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# AN ANALYSIS OF ENERGY CONSERVATION IN RESIDENTIAL SPACE HEATING AND COOLING AND RECOMMENDATIONS FOR PUBLIC INFORMATION PROGRAMS FOR KNOX COUNTY, TENNESSEE

A Thesis

Presented for the

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ABSTRACT

The purpose of this study is to determine for the residents of Knox County, which energy information programs have been used in the past; what home heating and cooling conservation actions have already been taken; which financial benefit programs have been used; the level of interest in new information programs; and public attitudes toward some of the Knox County Energy Project conservation strategies. The data gathered are to be used to design and target energy information programs for the residential sector as part of the comprehensive community energy planning project.

Data on Knox County residential energy conservation actions and energy interests were gathered through a mail questionnaire distributed to a random sample of area households. Personal interviews and a literature search also provided information. Responses to the questionnaire were analyzed via the SPSS computer package using cross tabulation and discriminant analysis.

Analysis of the data revealed that there still exists a number of households in the community which have not taken many energy conservation actions, especially those which require monetary expenditures; nor have they taken advantage of existing information and financial benefit programs. This group includes Black, low income, and elderly residents, and renters. These people did express interest in learning more about low cost energy conservation actions with few reservations about using government resources to provide this information. Existing information delivery mechanisms could be used to address many of their needs.

Many middle aged, middle income families have already taken low cost actions to reduce their fuel bills and are interested, or could be easily interested, in somewhat more expensive and exotic energy topics. Few had used existing information and financial benefit programs, however. These residents expressed a desire to obtain detailed information on energy topics. They preferred workshops involving volunteers and experienced homeowners to deliver this detailed instruction. Concern about expenditures of public money for more permanent local energy bodies was expressed by these residents.

Both groups of residents expressed an interest in an energy newsletter, although such a mechanism is not now available in the community. A newsletter could be used as a means of raising energy awareness and evoking interest in more specialized workshops.

Energy planning is a relatively new field of investigation. More research is needed on how energy considerations can be incorporated into all aspects of planning. In addition, more knowledge is needed about the role public education can play in obtaining community energy objectives. The effects on energy use behavior of values, attitudes, and various types of influence and persuasion warrant more investigation so that more effective energy conservation strategies can be devised.

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# CHAPTER I

# INTRODUCTION

## U.S. Energy Use

Most Americans are dependent on commercially supplied energy. Their reliance developed relatively swiftly if viewed in an historical perspective. Until the mid-nineteenth century, Americans relied upon human muscles and draft animals to supply much of their energy. Wood burning, waterwheels, and windmills also supplied power. With the invention of the steam engine and increased use of coal, a new era had begun. S. David Freeman (1974) has labeled it the "Age of Energy" (p. 16). The world's first commercial oil well was put into operation in Pennsylvania in 1859. Natural gas, first regarded only as a by-product, was found to be cleaner, cheaper, and easier to use than coal in homes and many industries. Use of natural gas has grown tremendously since World War II. The total U.S. energy demand has grown until "the United States, with 6 per cent of the world's population, uses 30 per cent of the world's energy" (Fowler, 1978, p. 23).

There are several reasons why the U.S. uses such a disproportionate share of the world's energy resources. The American population is dispersed over a large area. This necessitates long-distance transportation of goods and people. Many American automobiles are relatively inefficient, getting low gas mileage and carrying few passengers. Industrial processes were designed during a period when energy operating expenses cost less than capital investments in more efficient machinery.

Promotional rate structures such as the declining block method also have encouraged Americans to purchase more energy-using appliances for their large single family homes (Schurr, Darmstadter, Perry, Ramsay, & Russell, 1979). Many Americans have also come to associate increasing affluence and upward social mobility with this increased energy use.

In the last decade, however, rising fuel prices, interruptions in supply, and increasing concern with the environmental and health effects of fuels, have prompted a rethinking of this behavior. With proper policies, energy use can be controlled without endangering economic growth, and adequate amounts of energy can be provided at affordable prices that include environmental and health costs (Schurr et al., 1979). In this context, energy conservation is not an end in itself, but the "means toward greater social and economic welfare as a way to promote the well-being of the citizenry" (Yergin, 1979, p. 139). According to Freeman (1974), a strong commitment to conservation could allow Americans to sustain and continue to improve their standard of living with less energy. Conservation would help keep energy costs within the reach of the poor. Reducing American energy use could decrease the country's dependence on foreign sources of energy, helping to protect the national security and economy. By decreasing the rate of consumption of oil, coal, and natural gas, the nation can buy time to develop alternative energy sources which will not have adverse environmental and health effects.

## Energy in the Residential Sector

### Current Energy Use

One area in which conservation efforts could have a significant effect is the residential sector. There are some 80 million year-round homes in the United States (Yergin, 1979). This represents a large investment in housing which is often energy inefficient. The U.S. residential sector used 16.7 quadrillion BTU's of energy in 1976, 27.3% of all energy used in the nation (U.S. Department of Agriculture, 1978). "The largest single energy-consuming function in the home is space heating" (Hirst & Moyers, 1974, p. 14). It accounts for approximately 18% of the energy used in the home (Hayes, 1976). Air conditioning has become relatively commonplace in the last several decades. In U.S. all-electric homes, air conditioning is the third major user of energy (Hirst & Moyers, 1974). It accounts for approximately 3% of residential energy use (Hayes, 1976).

Since space heating and cooling comprise such a substantial proportion of the average residential fuel bill (21%), the thermal efficiency of the home and the behavior and attitudes of the residents toward comfort and temperature are important. The 1977 U.S. Bureau of the Census Annual Housing Survey (1979) revealed that approximately 15% of the nation's housing units "lack any attic or roof insulation" (p. 9). Before 1939, attic insulation was a rarity. Wall insulation was not commonly installed in U.S. homes until the late 1950s (Schurr et al., 1979). Leaks are common in older homes that were "built less tightly, without weatherstripping or complete sealing, without vapor-seals. Time

has caused wear or warping, and dried-out putty and caulking" (Oviatt & Brevik, 1978, p. 1).

Potential for Conservation

Freeman (1974) suggests that U.S. homes use 40% more fuel than necessary for heating and cooling each year than they would if they were designed, insulated, and built to be energy efficient. Greater efficiencies can be achieved, however, even in existing housing, through retrofitting the structure and changing the behavior of the residents. Rowse and Harrje (U.S. Congress, 1979) estimate that two-thirds of the existing stock of American homes could use additional insulation. The amount of energy that can be saved in any particular housing unit depends on many factors, including the size, shape, location, and current thermal efficiency of the structure. The U.S. Congress Office of Technology Assessment (1979) reports that attitudes, choices, and behavior of residents can vary energy use in identical houses by "as much as a factor of two" (p. 7).

Any savings in fuel use can be translated into monetary savings on fuel bills for residents. "Energy costs are now about 15 percent of the average annual cost of homeownership" (U.S. Congress, 1979, p. 7). If consumers do not meet rising prices with reduced demand, this figure could rise.

One of the most effective ways to improve the heating efficiency of most homes is to increase insulation, as demonstrated by the following examples. An Ohio study reported a 34% reduction in energy required for space heating and cooling by raising the thermal resistance of the home's ceiling from R-13 to R-19, installing storm windows, and adding

weatherstripping (Degelman & Lewis, 1975). The National Bureau of Standards installed additional insulation in the walls, ceiling, and floor of a large single family home in Washington, D.C., and reduced heating energy consumption by 33.3%. "The addition of storm windows reduced the heating requirement [of the same house by an additional] 25.2 percent" (U.S. Department of Commerce, National Bureau of Standards, 1978, p. 1). The total reduction in energy required was 58.5%. A H.U.D. research program concluded that 3 inches of insulation in a previously uninsulated attic may reduce energy use 33%. Six inches in the attic combined with 3 inches in the walls and the installation of storm doors and windows could save 55%. A heat pump could be operated at 60% of the cost of electric resistance heating. Caulking and weatherstripping alone can save 10%. Plastic over the windows could reduce use by 15% (Allan, 1975).

Pilati's (1975) work with a model house revelaed that a home in the southeastern U.S. could save 32% of its heating costs if the residents reduced their thermostats from 72°F to 68°F. In fact, Pilati concluded, "the total U.S. energy budget could be reduced by 4% if homes typically heated at 72°F were heated to 68°F in the daytime and to 55°F at night" (p. iii). Additional measures, such as sealing duct leaks, insulating pipes, scheduling the use of heat producing appliances for cooler times, replacing a gas pilot light with an electric igniter, installing fireplace covers, closing off unused rooms, and installing a ventilation fan in an attic or upstairs window can also increase the resident's savings.

Barriers to Conservation

Americans face many barriers to the most efficient ways of using energy in their homes. There are political, financial, cultural, and informational impediments to energy conservation.

The building codes in many communities do not consider energy efficiency. They often require air exchange rates and window areas that result in the relatively inefficient use of fuels for space heating and cooling.

Subdivision regulations can restrict the flexibility of home builders to take advantage of the natural heating and cooling potential of many lots. Setback requirements can hamper optimum solar exposure. Restrictive covenants may not allow windmills or other energy devices. Zoning regulations may restrict such energy efficient designs as common wall construction.

Air pollution regulations can restrict the types of fuels used to heat homes. The burning of coal and wood is especially subject to regulation.

Regulated utility rates often do not encourage reduction in energy use. Declining block rate structures are used in many areas. Such structures allow for the price per unit of electricity to decrease as the quantity used increases. Also, with recent rapidly rising rates, "a complicating factor is that even when realistic efforts have been made to reduce energy use, expenditures have nonetheless risen because of increased rates" (Gallup Organization, Inc., 1976, p. 28).

Many American homes are built by speculators who try to keep the initial cost of the house low enough to sell easily (Schurr et al.,

1979). Energy efficient equipment often costs more than its energy inefficient counterpart. Consumers are very sensitive to this initial cost.

When the house is purchased, the resident is faced with making energy conservation improvements to save money on operating expenses. Homeowners are reluctant to invest heavily in equipment when they may not live in the home long enough to recoup the cost of the equipment through fuel bill savings. Many consumers are uncertain about the cost effectiveness of new items on the market because of unknown life expectancies, maintenance costs, and future energy prices (U.S. Department of Energy, 1978c). The cost of the equipment cannot always be recovered when the house is sold since many appraisers and buyers do not realize the value of the increased energy efficiency of the home (Seidel, Plotkin, & Reck, 1973).

Renters present an even more difficult problem. Many do not pay for their utilities directly. The cost is reflected in their rent. The savings possible through conservation efforts are, therefore, not as evident as when the resident pays a fuel bill each month. Even renters who do pay their fuel bills directly are unlikely to make major improvements on property they do not own. Renters frequently do not plan to live in their homes long enough to recoup their investment. Others fear rent increases if their homes were made more energy efficient.

Many Americans see energy use as a symbol of affluence. If they have sufficient income they believe they should be able to use as much energy as they wish. Consumers who believe that their standard of living

is tied to energy use are unwilling to reduce their energy consumption and thereby their social and economic status. Some people are only willing to conserve if they can somehow be sure that everyone else is also reducing their energy use (Bee Angell and Associates, Inc., 1975). These people do not want their relative position to worsen. Others feel that it is the responsibility of government or industry to conserve first.

Yet another barrier to energy conservation is a lack of information and understanding among the general public. Several polls across the nation have shown that Americans disagree on the basic issue of whether the country has an energy problem. In Texas, those agreeing that there is a problem do not see it as important as inflation, crime, or unemployment (Gottlieb & Matre, 1976). In another study, a group of college students and petroleum company executives ranked economics and corruption as the nation's most important problems (Muchinsky, 1976). Public opinion polls between 1974 and 1977 consistently showed that one-half of all Americans believed that the seriousness of shortages was exaggerated, and that the problem was "manufactured" by the oil exporting countries and the oil companies, aided by federal government mismanagement (El Mallakh, 1978a). When asked who was most to blame for the nation's energy problems during this period, respondents consistently put most of the blame on the oil companies. The Arabs were blamed more each subsequent year and the government less. The general public was one of the least blamed actors (Zentner, 1978). As long as the American public blames someone else for the nation's energy problems, most people are unlikely to take much personal action to combat the situation.

Most people have only a limited understanding of how their habits affect energy use and conservation (Webber, A., 1979). Residents may believe they are drastically reducing their energy consumption by turning off the lights while operating the air conditioner more to compensate for the heat generated by the natural light entering through unshaded windows. A 1977 national survey of 26-to-35-year-olds revealed that most of the respondents were aware of actions that they could take to conserve energy but did not realize how substantial and relatively effective their actions were (National Assessment of Educational Progress Project, 1978). This problem is further aggravated by the monthly aggregate billing process used by most utility companies which does not provide the feedback necessary for energy users to identify the quantity and cost of energy used by different appliances at different times.

When a consumer decides to take actions to reduce household energy use, there are difficulties in deciding what is the most cost effective action to take. "Consumers are frequently unsure about what changes are most effective" (U.S. Congress, 1978, p. 7). Each piece of energy conservation equipment is marketed independently, not in packages designed to meet the individual needs of each home. The consumer must choose between many brands and models. There is no industry-wide certification or testing organization for energy conservation equipment. Neither is there a convenient "one-stop shopping outlet" (U.S. Department of Energy, 1978c, p. 16).

There is no "reliable, convenient, or comprehensive source of information about the costs, features and capabilities of energy conserving items" (U.S. Department of Energy, 1978c, p. 16). The public

must rely on friends, private firms, and public agencies for energy conservation information. Unfortunately, several studies show a lack of confidence in many energy information sources. A 1975 study showed that only 50% of all Americans had at least some confidence in information they received from "conservation activists" (Zentner, 1976, p. 72). Television and newspapers fared little better with a vote of confidence of 57 and 56%, respectively. Only 38% had confidence in federal government information and 19% in oil company sources (Zentner, 1976).

