</td>
<td>0.4</td>
<td>0.3</td>
<td>0.5</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Total Country</td>
<td>74.6</td>
<td>72.8</td>
<td>70.7</td>
<td>74.5</td>
<td>76.3</td>
<td>78.2</td>
<td>79.0</td>
<td>76.2</td>
</tr>
</tbody>
</table>

Note: All fuels used to generate electricity are included in that type, and not in any other type.

Table H-5
TOTAL UNITED STATES ENERGY CONSUMPTION BY SECTOR AND TYPE OF ENERGY, 1973-1980
In Quadrillion ($10^{15}$) BTUs (Quads)

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<td><strong>Industrial and Agricultural Sector</strong></td>
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<td></td>
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<tr>
<td>Electricity</td>
<td>7.9</td>
<td>8.2</td>
<td>8.0</td>
<td>8.6</td>
<td>9.2</td>
<td>9.6</td>
<td>9.9</td>
<td>9.6</td>
</tr>
<tr>
<td>Oil</td>
<td>6.7</td>
<td>6.5</td>
<td>6.2</td>
<td>7.0</td>
<td>7.7</td>
<td>7.8</td>
<td>9.4</td>
<td>8.9</td>
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<tr>
<td>Gas</td>
<td>10.4</td>
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<td>8.6</td>
<td>8.5</td>
<td>8.6</td>
<td>8.4</td>
</tr>
<tr>
<td>Coal</td>
<td>4.3</td>
<td>4.1</td>
<td>3.8</td>
<td>3.8</td>
<td>3.5</td>
<td>3.5</td>
<td>3.7</td>
<td>3.4</td>
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<td><strong>Residential and Commercial Sector</strong></td>
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</tr>
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<td>Electricity</td>
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<td>14.0</td>
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<td>15.1</td>
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<tr>
<td>Oil</td>
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<td>6.1</td>
<td>5.8</td>
<td>6.3</td>
<td>6.3</td>
<td>6.3</td>
<td>5.0</td>
<td>4.4</td>
</tr>
<tr>
<td>Gas</td>
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<td>7.5</td>
<td>7.6</td>
<td>7.9</td>
<td>7.5</td>
<td>7.6</td>
<td>7.9</td>
<td>7.6</td>
</tr>
<tr>
<td>Coal</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Transportation Sector</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil</td>
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<td>17.3</td>
<td>17.5</td>
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<tr>
<td>Gas</td>
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<td>0.7</td>
<td>0.6</td>
<td>0.6</td>
<td>0.5</td>
<td>0.5</td>
<td>0.6</td>
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</tr>
</tbody>
</table>

Note: Figures for the industrial and agricultural sector and the residential and commercial sector all include proportional shares of electrical generating and line losses, as determined by the U.S. Department of Energy.

Table H-6

RESIDENTIAL ENERGY CONSUMPTION IN THE UNITED STATES BY TYPE OF ENERGY AND BY END USE, 1970, 1979, AND 1980
In Quadrillion (10^{15}) BTUs (Quads)

<table>
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</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>1.6</td>
<td>2.4</td>
<td>8.7</td>
<td>2.4</td>
<td>9.1</td>
</tr>
<tr>
<td>Oil</td>
<td>2.3</td>
<td>2.2</td>
<td>2.2</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Gas</td>
<td>5.3</td>
<td>5.7</td>
<td>5.7</td>
<td>5.6</td>
<td>5.6</td>
</tr>
<tr>
<td>Coal</td>
<td>0.2</td>
<td>--a</td>
<td>--a</td>
<td>--a</td>
<td>--a</td>
</tr>
<tr>
<td>Wood</td>
<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Total Sector</td>
<td>9.8</td>
<td>10.7</td>
<td>17.0</td>
<td>10.1</td>
<td>16.8</td>
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<table>
<thead>
<tr>
<th>End Use</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Space heating and cooling</td>
<td>6.8</td>
<td>7.1</td>
<td>7.7</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Water heating</td>
<td>1.5</td>
<td>1.7</td>
<td>3.0</td>
<td>*</td>
<td>*</td>
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<tr>
<td>Other appliances</td>
<td>1.5</td>
<td>1.9</td>
<td>6.3</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

Note: Figures for 1970A, 1979A, and 1980A are actual consumption only, while figures for 1979B and 1980B include proportional shares of electrical generating and line losses, as determined by the U.S. Department of Energy.