## Need for Information

"More public knowledge about how to save energy and the use of lifecycle costing in assessing such measures as insulation would encourage the savings of energy" (Commission on Critical Choices for Americans, 1977, p. 68). "The dissemination of information is one of the major objectives in the battle against excessive energy consumption. Distribution of statistics and data to private consumers is an absolute requirement if consumers are to respond rationally" (El Mallakh, 1978b, p. 198). Of those surveyed in the 1977 National Assessment of Educational Progress Project (1978), 95.9% desired more information on how to conserve energy. In addition, 94% responded that they would do more to conserve if they knew more about methods of reducing energy use.

## Local Government Role

The information consumers desire can be provided through both the public and private sectors. A Ford Foundation (1979) study concluded that government has a "vital role as educator and supplier to citizens of information concerning energy conservation" (p. 131). One value of

government sponsored information programs is that they can provide comparison information in an impartial manner, whereas private manufacturers tend to promote their own products. Also, energy conservation actions which require no purchase (and therefore no profit) must be promoted by an agent working for the good of the entire community.

"Residential homes comprise the most decentralized sector of energy consumption, and therefore public education and information is particularly important" (Yergin, 1979, p. 174). "Because effective conservation involves the decisions of millions of diverse individuals, with a few notable exceptions it cannot realistically be mandated or managed centrally but requires that information and incentives be provided for energy users who make their own adjustments" (Ford Foundation, 1979, p. 4).

The local governments in the U.S. are in a unique position to provide helpful, accurate information to their constituents. The climate, topography, air quality, and prices of fuels and energy conservation equipment vary tremendously across the country. To be useful, state and federally provided information often needs to be adapted to these varying local conditions.

Another advantage of local government delivery of energy conservation information is the established contact local social service offices have with the poor and disadvantaged. Local governments are also more likely than the state or federal government to be in a position to provide individualized assistance (U.S. Department of Energy, 1979d).

As a 1975 study showed, credibility is an important issue in the energy situation (Zentner, 1976). Citizens identify more with their

local officials and government programs. Consumers appear to have more trust in information they receive from local governments than from "remote institutions" (U.S. Congress, 1979, p. 7).

The local government has a significant potential for affecting the rate and type of energy used in its community (Darmstadter, 1976; Harrison & Shapiro, 1979; Hittman Associates, Inc., 1978). Local governments possess abilities to affect local energy usage by the use of building codes, tax policies, zoning and subdivision regulations, demonstration programs, and public information channels, but so far most have not chosen to do so.

Recent shortages and rising prices have made even more evident the need for planning and coordination among energy suppliers and users and all levels of government (Zelinski, 1980). The incorporation of energy considerations would help reduce the community's susceptibility to energy supply interruptions and "minimize the impact of increased fuel prices on the community" (Hittman Associates, Inc., 1978, p. 3). Community planning decisions in the past have had tremendous influence on current energy supplies and uses without any coordinated purpose or plan. The potential exists to develop goals, policies, and programs that recognize the relationship of the community's energy future to all other planning decisions.

## Comprehensive Community Energy Management Program (CCEMP)

The U.S. Department of Energy, recognizing the potential of local energy planning and management, contracted with Argonne National Laboratory to develop a methodology to test the ability of local governments to develop comprehensive community energy plans. A national

competition was held to select 17 pilot program communities. Those selected represent a range of climatic conditions, governmental structures, populations, and energy management experience. The communities selected were:

Allegheny County, Pennsylvania

Boulder, Colorado

Dayton, Ohio

Greater Bridgeport Regional Planning Agency, Connecticut

Greenville, North Carolina

Janesville, Wisconsin

King County, Washington

Knoxville, Tennessee

Los Angeles, California

Philadelphia, Pennsylvania

Portland, Maine

Richmond, Indiana

Seattle, Washington

South Florida Regional Planning Council

Toledo Metropolitan Area Council of Governments, Ohio

Tulsa, Oklahoma

Wayne County, Michigan

These communities were to establish an energy management organizational structure, conduct an energy audit, develop a list of energy issues and objectives, set priorities, identify and evaluate alternative conservation strategies, and prepare an implementation plan for the community. The plan would then be presented to local legislative bodies, planning

commissions, and the general public for review, adoption, and implementation (Zelinski, 1980).

Knoxville Energy Project

The Knoxville-Knox County Metropolitan Planning Commission (MPC) was assigned the task of developing this community's energy management plan by October 1980, with a program budget of $200,000. The Knoxville project's primary objectives were to increase the efficiency of energy use in the community; identify and increase the use of renewable energy resources; ensure that the community would be prepared in case of an energy emergency; and establish Knoxville as an energy information center (Zelinski, 1980).

A steering committee, with representatives of the City, County, MPC, local utility companies, industry, finance, builders, and private citizens, was established to review and guide the program. Five subcommittees were formed to assist in developing the strategies and implementation options for the energy plan. The subcommittees were each assigned a subject area: (a) land use, (b) transportation, (c) emergency contingency, (d) alternative energy resources, and (e) building structures and uses. Each of the subcommittees discussed issues, determined objectives, and evaluated conservation alternatives for Knox County based on feasibility and expected effectiveness. Based on these discussions, each group prepared a list of implementation strategies for the planning staff to consider while developing the energy plan (Zelinski, 1980).

The planning staff, meanwhile, conducted an energy audit of the county. The audit was designed to develop a data base that depicts the history and current state of the community's energy supply and use. The

information gathered included energy supply by fuel source (electricity, natural gas, petroleum products, coal, wood, and bottled gas), and the quantity used by each sector (residential, commercial-industrial-institutional, transportation, municipal, and public schools) (Zelinski, 1980).

According to Wayne Blasius (1980), MPC Energy Project Director, the Knox County energy audit revealed that in 1978, the 113,680 occupied dwelling units in the county used approximately 26,184 billion BTU's of energy, 33% of all energy consumed in the county which compares with 23.7% on the national level. Almost 70% of the energy used by the residential sector in Knox County went for space heating and cooling. Electricity was the major fuel for space heating, being used in 60% of all dwelling units. Natural gas was used in 17%, coal in 12%, oil in 10%, and liquid propane (LP) in 1% of all dwelling units. Wood was used in less than 1% while .1% used no fuel for space heating. Air conditioning was estimated to be present in 39.3% of all dwelling units in the county.

The role of energy conservation public information programs in the overall energy management plan is addressed in the Energy Project Skeleton Plan. Two major purposes of the plan are energy information availability and education. "Information on energy issues, home conservation tips, transit availability, etc., should be distributed through the regular school curriculum, clubs and organizations, and the local media. In addition, specialized means should be formulated to meet special needs. For example, advertising of specific programs or opportunities should be targeted at those most in need; or at the largest users . . ." (Knoxville-Knox County Metropolitan Planning

Commission, 1980, p. 5). Since the residential sector was responsible for one-third of the county's energy use in 1978, residential users are prime targets for energy conservation strategies.

Conserving energy in the home in Knox County can result in benefits to the residents and the community as a whole. Consumers can save money on their utility bills, releasing that money for use in other ways which could stimulate the local economy. A reduction in the amount of electricity demanded for air conditioning during peak hours and days would reduce the required generating capacity for TVA, slowing the need for expansion of power generating plants which could have detrimental health and environmental effects. Increasing the efficiency of fuel use in the home would help the community reach its objective of increasing the efficiency of energy use throughout the community. By providing information on such topics as solar energy and wind power to homeowners, the local government can work toward the Energy Project's objective of increasing the use of renewable energy resources. Reductions in energy demand by households could also help reduce the threat of shortages and power interruptions in Knox County.

The residents of Knox County have several sources available from which to obtain information on home energy conservation, alternative energy sources, and financing programs for weatherization and alternative energy equipment. Federal government agencies such as the Department of Energy, the Department of Housing and Urban Development, the Department of Commerce, the Department of Agriculture, the Community Services Administration, and the Internal Revenue Service provide information directly by mail, telephone, and mass media. Federal agencies also offer information and assistance through such installations as the

Technical Information Center at Oak Ridge, the National Solar Heating and Cooling Information Center, and the National Center for Appropriate Technology. Many programs and offices administered on the state and local level which provide energy information also receive some support from federal agencies. The State of Tennessee operates a toll-free telephone hotline as part of the energy extension service. The University of Tennessee Energy, Environment, and Resource Center also distributes information upon request. TVA, the Knoxville Utilities Board (KUB), and the Lenoir City Utilities Board (LCUB) provide information and home energy audits. The Community Action Committee (CAC) and the Community Design Center have produced information booklets. Unions, clubs, and other organizations produce their own publications. Local libraries and bookstores carry privately published books and magazines which contain energy information.

## Purpose of This Study

Although the users of some information and financial assistance programs have been identified and singled out for study, only limited research has been conducted on the relative characteristics of program users and nonusers. The level of interest in home energy conservation and new information programs in Knox County is unknown. The attitudes and opinions of the general public about the energy conservation strategies developed by the "expert" subcommittee members have not been studied. To design and target information programs as suggested in the Energy Project Skeleton Plan, more data is needed on energy attitudes, conservation activities, the interests of the public, and opinions on energy conservation.

The purpose of this study was to determine for the residents of Knox County which information programs have been used in the past; what home heating and cooling conservation actions have already been taken; which financial benefit programs have been used; the level of interest in new information programs; and public attitudes toward some of the proposed energy plan conservation strategies related to residential energy use.

Data for the study of Knox County households were collected between May and July 1980, through a mail questionnaire. The subjects were chosen from the Knoxville area telephone directory. Although a lower proportion of Black, low income, high income, and transient households were expected to be included in the listings, it was unlikely that any group was entirely excluded. The study was limited to the residential sector and its use of energy in space heating and cooling.

This thesis provides recommendations for public information programs on energy conservation and alternative energy sources. Target groups in need of such information are identified. The type of programs and the topics of interest to these groups are also presented.

Results of this study are only applicable to Knox County but could be of potential value to other areas with similar characteristics and problems. It can be assumed that although no two communities are exactly alike, Knox County residents possess many of the same characteristics, attitudes, and interests as other Americans.

## Organization of the Study

Chapter II presents a review of the literature on U.S. energy use, energy conservation attitudes, residential energy conservation,

public information programs related to energy conservation available to Knox County residents, and public information programs in other communities. The methodology of the survey is presented in Chapter III. The results of the survey are presented and analyzed in Chapter IV. Chapter V contains a summary of the findings and recommendations for public information programs for the Knoxville-Knox County Metropolitan Planning Commission, as well as recommendations for further study.

# CHAPTER II

## LITERATURE REVIEW

Just as energy production and use were not important topics to the consumer before the 1970s, they were not topics of interest to many researchers. The majority of the studies dealing with energy before the Arab oil embargo of 1973 dealt with projections of energy use and estimation of fuel reserves. Little work was conducted by social scientists to study the reasons behind levels of energy demand or the factors which could affect energy use behavior.

As the importance of energy supply and use was pointed out by shortages and rising prices, interest grew in the investigation of other, less technical aspects of energy use. Studies on policy issues and public opinions related to energy were begun. Economists began to question the accepted theory that a direct relationship existed between economic growth and increasing energy use. Some researchers have delved into the psychological and attitudinal factors that affect energy use. Architects and engineers have constructed models to isolate the structural factors affecting energy use. The relative effectiveness of various incentives to alter energy use are now being investigated.

The roles of local government and the planning profession in energy are also attracting some interest. A few works have considered the role of public information programs in energy use and conservation, but the research is all very recent. The results of these studies are part of a data base, as yet incomplete, which will enable future

researchers to better isolate the political, economic, social, and psychological factors affecting energy use so as to more effectively influence energy consumption.

Thus far the research has concentrated on information gathering. Few studies have been conducted to test hypotheses. The findings have differed and conflicted somewhat, as is common in the early stages of research in any new area of investigation. The results can only be substantiated through further research over a longer time span, which will allow trend identification.

## Energy Use and Projections

Many studies of the quantities of fuels being used currently in the U.S. are being undertaken by the federal government and various private organizations. They vary depending on whether fuel resources or end use are measured. Statistical publications such as the Department of Energy's Monthly Energy Review and Edison Electric Institute's Statistical Yearbook are updated regularly as the situation constantly changes.

Energy use projections also vary considerably. U.S. energy use has fallen below the growth rates originally projected in the 1960s. Many researchers now choose to estimate high, medium, and low usage figures, attaching conditions such as level of conservation, fuel prices, and technological advances for each scenario (Ford Foundation, 1974; Hirst, 1979b). The models used to predict future energy demands are complicated and consider many variables, such as demand elasticity (Chern, 1978). The econometric approach has been popular to explain growth in energy use (Halvorsen, 1978; Uri, 1977; Uri, 1978).

Researchers at the Oak Ridge National Laboratory have developed two engineering-economic models to predict future U.S. energy use in buildings (Hirst, 1979b; Hirst & Jackson, 1979).

Several energy policy studies have been conducted to study past usage, present demand, and projections for the future (Commission on Critical Choices for Americans, 1977; Ford Foundation, 1974; Ford Foundation, 1979; Schurr et al., 1979; Stobaugh & Yergin, 1979). These studies addressed the issue of conservation and the role of public information. The Commission on Critical Choices for Americans (1977) asserted that the general public needs more knowledge and that conservation should be taught in the schools. The 1979 Ford Foundation report stated that evoking conservation efforts requires that information be provided energy users who can then make their own adjustments. The authors believe there is an economic argument for educational programs aimed at the energy user. Public information is needed to help consumers who possess limited resources for exploring and evaluating options. The studies of both Schurr et al. (1979) and Yergin (1979) point out that the particular importance of residential energy use information because of the current lack of knowledge and the decentralized nature of the consuming sector.

## Attitudinal Studies

### Initial Energy Crisis

Studies of attitudes related to energy appear to have been initiated during the 1973 energy crisis. A large body of information has been gathered as to whether consumers believed a crisis existed, who was to blame, and how the situation affected their lives. The importance

of the energy problem to consumers seemed to be directly related to the inconveniences and rising costs individuals had faced (Gottlieb, Murray, Minor, Bradburn, Cotterman, Frankel, & Pisarski, 1974). Those surveyed during or immediately following the 1973 oil shortages appeared to doubt the severity or permanence of an energy problem unless they had personally experienced inconveniences and were unable to obtain the fuel they wanted. The problem seemed abstract and distant. Although some reported taking conserving actions, they were only minor changes, probably seen as temporary measures while the shortage existed. The people were looking for someone to blame for causing the shortages and expected someone else, usually the federal government, to solve the problem.

Three studies of Michigan residents showed respondents were evenly divided on belief in the reality of the crisis (Morrison & Gladhart, 1976; W. B. Doner, Inc., & Market Opinion Research, 1975; Zuiches, 1975). In Los Angeles, 20% of those interviewed believed there was a severe energy shortage; 48% said it was mild; and 26% believed no shortage existed (Bartell, 1974). Fifty percent of those responding to a mail questionnaire in Indiana did not really believe there was an energy crisis (Doering, Fezi, Gaulker, Michaud, & Pell, 1974). Gottlieb and Matre (1976), in their follow-up study in Texas in 1975, found that belief in the energy crisis was directly related to age and socioeconomic status. Warren (1974) found that in Detroit, middle income groups were more likely to believe in the reality of the crisis.

Those participating in Gottlieb and Matre's Texas survey who put most of the blame for the energy situation on the oil companies tended to be younger and of lower socioeconomic status. The oil

companies were also blamed most often (34%) by Indiana automobile owners (Doering et al., 1974), Michigan residents (Talarzyk & Omura, 1975), Los Angeles adults (Bartell, 1974), and Iowa State University students (Muchinsky, 1976). A nationwide survey conducted by NOTC-University of Chicago supported these results, with some respondents also blaming the federal government (Murray et al., 1974). In the Perlman and Warren (1975) study of Hartford, Connecticut, Mobile, Alabama, and Salem, Oregon, the lower income groups were more skeptical about the reality of the crisis, blaming the federal government. Petroleum company executives also tended to perceive that the federal government was primarily responsible by hampering the petroleum industry with taxation, pricing, and import legislation (Muchinsky, 1976). Home interviews of Des Moines, Iowa, residents revealed that members of middle and lower classes (based on occupation, education, house value, and average monthly rent) tended to blame the oil companies and government favoritism to these companies for the crisis. Members of the upper class were more likely to see the shortage as resulting from dwindling energy supplies, wasteful energy use, and population growth (Bultena, 1976).

Throughout the studies conducted at this time, there was a prevailing belief that the problem was only temporary. The people thought that either the oil companies and federal government would change their policies and oil would once again be available, or a technical solution to the energy problem would be found. Consumers appeared unwilling to accept any responsibility or to feel that it was up to them to combat the problem.

A majority of those interviewed during the energy crisis reported that the shortage had affected their use of energy (Bartell,

1974; Bultena, 1976; Doering et al., 1974; Gottlieb & Matre, 1976; Morrison, 1976; Murray et al., 1974; W. B. Doner, Inc. & Market Opinion Research, 1975; Warren, 1974; Zentner, 1978). The changes most often reported were easy, low cost adjustments such as reducing the thermostat and turning off unnecessary lights. Since most of these surveys were conducted within 1 to 2 years of the oil embargo, the respondents should not be expected to have undertaken major steps to conserve energy which involve substantial investment, especially since so many doubted that the problem would last very long.

The researchers disagree as to the characteristics of conservers versus nonconservers during this period. Morrison (1976) concluded in her Michigan studies that belief in the reality of the energy crisis did not affect whether consumers reduced their use of energy. Meanwhile, Murray et al. (1974), Gottlieb (1974), and W. B. Doner, Inc. and Market Opinion Research (1975) found that those who believed an energy crisis existed were more likely to change their behavior to conserve energy. Kilkeary (1975) reported that in New York City, conservation was directly related to energy knowledge. Middle income couples with children demonstrated high levels of knowledge and conservation. Bultena (1976), Perlman and Warren (1975), and Talarzyk and Omura (1975) found that the highest income and education groups were most likely to report taking energy conservation actions. Curtin's (1976) survey revealed that young, highly educated groups conserved more. In their follow-up study, however, Gottlieb and Matre (1976) reported that lower and middle status people were more likely to reduce energy usage. This highlights the argument as to whether lower income families are more likely to conserve because they cannot afford fuel costs or higher

income groups are more likely to take conservation efforts because they can afford the extra expenditure. Both arguments are probably true. A more detailed definition of conservation is needed in such cases. The lower income groups will be forced to reduce usage because of costs. They most likely will change their behavior, suffer more inconvenience and discomfort, while undertaking only low cost conserving actions unless offered financial assistance. Higher income groups can afford larger fuel bills. They are also more likely to purchase conserving equipment that requires substantial investment so that they will not have to alter their behavior or comfort. In his Los Angeles study, Bartell (1974) found that the only significant relationship between conservation efforts and attitudinal or demographic variables was a positive relationship between conservation and the expected future effect on the respondents' own employment.

## After the Crisis

Unfortunately, the U.S. energy problem did not go away and has not been solved. Further research has been conducted to assess public attitudes in the years following the initial crisis. During group sessions in Seattle, Chicago, Nashville, and Hartford, Connecticut, Bee Angell and Associates, Inc. (1975) found a willingness on the part of the American people to make the sacrifices necessary to solve the energy problem, but "only if assured that the need is genuine and that the burden of responsibility is carried equitably by all" (p. 10). Participants were frustrated, almost angry, because of the sense of helplessness they felt in the face of rising prices. Their frustration was intensified by the feeling that the general population could do relatively little to

save energy in comparison to government and industry. Only 20% of those interviewed in Grand Rapids, Michigan, in 1975 believed in real and persistent energy shortages. A majority of the participants were still cynical about the nature of the problem (Thompson & Mactavish, 1976). In a 1977 mail questionnaire to natural gas customers in the Southwest, Cunningham and Lopreato found that although more people now believed that the country had an energy problem, some still placed the blame for the crisis on the oil companies. Even those who believed there was a problem reported using more energy, perhaps expecting a technological solution to the problem. The more educated higher income respondents were more likely to perceive a problem. Using 70 knowledge and 76 attitudinal questions related to energy, the National Assessment of Educational Progress Project (1978) survey of 26-to-35-year-olds also measured energy knowledge and attitudes. The study's results reveal that belief in the seriousness and length of the nation's energy problem has spread since the early 1970s. Knowledge about fuel sources and the relative importance of those fuels was still less than desirable with only 14% knowing that coal is the primary U.S. fuel for electricity and just 50% knowing that the U.S. imports 30 to 60% of its oil. It is encouraging that most respondents knew about activities that will reduce energy use, but few realized how much they could conserve. Although it is also encouraging that 95.9% said they would like more information on conservation and 94.0% said they would conserve more if they knew more about conservation methods, the age group surveyed must be kept in mind. Younger groups may be more interested in the topic of energy and may not be representative of the general population.

## Residential Conservation

### Technical Potential

With the growing interest in energy conservation came the realization that little was known about the potential savings available through structural changes in housing. The cost of energy had been so low in comparison to construction costs that the subject had been given little attention. Pleas to persuade residents to alter their homes to conserve energy could have little impact without reliable evidence that such changes would indeed decrease the amount of energy used in their residences.

Hittman Associates, Inc. (1973; 1974; 1975) undertook several studies with federal funding to investigate the effectiveness of storm doors and windows, ventilation, furnace energy recovery, open air cycle air conditioning, and double glazed windows in single and multifamily housing. The modifications resulted in savings of 23 to 36% of energy used to space heat and cool. The studies showed that increasing insulation was the most effective way of improving heating efficiency. Three inches in an uninsulated attic may reduce use by 33%. Six inches in an uninsulated attic, 3 inches in the walls, and storm doors and windows could save 55%. Lowering the heating thermostat produced a 15% annual savings; servicing the furnace, 10%; using a heat pump instead of electric resistance heat, 40%; caulking and weatherstripping, 10%; storm windows and doors or plastic coverings, 15%; and raising the air conditioning thermostat six degrees, 47% (Allan, 1975).

The National Bureau of Standards retrofitted a large 20 year old wood-frame house in Washington, D.C. in three stages to measure

savings. The first stage was to reduce air leaks, but since the house was already tight the first actions had little effect on energy use. The second stage involved adding storm windows. "The addition of storm windows reduced the heating requirement by 25.2 percent" (U.S. Department of Commerce, 1978, p. 1). The third stage, installing insulation in the floor, ceiling, and walls, reduced heating energy use by an additional 33.3%. The floor insulation prevented natural heat loss and so the retrofit was not successful in reducing the cooling requirements for this particular house.

Another widely respected study is Princeton's Twin Rivers Experiment. For 5 years researchers used sophisticated equipment to measure energy use in 32 New Jersey townhouses in order to study the effects of weather, building type, retrofits, and resident behavior on energy use (Socolow, 1978). One interesting conclusion of the study was that "with interior window insulators of various designs, basement and attic insulation, and systematic attention to routes of air infiltration . . ." space heating requirements were reduced 67% (Sinden, 1978, p. 63). These significant savings were due in part to the improved retention of nonfurnace heat from the sun, appliances, and residents. Upgrading the thermal resistance of a ceiling in Canton, Ohio, from R-13 to R-19, installing storm windows, and adding weatherstripping reduced the amount of energy required for space heating and cooling by 34% (Degelman & Lewis, 1975).

A report by Steinhart, Hanson, Gates, Dewinkel, Briody, Thornsjo, and Kabala (1978) stated that an average of 50% of heating fuels could be saved by reducing infiltration, adding insulation, and improving windows in older homes.

The amount of energy used within the home can vary dramatically with the behavior of the residents and their use of appliances. The U.S. Congress Office of Technology Assessment (1979) reported that use can vary in identical houses by "as much as a factor of two" (p. 7). Several studies have addressed the problem of identifying the characteristics of high and low energy users. Most researchers agree that income is the best predictor of residential energy use, with higher income groups using more energy (Craig, McCann, & Stannard, 1977; Donnermeyer, 1978; Grier, 1978; Morrison & Gladhart, 1976; Newman & Day, 1975; Warkov, 1976). This could be explained in part by the fact that higher income groups can afford larger homes and more energy-using appliances. In two Washington Center for Metropolitan Studies nation-wide surveys, Grier also found that surburban residents used more energy in their homes than central city residents. This could be due in part to the greater number of more energy efficient multifamily dwellings in the central city. Morrison and Gladhart, in a survey of Lansing, Michigan, residents, also found that families in the child rearing stages used more energy than those without children or in later stages. Family size was also found to be directly related to energy use in a study of a low income federally subsidized housing project (The University of Tennessee, 1980). The socioeconomic profile of heavy residential users has been developed as high income, well educated families living in suburban single family homes.

Profiles of high and low energy users, based on attitude, preferences, and general energy knowledge have been more difficult to establish. Donnermeyer (1978) found no correlation between use and opinions or attitudes. In the Twin Rivers experiment, attitudes toward

"personal comfort and health were the best predictors of consumption" (Seligman, Darley, & Becker, 1978, p. 231).

Reported Conservation

In the years following the Arab oil embargo, studies have shown growing numbers of persons taking energy conservation actions in their homes, but these were mostly easy low cost actions. Grier's (1978) findings showed that only a small percentage of households had made substantial energy saving improvements to their homes. Middle income groups ($14,000-16,999) made the largest proportion of improvements. Walker and Draper (1975), in their Austin, Texas, study, saw this as a result of the lower income households already holding their use at a minimum because of price and the upper income households being rather unresponsive to price.

An Opinion Research Corp. (1976a) national telephone survey revealed that 71% of the respondents had installed caulking or weather-stripping; 65%, storm windows and doors; and 65%, attic insulation. "Families with yearly incomes of $10,000 or greater were more likely than those with lower incomes to have already taken steps to caulk, weatherstrip, install storm windows and doors, and insulate attics" (p. 20). Of those who could adjust their thermostats, 85% reported having turned down their heat during the winter of 1974-75.

In Warkov's (1976) Houston study, 75% of those interviewed over the telephone reported reducing their use of lights; 65% reduced their air conditioning; and 14% had insulated their home or apartment in the last year. Reductions in lighting were reported by all income groups. Curtailment of air conditioning was less at higher income levels, while

the likelihood of adding insulation was directly related to income level. Renters tended to conserve less than owners, with house renters conserving more than apartment dwellers.

The U.S. Department of Energy's Energy Information Administration (1980) conducted a survey on conservation actions taken by residential energy users between January 1977 and December 1978. The researchers found that most energy conservation additions to the respondents' homes were relatively inexpensive. "Approximately one-third of the households added some sort of insulating material or equipment. Over two-thirds of the households making additions in each year added inexpensive items only" (p. 4). Over the 2 year period, approximately 20% added either storm windows, storm doors, or attic insulation. Some 10% made at least one relatively expensive addition each year. Caulking and plastic were added most often to homes over 5 years old. Basement and wall insulation had been added to more newer homes along with storm doors and clock thermostats. Higher income households were more likely to have installed weatherstripping, caulking, roof insulation, storm doors, and storm windows. Lower income residents were more likely to have placed plastic over their windows. Younger households tended to install plastic over windows and weatherstripping. Housing units with heads 35 to 39 years old were more likely to have installed caulking, storm windows, and storm doors. Whites and "others" were generally more likely to have installed all types of conservation equipment than Blacks. Less educated respondents had installed more weatherstripping and plastic window coverings. Education had little effect on other efforts.