^aLess than 0.1 Quad
★Data not available

### Table H-7

**RESIDENTIAL ENERGY CONSUMPTION IN THE UNITED STATES, PER HOUSEHOLD, BY TYPE OF ENERGY, 1970 AND 1973-1980**

*In Million ($10^6$) BTUs*

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>25</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>31</td>
<td>30</td>
</tr>
<tr>
<td>Oil</td>
<td>36</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td>Gas</td>
<td>84</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>74</td>
<td>71</td>
</tr>
<tr>
<td>Coal</td>
<td>3</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>--a</td>
<td>--a</td>
</tr>
<tr>
<td>Wood</td>
<td>4</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**Total Sector** | 154  | 149  | 140  | 137  | 141  | 137  | 135  | 138  | 126  |

**Note:** Figures do not include any electrical generating or line losses.

* Data not available

aLess than 1 million BTUs

**Sources:** Meyers (1982), personal communication with Lee Schipper, and *Statistical Abstract of the United States*
Table H-8

RESIDENTIAL ENERGY CONSUMPTION IN THE UNITED STATES, PER HOUSEHOLD, BY TYPE OF ENERGY AND END USE, 1979

In Million \((10^6)\) BTUs

<table>
<thead>
<tr>
<th>Type of Energy</th>
<th>Space Heating and Cooling</th>
<th>Water Heating</th>
<th>Other Appliances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>10.1</td>
<td>4.2</td>
<td>17.2</td>
</tr>
<tr>
<td>Oil</td>
<td>25.1</td>
<td>3.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Gas</td>
<td>52.9</td>
<td>13.8</td>
<td>7.4</td>
</tr>
<tr>
<td>Coal</td>
<td>0.6</td>
<td>--a</td>
<td>--a</td>
</tr>
<tr>
<td>Wood</td>
<td>3.7</td>
<td>--a</td>
<td>--a</td>
</tr>
</tbody>
</table>

Note: Figures do not include any electrical generating or line losses.

\(a\)Less than 0.1 million BTUs

Source: Meyers (1982)
### Table H-9

**RESIDENTIAL ENERGY CONSUMPTION AND EXPENDITURES IN THE UNITED STATES BY TYPE OF ENERGY AND INCOME LEVEL, TOTAL AND PER HOUSEHOLD, 1980**

<table>
<thead>
<tr>
<th>Type of Energy</th>
<th>Total Energy Consumption</th>
<th>Per Household</th>
<th>Total Energy Expenditures</th>
<th>Per Household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>2.4 Quads(^a)</td>
<td>*</td>
<td>$17.8 billion</td>
<td>*</td>
</tr>
<tr>
<td>Oil</td>
<td>1.7 &quot;</td>
<td>*</td>
<td>$10.7 &quot;</td>
<td>*</td>
</tr>
<tr>
<td>Gas</td>
<td>5.6 &quot;</td>
<td>*</td>
<td>$17.8 &quot;</td>
<td>*</td>
</tr>
<tr>
<td>Other</td>
<td>0.4 &quot;</td>
<td>*</td>
<td>$ 2.1 &quot;</td>
<td>*</td>
</tr>
<tr>
<td>Total Sector</td>
<td>10.1 Quads(^a)</td>
<td>126 mil.(^b)</td>
<td>$63.2 billion</td>
<td>$815</td>
</tr>
</tbody>
</table>

**Income Levels**

<table>
<thead>
<tr>
<th>Income Levels</th>
<th>Total Energy Consumption</th>
<th>Per Household</th>
<th>Total Energy Expenditures</th>
<th>Per Household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under $10,000</td>
<td>2.6 Quads(^a)</td>
<td>103 mil.(^b)</td>
<td>$15.8 billion</td>
<td>$640</td>
</tr>
<tr>
<td>$10,000-$20,000</td>
<td>2.9 &quot;</td>
<td>121 mil.(^b)</td>
<td>$18.5 &quot;</td>
<td>$890</td>
</tr>
<tr>
<td>Over $20,000</td>
<td>4.3 &quot;</td>
<td>143 mil.(^b)</td>
<td>$28.8 &quot;</td>
<td>$1400</td>
</tr>
</tbody>
</table>

\(^a\) Quadrillion \((10^{15})\) BTUs  
\(^b\) Million \((10^6)\) BTUs  
* Data not available  
Source: Statistical Abstract of the United States
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Motor Vehicles (In millions)</td>
<td>*</td>
<td>130</td>
<td>133</td>
<td>138</td>
<td>143</td>
<td>149</td>
<td>154</td>
<td>159</td>
</tr>
<tr>
<td>Total Miles Travelled (In billion miles)</td>
<td>1309</td>
<td>1286</td>
<td>1330</td>
<td>1412</td>
<td>1477</td>
<td>1548</td>
<td>1529</td>
<td>*</td>
</tr>
<tr>
<td>Total Fuel Consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In billion gallons</td>
<td>111</td>
<td>106</td>
<td>109</td>
<td>116</td>
<td>120</td>
<td>125</td>
<td>122</td>
<td>*</td>
</tr>
<tr>
<td>In quadrillion BTUs</td>
<td>18.5</td>
<td>18.0</td>
<td>18.2</td>
<td>19.1</td>
<td>19.7</td>
<td>20.6</td>
<td>20.0</td>
<td>18.6</td>
</tr>
<tr>
<td>Per Capita Fuel Consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In gallons</td>
<td>525</td>
<td>497</td>
<td>506</td>
<td>533</td>
<td>546</td>
<td>563</td>
<td>539</td>
<td>*</td>
</tr>
<tr>
<td>In million BTUs</td>
<td>88</td>
<td>85</td>
<td>85</td>
<td>89</td>
<td>91</td>
<td>94</td>
<td>93</td>
<td>82</td>
</tr>
<tr>
<td>Average Automobile Miles Per Gallon</td>
<td>13.1</td>
<td>13.4</td>
<td>13.5</td>
<td>13.7</td>
<td>13.9</td>
<td>14.1</td>
<td>14.3</td>
<td>15.2</td>
</tr>
</tbody>
</table>

*Data not available

Table H-11

AVERAGE ENERGY PRICES IN THE UNITED STATES IN REAL (1972) DOLLARS AND IN RELATION TO THE CONSUMER PRICE INDEX, 1973-1980

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Real Price (1972 Dollars) of Each Type of Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity (¢/KWH)</td>
<td>2.5</td>
<td>3.1</td>
<td>3.5</td>
<td>3.7</td>
<td>4.1</td>
<td>4.3</td>
<td>4.6</td>
<td>5.4</td>
</tr>
<tr>
<td>Oil (¢/gallon)</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>40.6</td>
<td>46.0</td>
<td>49.4</td>
<td>65.6</td>
<td>97.8</td>
</tr>
<tr>
<td>Gas (¢/1000 cu. ft.)</td>
<td>108.2</td>
<td>125.3</td>
<td>154.2</td>
<td>184.6</td>
<td>226.4</td>
<td>262.6</td>
<td>323.1</td>
<td>394.6</td>
</tr>
<tr>
<td>Coal (¢/million BTUs)</td>
<td>40.5</td>
<td>71.0</td>
<td>81.4</td>
<td>84.8</td>
<td>94.7</td>
<td>111.6</td>
<td>122.4</td>
<td>135.2</td>
</tr>
<tr>
<td>Gasoline (¢/gallon)</td>
<td>*</td>
<td>53.2</td>
<td>56.7</td>
<td>59.0</td>
<td>62.0</td>
<td>62.6</td>
<td>85.7</td>
<td>119.1</td>
</tr>
<tr>
<td>Average Real Price of Each Type of Energy in Relation to the Consumer Price Index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>125</td>
<td>148</td>
<td>167</td>
<td>178</td>
<td>189</td>
<td>201</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Oil</td>
<td>117</td>
<td>213</td>
<td>231</td>
<td>248</td>
<td>280</td>
<td>291</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Gas</td>
<td>123</td>
<td>147</td>
<td>182</td>
<td>219</td>
<td>268</td>
<td>299</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Coal</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Gasoline</td>
<td>*</td>
<td>*</td>
<td>171</td>
<td>178</td>
<td>188</td>
<td>195</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

Average Disposable Income Per Person in Constant 1972 Dollars

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4062</td>
<td>3973</td>
<td>4025</td>
<td>4144</td>
<td>4285</td>
<td>4449</td>
<td>4512</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

*Data not available

Source: Statistical Abstract of the United States
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Expenditures</strong></td>
<td>5217</td>
<td>5861</td>
<td>6856</td>
<td>6313</td>
<td>6789</td>
<td>4846</td>
<td>4330</td>
</tr>
<tr>
<td><strong>(In million dollars)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Conservation Expenditures</strong></td>
<td>143</td>
<td>527</td>
<td>611</td>
<td>736</td>
<td>728</td>
<td>163</td>
<td>27</td>
</tr>
<tr>
<td><strong>(In million dollars)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Percent of Budget for Conservation</strong></td>
<td>2.7</td>
<td>9.0</td>
<td>8.9</td>
<td>11.7</td>
<td>10.7</td>
<td>3.3</td>
<td>0.6</td>
</tr>
</tbody>
</table>

*a* The Department of Energy was established in 1977

*b* Estimated

Source: Budget of the United States