Cunningham and Lopreato (1977) also found that people were more likely to have made efforts to conserve energy which did not require

much expense or change in habits and lifestyle. A total of 96.1% of the respondents reported turning down their thermostats in winter, 89.2% turning up their thermostats in summer, 88.3% using their drapes to help heat and cool, and 85.5% closing off unused rooms. Just 11.4% had installed Thermopane windows; 25.0%, storm windows; 36.0%, attic insulation; and 59.3%, weatherstripping. Those classified as energy conservers were "low-income, less educated, and more likely to be of a minority race or ethnic group than were the less energy-conserving subjects" (p. 75).

Hogan (1976) found no relationship between energy conservation behavior and education, occupation, age, income, or family size. Thompson and Mactavish (1976) found that those who were older, less educated, and of lower occupational level had taken few conservation measures. Those taking conservation actions tended to be under 45, skilled or professional, and have a college degree.

Some attempts have also been made to determine relationships between attitudes and energy conservation behavior with perplexing results. Bee Angell and Associates, Inc. (1975) found that by and large "active energy conservationists could not be classified as being particularly different from their less-committed counterparts, either in terms of their socioeconomic profile, their appreciation of the problem, or their lifestyle" (p. 27). Those actively trying to conserve energy did tend to have a "personal sense of responsibility." They mentioned "concern for the quality of life, interest in their children's future, [and] care for the environment" more often (p. 28). Hogan (1976) found those conscious of environmental problems were more likely to conserve.

Behavior Modification

The lack of action on the part of so many residents has prompted those interested in achieving energy conservation and energy efficiency goals to study the motivation of energy conservers and what type of stimulus or reward will elicit the desired results. Thus far monetary savings has appeared to be the major motivating factor among those taking energy conservation actions. Expected savings were important to Knoxville homeowners with above average property values (Ericsson, 1978). Stern and Kirkpatrick (1977) stress that although group consciousness can pressure individuals to behave in the long-run interest of the entire society, immediate reinforcements or punishments must be used to make the long-run benefit of society the same as the short-run individual benefit. Incentives, Stern and Kirkpatrick report, can reinforce some people's desire to consume. With those who do not favor conserving initially, reducing energy use to obtain rewards may translate into work and they may then only conserve for as long as the incentive lasts. The long-term outlook for society is easily forgotten in working just to obtain the reward. The authors suggest that appeals to patriotism and loyalty, and forewarning of consequences can effectively induce conservation without the subjects feeling coerced. The researchers believe that cohesive groups such as neighborhoods are the best targets for inducing conservation. Stern (1976) introduced incentives into a carpooling game. Although price increases reduced energy use, direct payoffs and rationing were ineffective. Thirty-one volunteer households in Lexington, Kentucky, were divided into two groups. One received a manual outlining conservation options and a recording sheet for taking their own meter

readings, while the other group received the same material plus cash payments ranging from $2 to $20 per week for achieving conservation goals. The cash incentive group averaged 15% more electricity reduction than the information group during the experiment, however, the follow-up analysis after 2 months revealed a weaker conservation trend for the incentive group than the information group (Winett & Neitzel, 1975).

Lack of feedback on energy use has been cited as a problem in achieving conservation in the past. Several researchers have, therefore, been studying the effects of feedback on energy use. In the Twin Rivers experiment, 29 households were told that the air conditioner was their largest electricity user and were encouraged to conserve during the experiment. One group of homeowners was shown its electricity usage four times a week for 1 month expressed as a percentage of their usage as predicted by the researchers based on average daily outdoor temperature. During this time, the experimental group used 10.5% less electricity than the control group (Seligman & Darley, 1977). Hayes and Cone (1977) studied the relative effectiveness of feedback, incentives, and information on consumers who do not pay their own utility bills directly. In four units of college student housing, payments produced immediate and substantial reductions. Feedback produced some reductions, but information about conservation and the cost of running appliances had no effect. Adding feedback or information to the payments produced no greater reductions. In West Virginia, feedback in the form of a daily flyer with energy costs for that day, week, and the percentage above or below a baseline projection was contrasted with providing information on a single poster listing the amount each appliance used per year produced similar results. Providing financial incentives to

those who do not pay their utility bills directly should be expected to have greater results than one-time exposure to conservation information. Providing energy use feedback daily, but conservation information only once with no instruction, is not a very fair comparison in terms of relative costs and extent of personal contact. Palmer, Lloyd, and Lloyd (1977) put a written conservation slogan and/or feedback on four subjects' doors daily. Responses in energy use varied among the families so that there was no clear difference in the effects of the two prompts. It should be noted that the participants again were not provided any instructions in ways to reduce use. Kohlenberg, Phillips, and Proctor (1976) used information, feedback, and incentives in an attempt to reduce peak electricity consumption. A combination of feedback and incentives proved most effective, cutting peak demand in half. After removal of the experimental feedback equipment and the incentives, though, the subjects returned to their pretreatment patterns of consumption. In Stern's (1976) carpool game, detailed information about long-term consequences of current usage levels had a significant effect even before incentives showed any influence.

Heberlein (1975) recorded no change in use 1 year after sending letters to Madison, Wisconsin, apartment residents in an effort to affect their energy use. Only one-half (43) of the families were still living in the apartments when the second readings were taken, so few participants received the full treatment of the experiment.

Craig and McCann (1978) manipulated communication variables in an attempt to reduce air conditioning usage in 2400 single-metered electric residences in New York City. "The results suggest that properly

designed persuasive messages can have an impact on energy conservation" (p. 433). The message varied by source (Public Service Commission, Consolidated Edison, Cooperative Extension), appeal (monetary savings, patriotic—make U.S. energy independent), and recommendations (familiar—four tips to save energy; unfamiliar—NSF ventilation study), and was included in two of the subjects' electricity bills along with a reply card. The researchers measured actual use, interest in receiving more conservation information, and participants' intention to conserve. Those receiving the unfamiliar information on ventilation systems conserved more and requested more information. The different sources and appeals used had no visible effect on use or interest. A questionnaire on future intent from Cornell University was returned by only 17% of the participants. Although the respondents' energy use did not differ from nonrespondents, responses were returned more often by professionals over 40 years old with incomes over $15,000. None of the main variables appeared to have a significant effect on the intentions of the respondents. Craig and McCann pointed out that short communication on an interesting subject can affect behavior if properly designed.

Craig and McCann also asked subjects how useful various information sources had been to them. Television and newspapers were useful to 86%; bill enclosures, 78%; radio, 75%; magazines, 73%; mail, 50%, friends and relatives, 43%; and billboards, 40%.

Cunningham and Lopreato (1977) found that newspapers were the most important source of information for their respondents. Others cited as important were television and news magazines. Radio, friends, and family were listed to a lesser extent.

The credibility of the source of information was found to be important in the Craig and McCann study. The Public Service Commission (PSC) generated an "18.1 percent response rate compared with a 10 percent response rate for the same communications identified as originating from Con Edison" (Craig & McCann, 1977, p. 44). Those receiving the communication identified as coming from the PSC used significantly less electricity than those who received the same message identified as originating from Con Edison. The University Cooperative Extension was perceived as being "the most credible source overall" (p. 33). The Federal Energy Administration received the highest expertise rating. Consolidated Edison fared the worst in the ratings. Gottlieb and Matre (1976) found that the utility companies were ranked lowest as accurate and honest information sources. The government and national newspapers were growing in credibility between 1974 and 1975. News magazines, local newspapers, radio, and television declined as perceived reliable information sources, but were still ranked higher than utilities, fuel supply companies, and the government.

Another 1975 study supported these findings (Zentner, 1976). Television received a vote of confidence from 57% of those surveyed; newspapers, 56%; and conservation activisits, 50%. A majority of those surveyed had little confidence in energy information originating from the federal government (55%) and the oil companies (69%).

In 12 studies to determine source credibility's effect on attitude change, McCrosky (1969) determined that a moderate to low credibility source could increase its influence by presenting new evidence from a credible source. A high credibility source does not have this problem and can present its own evidence.

A few of the studies on energy behavior and use have dealt with the problem of designing successful public information programs. Mashburn and Pusey (1977) have produced some guidelines for energy education programs. The objectives of such a program can be to:

1. create attitudinal changes
2. create behavioral changes
3. increase knowledge and skills of conservation practice
4. increase knowledge and skills of alternative sources of energy. (p. 298)

The objectives can be separated and only one or two emphasized for a particular audience, but first, the authors suggest, a constant awareness of how people use energy in all aspects of their lives must be ingrained. To achieve these objectives, the audience should be broken down by age, income, and housing types (including new, old, historical, and delapidated). The services that can be used to reach these groups include seminars, workshops, training programs, demonstrations, exhibits, publications, individual consultation, referrals, and the media. It is difficult to attract audiences for workshops, seminars, and training programs unless there is communication to establish a specific need and/or the program involves something "a bit exotic," such as solar or wind energy (p. 299). The authors suggest taking advantage of captive audiences at meetings of civic groups, women's clubs, youth groups, and trade associations. Spring and summer are bad for meetings, as are Saturday mornings. They suggest that demonstrations and exhibits can be helpful. Sessions should not last longer than 1 hour. The authors feel that shopping center displays with working models and cutaways that are staffed by competent, impartial personnel can be effective. Computer simulators and games attract interest. Mashburn and Pusey emphasize the

need for some type of follow-up where technical assistance and further information would be available. The delivery organizations suggested are colleges and universities, utility companies, building material suppliers, technical societies, and volunteers.

An Opinion Research Corp. (1974b) report suggested that two types of educational campaigns are needed—one to educate people on basic factual information and the other portraying more specific potential savings to more knowledgeable groups. The studies conducted by Grier (1978) and Walker and Draper (1975) recommended that conservation pleas be directed toward middle income groups, those most likely to take conservation actions.

National polls show that parents want their children to receive energy information in school (Opinion Research Corp., 1976a). The Gallup Organization Inc. (1976) reported, however, that reaching teens and preteens is not an effective way of educating adults. They concluded that children reflect their parents' views and have little influence over them. The authors suggested using television to reach children and an "advice to consumer" column in newspapers to educate adults (p. 29). The report recommended stressing the monetary savings available to reinforce saver values rather than trying to create an energy conservation ethic.

The Tennessee hotline reported more interest in general conservation topics during the fall and winter. Solar topics were of more interest during the spring and summer months. Inquiries about home energy audits and utility loans "were the greatest in the fall" (Webber, R. E., 1979, p. 13).

Several federal government publications offer advice to community groups wanting to organize energy events. The Solar Energy Research Institute (1979) provides suggestions for groups of varied levels of interest and previous knowledge based on community experiences. For uninformed groups, SERI suggests a Solar Energy Fair conducted by CETA workers and volunteers. The local AIA chapter can be asked for graphic illustration of passive solar systems. Lectures can be held in local churches or public buildings along with displays of photovoltaic panels. The support of local politicians and environmental groups is an asset; coordination with the National Sun Day Committee can secure free publicity. Music, mime, and folk dancing are possible types of entertainment for such events. To promote energy conservation through appropriate dress, a luncheon fashion show and bazaar can be organized. This event can include displays, clothing sales, sewing workshops, and design seminars. For an uninformed, concerned neighborhood, a more involved project could be attempted. One neighborhood has combined energy conservation with rehabilitation. Flyers, telephone calls, and personal visits were used to advertise an organizing conference. Music was provided at the conference along with plays by local children. Follow-up workshops were held in six buildings as demonstrations. Thereafter, residents and owners bought the materials, some with financial assistance, and volunteers weatherized the homes. To increase energy awareness in an interested community, one group sponsored a fair to bring citizens together with representatives from industry, government, professional organizations, energy offices, and utility companies. The fair was publicized through community organizations, free calendar of events

notices, the Chamber of Commerce, and Scouts. The Jaycees and women's clubs provided food and a fast-food chain provided free drinks. The program included speakers, concerts, and youth activities. SERI suggests locating the fair at a shopping mall, university campus, park, or closed block. Timing the fair to coincide with a home and garden show, holiday, or school program can boost attendance. Sponsors are warned to emphasize only one topic, such as a county fair theme with awards for solar cooked or dried foods. A fairly energy conscious and interested group may be more interested in an evening of high quality speakers dealing with one subject of interest.

The Department of Energy (1979a) has published a workbook for neighborhood leaders to learn how to obtain grants for appropriate technology, weatherization, energy audits, crisis intervention grants, tax credits, and loans for solar projects to help the poor, minorities, and low income elderly. Allan (1975) recommends that a community conservation program include contests for the best conservation ideas, recognition of citizens who practice good conservation habits, and printed handouts in the newspaper and announcements on radio and television which contain specific instructions and the amount of money that consumers can save. Collins (1976) suggests that homeowners be approached through several programs. Information centers could provide materials, audiovisual programs, technical assistance, and a speakers bureau. Demonstrations could show how to retrofit a home. Workshops, conferences, seminars, and symposia could be conducted. Mass media programs could also be designed.

In five San Francisco Bay communities a neighbor-to-neighbor energy campaign has been initiated by an educational foundation

("Neighbor-to-neighbor," 1980). Volunteer workers contact homeowners at their residences and arrange 1 hour, informal workshops in the homes of volunteers. These workshops include displays, written materials, and homeowners sharing their experiences. As of February 1980, 6000 homeowners had been contacted and 15 workshops had been conducted.

## Local Residents' Information Sources

Knox County residents have several sources available for energy conservation information. The use of these sources is in part dependent on their perceived reliability, ease of access, cost, and level of sophistication. Knox County residents have available to them more government sources than residents of many other communities.

### Local Government

On the local level, energy conservation information can be obtained in a variety of ways. The City-County library system has volumes available for loan on energy use, conservation, and instructions for weatherization. The Knoxville-Knox County Community Action Committee has videotapes on energy conservation and information booklets available from its office and the East Tennessee Design Center. The Design Center welcomes visitors to its solar greenhouse. The CAC also provides weatherization services to those eligible in the community. The Knoxville and Knox County school systems relay some energy conservation information to students, primarily through science and home economics classes. KUB and LCUB, in cooperation with TVA, provide information, conduct home energy audits, and arrange weatherization financing for customers.

State Government

The State of Tennessee's Energy Authority operates a toll-free telephone hotline as part of the energy extension service. After 1 year of operation, "about 600 contacts were being received each month" (Webber, R. E., 1979, p. ii). The hotline is publicized through State Fair displays, home audit referrals, posters on city buses, and public service announcements on radio and television. Users of the service also report having heard about the hotline from pamphlets, libraries, teachers, newspapers, and friends. Hotline operators will send callers appropriate publications dealing with the subject of their calls. When the operator is unable to answer a question verbally or with publications, the caller is referred to experts whose names the operators maintain in a file.

The University of Tennessee Cooperative Extension Service provides information on home energy conservation to its clients through its regular contacts. Requests for specific information can be made to the local Extension agents. The University of Tennessee Energy, Environment, and Resource Center produces publications on energy conservation that are available at a nominal fee. The University also has an extensive collection of books, pamphlets, and reports dealing with energy conservation available in its library for use by the general public. Several courses relating to energy are taught at the University in various departments. To be eligible to attend, persons must register and pay appropriate fees. The noncredit program also offers classes related to energy. On occasion the University helps sponsor seminars with private groups concerned with energy which are held in University facilities.

Federal Government

At least 12 federal departments and agencies are involved with providing energy information for the public. Some provide information directly while others help sponsor research and information centers. Many state and local sources of information receive funding and, sometimes, their publications through federal agencies. The U.S. Department of Energy carries the main responsibility for energy information. The Department publishes documents and provides information and displays. It sponsors a toll-free information line and will answer written requests for information. The Technical Information Center at Oak Ridge, Tennessee, was established to disseminate the results of D.O.E. research and development activities. The Department also sponsors the Solar Energy Research Institute. Results of its work are available through requests by mail or over the telephone. D.O.E.'s Regional Solar Energy Center in Atlanta provides "technical assistance, training and education, workshops and conferences" (U.S. Department of H.U.D., 1979, p. 54). Public service announcements which provide conservation information are also produced by the Department. The American Museum of Science and Energy operated by the Oak Ridge Associated Universities for D.O.E. provides Knox County residents with a free nearby energy information center.

The Department of Housing and Urban Development is involved in energy information dissemination through the National Solar Heating and Cooling Information Center. It provides information and speakers on request by mail or its toll-free telephone number. The Department has produced "how-to" books such as In the Bank . . . Or Up the Chimney?,

for distribution to the general public. It also has pamphlets available on its weatherization finance programs.

The Department of Agriculture produces publications dealing with energy for distribution by the Cooperative Extension Service and by the U.S. Government Printing Office. Farmers Home Administration (FmHA) will provide information on its grant and loan programs.

The Department of Commerce's National Bureau of Standards (NBS) produces publications on structural energy efficiency, building standards, and consumer information. Many of the reports are the results of technical research conducted by the NBS at its National Center for Appropriate Technology. The Department also produces handbooks for builders. Results of its work are available at a nominal cost.

The Community Services Administration prepares information primarily for low income groups. Its publications include "how-to" pamphlets such as "Save Energy: Save Money." It also disseminates information on its emergency energy conservation services.

The Internal Revenue Service will provide information to taxpayers on income tax credits available for the installation of energy conservation and alternative energy equipment.

The Tennessee Valley Authority provides a tremendous energy information resource to Knox County residents. TVA has pamphlets and expert advice available upon request by telephone or mail. Displays are often set up at fairs and other gatherings to provide information. The staff works with the local utility companies to conduct energy audits and finance weatherization through up to 8 year no-interest loans with

payments added to customers' monthly bills. TVA maintains a library with a number of publications related to energy that are available for loan to the general public.

Besides being available from the federal agencies directly, many government publications on energy conservation can be obtained by mail from sources such as the Consumer Information Center and the U.S. Government Printing Office. Many of the publications are free.

Private Sources

Home repair manuals have for years contained information on how to weatherize homes. The growing interest in energy conservation and finding the least costly ways of lowering fuel bills has been followed by the private publishing companies. A proliferation of home "how-to" manuals have been placed on the bookstore shelves in the last few years ranging from manuals on how to test the energy efficiency of a dwelling to detailed instructions on how to retrofit a house for solar heating (Adams, 1975; Dervin & Nichols, 1976; Diamond & Lorris, 1978; Hand, 1977; Kleeberg, 1977; Morrell, 1974; Nunn, 1979; Price & Price, 1976; Vragel, 1975).

Magazines often carry articles related to home energy conservation. Such articles can be found in all types of magazines—housing and interior decorating, science, professional journals, energy publications, and others.

Nonprofit groups have also begun distributing energy information. Such organizations as the Tennessee Solar Energy Association, the Sierra Club, and the National Wildlife Federation disseminate information to members and other interested persons. Other organizations such as unions

and professional groups also are starting to disseminate energy information as a public service. The United Auto Workers, for example, has produced its own energy conservation booklet available upon request free of charge to the general public. Many of these groups also hold seminars and invite speakers knowledgeable about energy conservation.

Another source of information for local residents that is often forgotten is other private individuals. Friends, neighbors, and colleagues can share their experiences related to home energy conservation. This channel is less formalized than those previously discussed, but it is an important means of spreading energy conservation information.

## Energy Planning

The subject of the local government's role in energy planning, and energy information programs in particular, has only recently been addressed as more communities enter this new area of planning and programming. The part the local government plays depends upon the powers available to it, the funds at its disposal, and the desires of the local constituency for the government to work in this area.

Harrison and Shapiro (1979) expect local government's primary role to be to reduce the government's own demand for energy in its buildings and vehicles and to encourage the residential sector to reduce its fuel use. They suggest four approaches to the energy problem on the local level: (1) building code energy efficiency modifications; (2) zoning and subdivision regulation changes to promote denser development of more energy efficient types of structures; (3) habitation codes to promote conservation efforts in rental buildings; and (4) information and technical assistance to increase the public's

awareness of the economic benefits of energy conserving investments. Other researchers have been examining the problems and benefits of following these approaches (Allan, 1975; McGrane, 1978). The results have shown that the local government does have a role in energy planning and that public information and education is an area in which local government can have a significant effect on energy use (Wulfe, 1978).

Several communities are already involved with public information programs on energy conservation either through the CCEMP program, the Energy Extension Service, or on their own. The success of the programs has been mixed. Among the CCEMP communities, Allegheny County had a slide show produced which explains the energy planning program. It was printing a Daily Energy Index in a local newspaper which compared the community's daily usage by its consumption in 1976, but the column was cancelled due to "lack of interest" (U.S. Department of Energy, 1979d, Volume III, p. III-8). It also designed a program to teach residents how to implement energy conserving actions rather than just telling them what to do. Dade County has been working through its local CAC to sponsor seminars for low income residents. Los Angeles has developed a program in conjunction with the Boy Scouts to deliver information in low income areas. The City has developed a speaker's bureau and a mobile display unit. Working with the local utility company, a new billing system was designed which provides customers with their 12-month consumption pattern. King County is producing a newsletter, Energywise, for its residents. The City of Philadelphia, in cooperation with the Philadelphia Solar Demonstration Program, funded and organized "Consumer Caucus for Neighborhood Energy Planning" to develop outreach programs for community groups. In Richmond, the City is holding

seminars on energy and printing an energy newsletter. The City of Seattle has developed an Energy Information Center, helped in the training of teachers in energy curriculum, provided grants to neighborhood organizations for innovative energy projects, placed exhibits at fairs, run ads in newspapers, and conducted community outreach meetings.

Oakland is concentrating on providing alternative energy information to low income groups. It has also helped with a Museum Learning Center funded by U.S. D.O.E., Chevron, Pacific Gas and Electric, and the museum. In Minneapolis, infrared photographs of the city's homes are available at local banks and public information meetings conducted by the City. Slide shows and brochures on energy conservation are used at the meetings and are available to area residents upon request (U.S. Department of Energy, 1979d, Vol. III).

McGregor (1978) reported that in Davis, California, public education has been a significant part of their community energy conservation programs. Two local newspapers were used.

> In addition, quarterly free newspapers were given to every resident, containing practical advice for ECT's, explanation of the city goals and program, cartoons, and a "Wendy Weatherstrip" (Ala Ann Landers) column. Per household energy consumption dropped 18 percent between 1973 and 1978. During this period, only about 10 percent of the housing stock was new construction. If this housing had achieved a 50 percent reduction in energy use, it could have accounted for three to five percent of the drop. The remainder must be lifestyle changes brought about by public education or retrofitting for energy conservation. (McGregor, 1978, p. 34)

It must be remembered that the reductions in use resulting from retrofit can often be traced back to public education on what actions to take to conserve energy. The City of Vail has developed an energy facility with displays and staff experts. New products are presented by

knowledgeable persons who help citizens implement conserving actions, develop projects and classes, and coordinate public actions. The City publicized the program and received some help by holding an international conference in conjunction with professional organizations and federal agencies (Minger, 1977).

Harrisburg, Pennsylvania, held a workshop in coordination with the University of Pennsylvania as part of the Energy Extension Service. Despite advertising and contacts throughout the community, only a few people attended. There seemed to be little interest in the subject in the community (Loukissa, 1979). Other activities of the Pennsylvania Energy Extension Service conducted through the University of Pennsylvania's Community Consultation Laboratory include mall energy conservation fairs, television and radio programs, newspaper stories, coordination of car and van pooling, meetings with apartment owners and downtown merchants, infrared photography, and teaching high school students to conduct energy audits.

The Tennessee Energy Extension Service conducted three 6-week courses which met 2 hours per week during the fall and winter of 1978 in Nashville to discuss meter reading, insulation, heat pumps, solar energy, windows, home energy audits, and appliances. The workshops were conducted by urban residential coordinators and guest speakers from TVA, local utility companies, and the Tennessee Energy Commission, and local architects, landscapers, and businessmen. The classes attracted a total of 41 participants. The workshops cost $20 per household. Of the participants, 44% attended all six classes; 40% attended five; 12%, four; and 4%, three classes. One year later 25 participants were

surveyed. Of those questioned, 60% had added caulking; 36% added attic insulation; 36% changed their thermostats; 32% installed vents; 28%, weatherstripping; 12%, wall insulation; 12%, floor insulation; 8%, heat pumps; 8%, Thermopane, doublepane, or storm windows; 4%, insulated drapes; and 4%, wood stoves. When asked their opinions on the classes, "several participants suggested that more active, hands-on learning would have been highly beneficial" (Liebowitz, 1979, p. 13). The participants suggested having speakers who had actually built an energy efficient home and could, therefore, speak from experience.

After taking the course, 4% more reported attending other workshops and seminars than before the classes. An additional 28% attended exhibits and demonstrations. Eight percent more obtained literature on energy conservation and 20% more had an energy audit conducted on their homes. Whereas none of the participants had called the State hotline before the course, 8% did in the year following. In addition, 32% viewed infrared photographs of their homes.

The Texas Energy Advisory Service produced a newsletter which was sent to interested persons who were assumed to already have some knowledge on the subject of energy. A mean of "2.4 other persons" (U.S. Department of Energy, 1978a, p. A-6) also read each copy. Of the recipients, 68% reported adopting some of the suggestions. Most undertook low cost actions such as turning off appliances when not in use, lowering the heat and raising the air conditioning thermostats, sealing leaks around windows and doors, and shading east and west windows. Fewer participants reported ventilating the attic, buying conserving appliances, or adding attic and wall insulation. A survey of a sample

of those receiving the brochure "Plain Talk about Buying or Building an Energy-Efficient Home" from the Texas Energy Advisory Service revealed that a mean of 1.55 other persons read the brochure. Three-fourths of those planning to buy or build a home in the next year expected it to have the suggested features. The features readers most often learned about were heat pumps, energy efficiency ratings (EER), insulation, and ventilation systems. An open house held at two energy efficient houses advertised in the newspaper and on television attracted over 500 visitors. Of the 200 visitors surveyed, 34% later installed some feature they saw that day. The new features most often reported learned about were insulated doors, heat exchangers, double pane glass, caulking, and ventilation. A solar seminar conducted on a Saturday at a local university attracted 300 participants, mostly 25-to-34-year-olds who were not connected with the university. The attendees found out about the seminar from newspapers and friends. One-half of the participants intended to use the solar knowledge they gained. They did suggest shorter sessions with fewer speakers, a workshop format with more information on equipment. The Texas study also found displays and video-tapes effective in reaching large numbers of people and increasing their energy awareness, but by themselves they did not change behavior.

The Northwest Public Power Association is working through local utility companies in conjunction with local government to educate consumers to create a demand for energy efficient homes. Plaques were awarded to energy efficient homes based on insulation, windows, doors, vapor barriers and ventilation, fireplaces, showerhead restrictors, humidity control, and the water heater and pipes. The Association has

produced brochures, newspaper ads, bill stuffers, bumper stickers, lapel buttons, and award certificates. Yard signs are available for use by real estate agents and homebuilders to identify energy efficient homes.

## Need for Further Research

As the interest in energy conservation has grown, so has the need to understand attitudes and behavior of energy users, as well as the ways in which energy use can be modified. The findings of previous research have contributed to the existing knowledge on these subjects; however, conclusions have been conflicting and recommendations, therefore, diverse. The importance of developing interest in the subject has been repeated in several studies. The consumer's interest can be affected by the subject matter, source of information, and ways in which the information is delivered. To develop successful energy education and assistance programs, more research is needed on the behavior, interests, and attitudes of energy consumers (Ford Foundation, 1979; National Assessment of Educational Progress Project, 1978).

This study adds to the knowledge already gained in previous research on energy conservation. The data gathered will allow tailoring of energy information programs to the needs and interests of Knox County residents as part of the community's energy planning project.

## Purpose of This Study

The purpose of this study is to to determine for the residents of Knox County which information programs have been used in the past; what home heating and cooling conservation actions have already been

taken; which financial benefit programs have been used; the level of interest in new information programs; and public attitudes toward some of the proposed energy plan conservation strategies. Previous research on energy conservation has illustrated that programs especially tailored for a particular audience have a greater probability of achieving the desired objectives. The results of this study will enable the development of energy information programs as part of the community's energy planning project which reflect the needs and interests of Knox County residents.

# CHAPTER III

# METHODOLOGY

The general approach used in the study was that of survey research. A mail questionnaire sent to a systematic random sample of Knox County residents was used to gather data on energy users' conservation activities, interests, and attitudes. The responses were analyzed using the Statistical Package for the Social Sciences (SPSS) and compared with results from previous studies. Based on the information gathered in this study and others, recommendations are made for designing energy information programs for Knox County residents.

## Sample

In 1978 there were 113,680 occupied dwelling units in Knox County. The Knoxville area telephone directory provided the most complete listing of residential units available to the researcher to serve as a sampling frame. (A list of residential gas and electricity customers, considered the most complete listing of area residents, was not obtainable from KUB and LCUB because of legal restrictions. The City Directory of Knoxville presented an incomplete list of rural residents. Those areas included were selected by totally arbitrary means (Rothberger, 1980).) According to Jake Steele (1980), a South Central Bell employee, the Knoxville calling area has 114,923 main telephones. Of these, approximately 110,000 are located in Knox County. Three thousand households (3% of the population) do not have telephones. These

tend to be low income and transient residents. Of those households with telephones, 10% have unlisted numbers. Jean Solari (1980), a researcher with TVA, reports that no socioeconomic groups are completely missed when telephone listings are used as a sampling frame. The list obtained from the telephone directory, therefore, contains 87% of the target population, with the lowest and highest income groups underrepresented to some degree.

A systematic random sample of 1000 households was mailed the survey questionnaire. The size of the sample selected was determined by the population size, purpose of the study, and desired accuracy criteria. To estimate population characteristics in terms of proportions (e.g., proportion of Knox County households that can be classified as conservers, proportion of conservers who can be classified as low socioeconomic status), with a 90% level of confidence, requires 1071 observations to ensure a maximum error of estimation of 2.5%, 421 to ensure a maximum error of 4.0%, or 270 to ensure a maximum error of 5.0% (Brown & Vance, 1961).

To select the sample members, the last two digits of the last entry in a random number table were selected (09). One listing from each of the four columns on each of the 318 pages of the Knoxville area listings in the Knoxville telephone directory was selected, alternately counting from the top and the bottom of the columns to the ninth entry. This produced 1272 listings from which nonresidential listings and listings from outside Knox County were eliminated, leaving 1000 sample households.

## Survey

Each household was mailed a questionnaire in an MPC envelope accompanied by a cover letter on MPC Energy Project stationery explaining the study and giving telephone numbers from which assistance could be obtained. (Appendix A contains copies of the questionnaire and cover letter.) A business reply envelope addressed to The University of Tennessee Graduate School of Planning, Knoxville, was also enclosed. The questionnaires were numbered by hand in a corner so that non-respondents could be identified. The letters were mailed over a period of 5 days. The City Directory and Cross Reference Directory were consulted to find addresses for every questionnaire returned because of insufficient address or because the resident had moved. Those for which a better or more recent address could be found were sent another copy of the questionnaire.

Two weeks after the initial mailing, prompting postcards with the telephone numbers to call for assistance were mailed to all non-respondents except for those whose questionnaires had been returned because the address was incomplete, the resident had moved without leaving a forwarding address, or the addressee had died. (Appendix A contains a copy of the reminder postcard.) Twelve residents called the numbers listed. One reported that he had already submitted his completed questionnaire. Three asked to be removed from the list because they did not want to participate. Eight requested another copy of the questionnaire. Because of cost considerations only one follow-up mailing was used to increase response. In total, 280 usable responses were received, ensuring a maximum error of estimation of 5.0% with a 90% confidence level.

Since the initial questionnaire mailing was spread over a period of 5 days and other participants received their questionnaires only after two mailings, no attempt was made to separate the early and late respondents to help identify the characteristics of nonrespondents. Two weeks after the reminder postcards were mailed, a sample of the 636 still not responding was contacted over the telephone to assess response bias. A systematic random sample of 25 households was selected using the method described above. Calls were made at different times of the day to reach various family members. The subjects were asked socioeconomic questions, whether they had installed conserving equipment or changed their energy use behavior, and why they had not responded to the mail questionnaire.

## Questionnaire

The questionnaire (see Appendix A) consisted of questions on demographic variables, behavior, attitudes, and interests. All questions could be answered by checks in blanks provided to the left of each response, with a blank line provided beside each "other" response and one blank line for each response to a question asking for a reason for that response. The energy conservation behavior and interest questions were measured both by the total number of affirmative responses as well as which particular items were marked. The financial benefit program questions and the mode of information delivery questions were measured only by the individual items marked. The questions regarding attitudes toward the Energy Project strategies were coded from 1 to 6, indicating that the respondents strongly favored, favored,

were indifferent, disfavored, strongly disfavored, or needed more information about each strategy.

## Method of Analysis

The responses to the open-ended question asking the reason respondents would not attend an energy conservation workshop were summarized and placed in eight categories: lack of time, age, medical disabilities, already sufficiently knowledgeable, already undertaken all possible conservation efforts, renter, not worthwhile, and other miscellaneous reasons, such as lack of confidence in MPC and mistrust of the information which would be provided. The answers to the comment and suggestion section were grouped by the issue to which they referred and summarized.

The responses to all the questions were coded for use in SPSS computer analysis. A frequency distribution was created for each variable to examine the distribution of responses. The characteristics of the respondents were compared with the characteristics of the sample of nonresidents contacted by telephone and with existing demographic data for Knox County.

Bivariate cross tabulations were produced to examine relationships between socioeconomic characteristics, sources of information, behavior, interests, and opinions on the energy conservation strategies. A discriminate analysis was conducted to establish contrasting socioeconomic profiles of residents attempting to reduce their energy use for space heating and cooling and those not undertaking such actions. The discriminate analysis was based on the socioeconomic variables, age,

sex, race, employment status, occupation, and tenure, as predictors of the number of energy conserving actions, including structural and behavioral changes reported by the respondent. The direct, largest minimum between groups F, and Wilks lambda methods were all used to check for consistency of results. (See Nie, Hull, Jenkins, Steinbrenner, & Brent, 1975, for an explanation of these statistical procedures.)

## Limitations

The survey sample was drawn from households listed in the Knoxville area section of the Knoxville telephone directory. Households that have unlisted numbers, that are listed in another section of the telephone directory, that do not have telephone service, and that have received service since the directory was published were not sampled. This produces the possibility that the lowest and highest income groups were underrepresented in the sample. It is also possible that female headed households were underrepresented. More transient segments of the community including University students may also have been underrepresented. A larger percentage response was expected from persons who are already interested in the subject of energy. Also, persons who have undertaken energy conserving actions were probably more likely to respond than those who have fewer "accomplishments" to report. There is, in addition, the possibility that some respondents tried to improve their image by supplying what they consider to be the "right" answers to the questions.

Results of this study are only applicable to Knox County, but could be of potential value to other areas with similar characteristics

and problems. It can be assumed that although no two communities are exactly alike, Knox County residents possess many of the same characteristics, attitudes, and interests of other Americans.

# CHAPTER IV

# FINDINGS

## Characteristics of the Sample

Of the 1000 households originally selected, 83 were removed from the sample because they had moved without leaving a forwarding address, died, or refused to participate in the study. A total of 281 of the subjects returned their questionnaires, producing 280 usable responses, a response rate of 28.0%. The socioeconomic characteristics of the respondents are presented in Table 1.

The largest age group represented was the 21-to-34-year-olds (31.1%). Only 2.1% of the household heads were under 21. Persons over 64 made up 20.7% of the sample. Just 3.0% of the respondents indicated that they were Black and only one marked "other." Twenty-eight percent of the household heads were female. Almost two-thirds of the respondents (62.2%) earned between $10,000 and $39,999. A total of 20.2% were retired or disabled. Of the 280, 67.5% reported at least some college education. Professional and technical workers made up 49.3% of the respondents and sales 13.4%. No farmers or farm laborers returned the questionnaires. No townhouse or condominium residents responded. Single family homes were reported by 77.3%. Some 71.5% of the respondents were homeowners. Among renters, 87.5% paid their utilities directly. A majority (73.4%) of the homes were between 5 and 40 years old, but 44.7% of the respondents had lived in their current home less than 5 years.

Table 1

Socioeconomic Characteristics of Respondents

| Variable | Respondents % | (No.) |
|---|---|---|
| Age (years) | | (280) |
| Under 21 | 2.1 | |
| 21-34 | 31.1 | |
| 35-49 | 24.3 | |
| 50-64 | 21.8 | |
| Over 64 | 20.7 | |
| Race | | (270) |
| Black | 3.0 | |
| White | 96.7 | |
| Other | 0.4 | |
| Sex | | (271) |
| Male | 72.0 | |
| Female | 28.0 | |
| Education | | (277) |
| Less than 12 years | 14.1 | |
| High school graduate | 14.4 | |
| Vocational school | 4.0 | |
| Some college | 22.4 | |
| College graduate | 45.1 | |
| Employment Status | | (277) |
| Retired or disabled | 20.2 | |
| Unemployed | 5.8 | |
| Employed | 74.0 | |
| Part time | 10.3 | (20) |
| Full time | 89.7 | (174) |
| Occupation | | (209) |
| Sales | 13.4 | |
| Craftsman, foreman | 8.1 | |
| Farm laborer | 0.0 | |
| Nonfarm laborer | 2.4 | |
| Farmer, farm manager | 0.0 | |
| Professional, technical | 49.3 | |
| Service | 3.8 | |
| Manager, administrator | 8.6 | |
| Clerical | 4.8 | |
| Operative | 3.3 | |
| Other | 6.2 | |
| Income | | (272) |
| Less than $10,000 | 22.4 | |
| $10,000-$19,999 | 34.2 | |
| $20,000-$39,999 | 32.0 | |
| $40,000 or more | 11.4 | |

Table 1 (continued)

| Variable | Respondents % | (No.) |
|---|---|---|
| Tenure | | (274) |
| Owner | 71.5 | |
| Renter | 28.5 | |
| Pay utilities | 87.5 | (63) |
| Not pay utilities | 12.5 | (9) |
| Home type | | (278) |
| Apartment | 18.0 | |
| Townhouse | 0.0 | |
| Condominium | 0.0 | |
| Duplex | 3.2 | |
| Mobile home | 1.4 | |
| Single family detached | 77.3 | |
| Home age (years) | | (267) |
| Less than 5 | 12.4 | |
| 5-19 | 39.7 | |
| 20-39 | 33.7 | |
| 40 or more | 14.2 | |
| Years at present address | | (275) |
| Less than 5 | 44.7 | |
| 5-19 | 33.1 | |
| 20-39 | 17.8 | |
| 40 or more | 4.4 | |

## Assessment of Response Bias

Twenty-five households that were sent questionnaires, but did not respond, were interviewed over the telephone in an attempt to assess response bias. The socioeconomic characteristics of the nonrespondent sample are summarized in Table 2. Response to socioeconomic questions revealed that the age composition of the nonrespondent sample was slightly different from the respondents. A larger percentage of those telephoned were between the ages of 35 and 49 (52.0% versus 24.3%) and fewer gave their ages as 21 to 34 (8.0% versus 31.1%). A smaller percentage of female headed households were found in the nonrespondent sample (12.0% versus 28.0%). Those being interviewed over the telephone were generally reluctant to give their income. Of the households responding to the income question, 16.0% said they earned $20,000 to $39,999; and 8%, $40,000 or more. Just 16.0% of the non-respondents contacted were retired or disabled. Almost two-thirds (61.0%) reported changing their energy use behavior. Meanwhile, 72.0% cited conservation installations in the last 5 years. Only 28.0% said they would be interested in attending an energy conservation workshop.

When asked why they did not return the questionnaire, 40.0% said they were not interested in either the subject or the project; 20.0% believed themselves already knowledgeable enough on the subject; 24.0% did not want to participate in any mail survey; and 16.0% reported that they did not receive or did not remember the questionnaire.

According to MPC estimates, the Black segment of Knox County's population constitutes 8.6% of the total and the elderly (over 64) make

Table 2

Socioeconomic Characteristics of Nonrespondents

| Variables | Respondents % | (No.) |
|---|---|---|
| Age (years) | | (25) |
| Under 21 | 0.0 | |
| 21-34 | 8.0 | |
| 35-49 | 52.0 | |
| 50-64 | 20.0 | |
| Over 64 | 20.0 | |
| Race | | (25) |
| Black | 8.0 | |
| White | 92.0 | |
| Other | 0.0 | |
| Sex | | (25) |
| Male | 88.0 | |
| Female | 12.0 | |
| Employment status | | (25) |
| Retired or disabled | 16.0 | |
| Unemployed | 4.0 | |
| Employed | 80.0 | |
| Income | | (20) |
| Less than $10,000 | 20.0 | |
| $10,000-$19,999 | 36.0 | |
| $20,000-$39,999 | 16.0 | |
| $40,000 or more | 8.0 | |
| Tenure | | (25) |
| Owner | 76.0 | |
| Renter | 24.0 | |
| Home type | | (25) |
| Apartment | 20.0 | |
| Townhouse | 0.0 | |
| Condominium | 0.0 | |
| Duplex | 0.0 | |
| Mobile home | 0.0 | |
| Single family detached | 80.0 | |

up to 11.0% (Easley, 1980). The proportion of the households residing in single family dwellings is estimated at 73.2% (Zelinski, 1980).

The 1970 U.S. Census data for Knox County showed lower educational levels for the general population than the sample reflects. It also reported fewer persons employed in sales, professional, and technical occupations (U.S. Department of Commerce, 1972).

The survey results, therefore, represent opinions and behavior that are biased toward White upper income and better educated heads of households employed in professional and technical occupations and living in single family dwellings. A large proportion of elderly retired citizens is also included, however, which serves an important function by allowing more accurate estimation for a segment of the population which has special needs related to energy supply and cost.

## Survey Results

The survey questionnaire gathered information on socioeconomic data, energy conservation behavior changes and equipment installations, sources of information and financing used, energy topics of further interest, forms of information delivery preferred, and attitudes toward energy conservation strategies developed as part of the Knox County Energy Project. An analysis of the responses will help to identify current energy conservers and nonconservers, areas of interest related to energy, and general attitudes toward energy in the community.

### Behavior Changes Reported

Conservation efforts which respondents had taken in the last 5 years were divided into behavior changes and equipment installations.

The responses to the behavior questions are presented in Tables 3-8. The behavior change reported most often (80.4% of the respondents) was lowering the heating thermostat. Wearing warmer clothes in winter and cooler clothes in summer was reported by 71.4%. Shades, blinds, and curtains were used by 67.5%. Unused rooms were closed off by 57.1%. A total of 52.5% indicated turning up their air conditioning thermostat or giving up the use of air conditioning altogether. In addition, 4.3% listed other changes not listed such as wrapping up in blankets, closing garage doors, opening the oven after cooking, and placing towels at the base of outside doors.

The number of behavior changes was calculated for each respondent, with a maximum of six conservation efforts. Three or four changes were reported by 49.0% of the respondents. Only 2.9% indicated six behavior changes. Also, 2.9% reported they had not altered their behavior in any way.

Demographic characteristics. Inspection of demographic characteristics of the respondents reveals that a smaller percentage of the Black respondents reported undertaking each conservation activity than than White respondents. Also, few of those respondents with less than 12 years of education reported making each behavior change.

The age group with the largest proportion reporting five or six behavior changes was the 21 to 34 year old heads of households. A larger percentage (87.5) of Blacks reported just one or two changes. No Blacks reported making more than four changes. Only 7.7% of those with less than 12 years of education reported five or six behavior changes. Over one-fourth of those with education beyond high school reported three or more behavior changes.

Table 3

Energy Conservation Behavior Changes as Proportion of Respondents by Demographic Characteristics

| Behavior changes | All respondents | Age | | | | | Race | | | Sex | | Education | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than 21 | 21-34 | 35-49 | 50-64 | Over 64 | Black | White | Other | Male | Female | Less than 12 years | High school | Vocation | Some college | College graduate |
| | (280)[a] | (6) | (87) | (68) | (61) | (58) | (8) | (261) | (1) | (195) | (76) | (39) | (40) | (11) | (62) | (125) |
| Lower heat | 80.4 | 50.0 | 87.4 | 77.9 | 83.6 | 72.4 | 50.0 | 81.6 | 0.0 | 83.1 | 72.4 | 51.3 | 77.5 | 81.8 | 80.6 | 90.4 |
| Close rooms | 57.1 | 50.0 | 63.2 | 51.5 | 57.4 | 55.2 | 37.5 | 57.9 | 0.0 | 57.9 | 55.3 | 48.7 | 60.0 | 72.7 | 56.5 | 57.6 |
| Use shades | 67.5 | 66.7 | 70.1 | 64.7 | 63.9 | 70.7 | 50.0 | 68.2 | 0.0 | 69.2 | 63.2 | 64.1 | 70.0 | 90.9 | 79.0 | 60.8 |
| Raise air conditioning | 52.5 | 16.7 | 57.5 | 47.1 | 59.0 | 48.3 | 25.0 | 54.4 | 0.0 | 56.9 | 42.1 | 28.2 | 42.5 | 45.5 | 58.1 | 60.8 |
| Wear proper clothes | 71.4 | 83.3 | 82.8 | 67.6 | 68.9 | 60.3 | 37.5 | 72.8 | 100.0 | 69.2 | 78.9 | 59.0 | 67.5 | 72.7 | 69.4 | 77.6 |
| Other | 4.3 | 0.0 | 5.7 | 2.9 | 4.9 | 3.4 | 0.0 | 4.6 | 0.0 | 4.6 | 3.9 | 0.0 | 0.0 | 9.1 | 6.5 | 4.8 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 4

Energy Conservation Behavior Changes as Proportion of Respondents by Economic Characteristics

| Behavior changes | All respondents | Income | | | | Employment status | | | If employed, | | Occupation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than $10,000 | $10,000-19,999 | $20,000-39,999 | $40,000 or more | Retired/ disabled | Unemployed | Employed | Full time | Part time | Sales | Crafts, foreman | Labor | Profession, technical | Service | Manager, administrator | Clerical | Operative | Other |
| | (280)[a] | (61) | (92) | (88) | (31) | (56) | (16) | (205) | (174) | (20) | (28) | (17) | (5) | (104) | (8) | (18) | (10) | (6) | (13) |
| Lower heat | 80.4 | 67.2 | 80.4 | 86.4 | 90.3 | 69.6 | 56.3 | 85.4 | 87.9 | 70.0 | 78.6 | 82.4 | 80.0 | 86.5 | 100.0 | 77.8 | 100.0 | 85.7 | 84.6 |
| Close rooms | 57.1 | 50.8 | 64.1 | 59.1 | 45.2 | 60.7 | 37.5 | 57.4 | 58.6 | 55.0 | 57.1 | 82.4 | 40.0 | 57.7 | 62.5 | 33.3 | 70.0 | 42.9 | 61.5 |
| Use shades | 67.5 | 70.5 | 68.5 | 68.2 | 58.1 | 75.0 | 50.0 | 66.8 | 69.5 | 50.0 | 67.9 | 88.2 | 60.0 | 65.4 | 62.5 | 55.6 | 60.0 | 85.7 | 61.5 |
| Raise air conditioning | 52.5 | 37.7 | 48.9 | 59.1 | 71.0 | 42.9 | 43.8 | 55.1 | 55.2 | 50.0 | 57.1 | 35.3 | 40.0 | 62.5 | 25.0 | 72.2 | 40.0 | 28.6 | 61.5 |
| Wear proper clothes | 71.4 | 70.5 | 73.9 | 67.0 | 80.6 | 64.3 | 81.3 | 72.2 | 72.4 | 70.0 | 67.9 | 64.7 | 80.0 | 74.0 | 75.0 | 61.1 | 80.0 | 71.4 | 84.6 |
| Other | 4.3 | 3.3 | 4.3 | 5.7 | 0.0 | 3.6 | 0.0 | 4.4 | 4.0 | 10.0 | 3.6 | 5.9 | 0.0 | 4.8 | 0.0 | 0.0 | 10.0 | 0.0 | 15.4 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 5

Energy Conservation Behavior Changes as Proportion of Respondents by Residence Characteristics

| Behavior changes | All respondents | Tenure | | If renter, | | Home type | | | | Home age | | | | Years at current address | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner | Renter | Pay utilities | Not pay utilities | Apt. | Duplex | Mobile home | Single family | Less than 5 | 5-19 | 20-39 | 40 or more | Less than 5 | 5-19 | 20-39 | 40 or more |
| | (280)[a] | (197) | (78) | (63) | (9) | (50) | (8) | (4) | (216) | (33) | (105) | (90) | (39) | (122) | (92) | (49) | (12) |
| Lower heat | 80.4 | 82.7 | 76.9 | 87.3 | 22.2 | 80.0 | 87.5 | 50.0 | 80.6 | 90.9 | 85.7 | 81.1 | 53.8 | 83.6 | 79.3 | 79.6 | 58.3 |
| Close rooms | 57.1 | 57.9 | 59.0 | 66.7 | 11.1 | 50.0 | 62.5 | 75.0 | 58.3 | 48.5 | 60.0 | 57.8 | 56.4 | 61.5 | 47.8 | 67.3 | 41.7 |
| Use shades | 67.5 | 66.5 | 71.8 | 76.2 | 44.4 | 72.0 | 75.0 | 75.0 | 65.7 | 57.6 | 66.7 | 67.8 | 76.9 | 67.2 | 67.4 | 67.3 | 75.0 |
| Raise air conditioning | 52.5 | 54.8 | 44.9 | 49.2 | 22.2 | 60.0 | 37.5 | 0.0 | 52.3 | 63.6 | 55.2 | 55.3 | 30.8 | 54.1 | 53.3 | 51.0 | 41.7 |
| Wear proper clothes | 71.4 | 67.0 | 82.1 | 85.7 | 66.7 | 82.0 | 87.5 | 50.0 | 68.5 | 75.8 | 72.4 | 64.4 | 79.5 | 79.5 | 65.2 | 61.2 | 83.3 |
| Other | 4.3 | 4.1 | 5.1 | 6.3 | 0.0 | 4.0 | 12.5 | 25.0 | 3.7 | 9.1 | 3.8 | 4.4 | 2.6 | 5.7 | 2.2 | 6.1 | 0.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 6

Number of Behavior Changes as Proportion of Respondents by Demographic Characteristics

| Number behavior changes | All respondents | Age | | | | | Race | | | Sex | | Education | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than 21 | 21-34 | 35-49 | 50-64 | Over 64 | Black | White | Other | Male | Female | Less than 12 years | High school | Vocation | Some college | College graduate |
| | (280)[a] | (6) | (87) | (68) | (61) | (58) | (8) | (261) | (1) | (195) | (76) | (39) | (40) | (11) | (62) | (125) |
| 0 | 2.9 | 16.7 | 4.6 | 1.5 | 1.6 | 1.7 | 0.0 | 3.1 | 0.0 | 2.6 | 3.9 | 2.6 | 0.0 | 0.0 | 6.5 | 2.4 |
| 1 | 6.8 | 0.0 | 3.4 | 8.8 | 8.2 | 8.6 | 25.0 | 5.7 | 100.0 | 6.7 | 7.9 | 17.9 | 10.0 | 0.0 | 1.6 | 5.6 |
| 2 | 19.3 | 33.3 | 11.5 | 26.5 | 19.7 | 20.7 | 62.5 | 18.0 | 0.0 | 18.5 | 19.7 | 30.8 | 20.0 | 36.4 | 16.1 | 14.4 |
| 3 | 21.1 | 16.7 | 17.2 | 23.5 | 19.7 | 25.9 | 0.0 | 21.1 | 0.0 | 19.0 | 25.0 | 25.6 | 30.0 | 0.0 | 19.4 | 20.0 |
| 4 | 27.9 | 16.7 | 29.9 | 23.5 | 26.2 | 32.8 | 12.5 | 28.7 | 0.0 | 28.7 | 26.3 | 15.4 | 25.0 | 27.3 | 32.3 | 31.2 |
| 5 | 19.3 | 16.7 | 29.9 | 14.7 | 21.3 | 6.9 | 0.0 | 20.3 | 0.0 | 21.0 | 15.8 | 7.7 | 15.0 | 27.3 | 17.7 | 24.8 |
| 6 | 2.9 | 0.0 | 3.4 | 1.5 | 3.3 | 3.4 | 0.0 | 3.1 | 0.0 | 3.6 | 1.3 | 0.0 | 0.0 | 9.1 | 6.5 | 1.6 |

[a] The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 7

Number of Behavioral Changes as Proportion of Respondents by Economic Characteristics

| Number behavior changes | All respondents | Income | | | | Employment status | | | If employed, | | Occupation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than $10,000 | $10,000-19,999 | $20,000-39,999 | $40,000 or more | Retired/disabled | Unemployed | Employed | Full time | Part time | Sales | Crafts, foreman | Labor | Profession, technical | Service | Manager admnits. | Clerical | Operative | Other |
| | (280)[a] | (61) | (92) | (88) | (31) | (56) | (16) | (205) | (174) | (20) | (28) | (17) | (5) | (104) | (8) | (18) | (10) | (6) | (13) |
| 0 | 2.9 | 1.6 | 4.3 | 2.3 | 0.0 | 3.6 | 0.0 | 2.9 | 1.7 | 10.0 | 3.6 | 0.0 | 0.0 | 2.9 | 0.0 | 11.1 | 0.0 | 0.0 | 0.0 |
| 1 | 6.8 | 9.8 | 6.5 | 5.7 | 6.5 | 5.4 | 25.0 | 5.9 | 5.2 | 10.0 | 3.6 | 5.9 | 20.0 | 5.8 | 0.0 | 5.6 | 10.0 | 14.3 | 0.0 |
| 2 | 19.3 | 26.4 | 14.1 | 20.5 | 19.4 | 21.4 | 25.0 | 18.0 | 17.8 | 20.0 | 17.9 | 23.5 | 20.0 | 18.3 | 25.0 | 22.2 | 0.0 | 14.3 | 23.1 |
| 3 | 21.1 | 26.2 | 26.1 | 13.6 | 19.4 | 23.2 | 18.8 | 21.0 | 21.8 | 15.0 | 32.1 | 17.6 | 40.0 | 15.4 | 37.5 | 16.7 | 30.0 | 28.6 | 15.4 |
| 4 | 27.9 | 24.6 | 22.8 | 34.1 | 32.3 | 33.9 | 18.8 | 27.3 | 28.2 | 25.0 | 21.4 | 17.6 | 0.0 | 26.9 | 25.0 | 27.8 | 40.0 | 28.6 | 46.2 |
| 5 | 19.3 | 11.5 | 22.8 | 20.5 | 22.6 | 8.9 | 12.5 | 22.4 | 23.6 | 10.0 | 17.9 | 29.4 | 20.0 | 28.8 | 12.5 | 16.7 | 20.0 | 14.3 | 0.0 |
| 6 | 2.9 | 1.6 | 3.3 | 3.4 | 0.0 | 3.6 | 0.0 | 2.4 | 1.7 | 10.0 | 3.6 | 5.9 | 0.0 | 1.9 | 0.0 | 0.0 | 0.0 | 0.0 | 15.4 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 8

Number of Behavior Changes as Proportion of Respondents by Residence Characteristics

| Number behavior changes | All respondents | Tenure | | If renter, | | Home type | | | | Home age | | | | Years at current address | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner | Renter | Pay utilities | Not pay utilities | Apt. | Duplex | Mobile home | Single family | Less than 5 | 5-19 | 20-39 | 40 or more | Less than 5 | 5-19 | 20-39 | 40 or more |
| | (280)[a] | (197) | (78) | (63) | (9) | (50) | (8) | (4) | (216) | (33) | (105) | (90) | (39) | (122) | (92) | (49) | (12) |
| 0 | 2.9 | 2.5 | 3.8 | 1.6 | 22.2 | 6.0 | 0.0 | 0.0 | 2.3 | 0.0 | 5.7 | 2.2 | 0.0 | 3.3 | 2.2 | 2.0 | 0.0 |
| 1 | 6.8 | 6.6 | 6.4 | 1.6 | 33.3 | 6.0 | 0.0 | 25.0 | 6.9 | 0.0 | 3.8 | 11.1 | 12.8 | 2.5 | 10.9 | 10.2 | 8.3 |
| 2 | 19.3 | 21.3 | 14.1 | 14.3 | 11.1 | 10.0 | 25.0 | 25.0 | 21.3 | 33.3 | 16.2 | 16.7 | 23.1 | 19.7 | 19.6 | 14.3 | 33.3 |
| 3 | 21.1 | 18.3 | 25.6 | 23.8 | 22.2 | 24.0 | 25.0 | 25.0 | 20.4 | 27.2 | 18.1 | 21.1 | 25.6 | 22.1 | 19.6 | 24.5 | 16.7 |
| 4 | 27.9 | 29.9 | 24.4 | 27.0 | 11.1 | 22.0 | 12.5 | 0.0 | 29.6 | 21.2 | 30.5 | 26.7 | 28.2 | 23.0 | 32.6 | 28.6 | 33.3 |
| 5 | 19.3 | 18.3 | 23.1 | 28.6 | 0.0 | 30.0 | 37.5 | 25.0 | 16.2 | 18.2 | 22.9 | 18.9 | 10.3 | 26.2 | 13.0 | 16.3 | 8.3 |
| 6 | 2.9 | 3.0 | 2.6 | 3.2 | 0.0 | 2.0 | 0.0 | 0.0 | 3.2 | 6.1 | 2.9 | 3.3 | 0.0 | 3.3 | 2.2 | 4.1 | 0.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Economic characteristics. Fewer of the unemployed than the retired and employed reported taking all the actions except wearing appropriate clothing. More of the higher income respondents (71.0%) reported reducing their air conditioning use.

Only 12.5% of retired and disabled respondents indicated more than four changes. All those listing their occupation as craftsman, foreman, laborer, service worker, clerical worker, and other listed at least one behavior change. A total of 35.3% of the craftsmen and foremen and 30.7% of the professional and technical workers reported at least five behavior changes.

Residence characteristics. Residents who had lived at their present address 40 years or more and those living in homes that are at least 40 years old were less likely to have reduced their heating thermostat and raised their air conditioning thermostat settings. A larger percentage (82.1%) of all renters reported wearing appropriate clothing. Among renters, those not paying for their utilities directly were less likely to have made each of the changes listed.

Only 8.3% of those who had lived at their present address 40 years or more reported five or six behavior changes in the last 5 years. In addition, just 10.3% of those living in homes 40 years or more listed at least five behavior changes. Among renters, none of the respondents who do not pay their utility bills directly reported more than four changes in energy use behavior. Five or six behavior changes were reported by approximately one-third of apartment dwellers (32.0%) and duplex occupants (37.5%).

Equipment Installations Reported

The questionnaire contained 13 equipment installation questions. Responses to these questions are presented in Tables 9-14. Of the 280 respondents, 45.4% reported installing attic insulation in the last 5 years. Storm windows and doors were installed by 36.4% of the respondents, caulking by 33.9%, and weatherstripping by 30.7%. Only 1.4% reported active solar systems and 3.2% clock thermostats.

A total of 10.4% indicated they had installed other equipment not listed in the questionnaire. Six persons reported installing heat pumps, two households had aluminum siding, and two had purchased fireplace inserts and blowers. Other equipment included insulation around a fireplace, a new threshold, radiator covers, a dryer vent, and turbovents in a roof.

Those returning their surveys indicated installing a maximum of nine pieces of energy conservation equipment, with 4.4% installing seven or more items. No installations were reported by 26.1% of the respondents.

Demographic characteristics. Of those respondents with heads of household less than 21 years old, wall insulation and storm windows or doors were each reported by one-half. Wall insulation was reported least often by household heads over 64 years old (6.9%). A lower percentage of Blacks than Whites installed each of the pieces of equipment listed except plastic window coverings and clock thermostats (12.5% each). Male headed households reported installing most of the conservation equipment more often than female headed households.

Table 9

Energy Conservation Equipment Installations as Proportion of Respondents by Demographic Characteristics

| Equipment | All respondents | Age | | | | | Race | | | Sex | | Education | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than 21 | 21-34 | 35-49 | 50-64 | Over 64 | Black | White | Other | Male | Female | Less than 12 years | High school | Vocation | Some college | College graduate |
| | (280)[a] | (6) | (87) | (68) | (61) | (58) | (8) | (261) | (1) | (195) | (76) | (39) | (40) | (11) | (62) | (125) |
| Wall insulation | 22.9 | 16.7 | 27.6 | 32.4 | 21.3 | 6.9 | 0.0 | 23.8 | 0.0 | 25.1 | 17.1 | 15.4 | 25.0 | 36.4 | 27.4 | 21.6 |
| Attic insulation | 45.4 | 33.3 | 46.0 | 50.0 | 54.1 | 31.0 | 12.5 | 46.7 | 0.0 | 53.8 | 26.3 | 30.8 | 60.0 | 54.5 | 40.3 | 47.2 |
| Wood stove | 11.1 | 0.0 | 12.6 | 8.8 | 16.4 | 6.9 | 0.0 | 11.9 | 0.0 | 12.8 | 6.6 | 15.4 | 15.0 | 18.2 | 8.1 | 8.8 |
| Storm doors, windows | 36.4 | 16.7 | 32.2 | 41.2 | 37.7 | 37.9 | 25.0 | 36.8 | 0.0 | 35.9 | 36.8 | 25.6 | 52.5 | 27.3 | 45.2 | 32.0 |
| Passive solar | 2.1 | 0.0 | 2.3 | 2.9 | 0.0 | 3.4 | 12.5 | 1.5 | 0.0 | 2.1 | 2.6 | 0.0 | 5.0 | 0.0 | 1.6 | 1.6 |
| Active solar | 1.4 | 16.7 | 1.1 | 1.5 | 0.0 | 1.7 | 0.0 | 1.1 | 100.0 | 1.0 | 2.6 | 2.6 | 2.5 | 0.0 | 1.6 | 0.8 |
| Window plastic | 11.1 | 16.7 | 13.8 | 10.3 | 9.8 | 8.6 | 12.5 | 11.5 | 0.0 | 11.3 | 11.8 | 15.4 | 10.0 | 9.1 | 3.2 | 14.4 |
| Attic fan | 14.3 | 16.7 | 8.0 | 20.6 | 24.6 | 5.2 | 0.0 | 14.9 | 0.0 | 18.5 | 5.3 | 7.7 | 22.5 | 9.1 | 11.3 | 16.0 |
| Weatherstripping | 30.7 | 50.0 | 35.6 | 33.8 | 27.9 | 20.7 | 12.5 | 32.2 | 0.0 | 35.4 | 22.4 | 17.9 | 27.5 | 18.2 | 35.5 | 35.2 |
| Fireplace cover | 18.9 | 33.3 | 18.4 | 22.1 | 19.7 | 13.8 | 12.5 | 19.9 | 0.0 | 22.1 | 13.2 | 12.8 | 12.5 | 18.2 | 14.5 | 25.6 |
| Caulking | 33.9 | 50.0 | 37.9 | 41.2 | 26.2 | 25.9 | 0.0 | 35.6 | 0.0 | 39.0 | 21.1 | 23.1 | 35.0 | 36.4 | 30.6 | 38.4 |
| Clock thermostat | 3.2 | 16.7 | 2.3 | 0.0 | 6.6 | 3.4 | 12.5 | 2.3 | 0.0 | 2.6 | 3.9 | 2.6 | 2.5 | 27.3 | 1.6 | 2.4 |
| Other | 10.4 | 0.0 | 17.2 | 8.8 | 8.2 | 5.2 | 0.0 | 11.1 | 0.0 | 11.3 | 9.2 | 0.0 | 10.0 | 9.1 | 16.1 | 11.2 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 10

Energy Conservation Equipment Installations as Proportion of Respondents by Economic Characteristics

| Equipment | All respondents | Income | | | | Employment status | | | If employed, | | Occupation | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than $10,000 | $10,000-19,999 | $20,000-39,999 | $40,000 or more | Retired/disabled | Unemployed | Employed | Full time | Part time | Sales | Crafts, foreman | Labor | Profession, technical | Service | Manager, admins. | Clerical | Operative | Other |
| | (280)[a] | (61) | (92) | (88) | (31) | (56) | (16) | (205) | (174) | (20) | (28) | (17) | (5) | (104) | (8) | (18) | (10) | (6) | (13) |
| Wall insulation | 22.9 | 16.4 | 25.0 | 27.3 | 16.1 | 10.7 | 12.5 | 26.8 | 29.3 | 5.0 | 25.0 | 52.9 | 40.0 | 24.0 | 12.5 | 50.0 | 20.0 | 28.6 | 0.0 |
| Attic insulation | 45.4 | 24.6 | 40.2 | 63.6 | 51.6 | 32.1 | 18.8 | 51.0 | 54.0 | 30.0 | 57.1 | 47.1 | 80.0 | 47.1 | 37.5 | 83.3 | 40.0 | 85.7 | 30.8 |
| Wood stove | 11.1 | 3.3 | 14.1 | 12.5 | 9.7 | 12.5 | 6.3 | 10.7 | 10.9 | 10.0 | 17.9 | 23.5 | 20.0 | 9.6 | 0.0 | 11.1 | 0.0 | 14.3 | 0.0 |
| Storm doors, windows | 36.4 | 31.1 | 37.0 | 39.8 | 35.5 | 41.1 | 25.0 | 36.1 | 36.2 | 25.0 | 32.1 | 47.1 | 40.0 | 33.7 | 12.5 | 50.0 | 30.0 | 71.4 | 38.5 |
| Passive solar | 2.1 | 3.3 | 2.2 | 2.3 | 0.0 | 1.8 | 0.0 | 2.4 | 2.3 | 5.0 | 0.0 | 5.9 | 0.0 | 2.9 | 0.0 | 0.0 | 0.0 | 0.0 | 7.7 |
| Active solar | 1.4 | 3.3 | 0.0 | 2.3 | 0.0 | 1.8 | 12.5 | .5 | .6 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 5.6 | 0.0 | 0.0 | 0.0 |
| Window plastic | 11.1 | 14.8 | 10.9 | 11.4 | 3.2 | 8.9 | 6.3 | 12.2 | 12.1 | 15.0 | 10.7 | 11.8 | 0.0 | 13.5 | 0.0 | 5.6 | 30.0 | 14.3 | 7.7 |
| Attic fan | 14.3 | 1.6 | 10.9 | 19.3 | 32.3 | 8.9 | 6.3 | 16.6 | 19.0 | 0.0 | 17.9 | 11.8 | 20.0 | 18.3 | 0.0 | 16.7 | 30.0 | 28.6 | 0.0 |
| Weather-stripping | 30.7 | 21.3 | 26.1 | 44.3 | 29.0 | 19.6 | 18.8 | 35.1 | 35.1 | 30.0 | 21.4 | 29.4 | 40.0 | 39.4 | 12.5 | 55.6 | 10.0 | 42.9 | 30.8 |
| Fireplace cover | 18.9 | 6.6 | 13.0 | 30.7 | 25.8 | 14.3 | 12.5 | 21.0 | 21.3 | 20.0 | 14.3 | 11.8 | 0.0 | 23.1 | 12.5 | 38.9 | 30.0 | 28.6 | 7.7 |
| Caulking | 33.9 | 16.4 | 32.6 | 47.7 | 38.7 | 25.0 | 12.5 | 37.6 | 39.1 | 25.0 | 21.4 | 47.1 | 20.0 | 45.2 | 25.0 | 55.6 | 30.0 | 14.3 | 15.4 |
| Clock thermostat | 3.2 | 3.3 | 2.2 | 3.4 | 0.0 | 3.6 | 0.0 | 3.4 | 3.4 | 5.0 | 0.0 | 0.0 | 0.0 | 1.9 | 12.5 | 5.6 | 0.0 | 42.9 | 0.0 |
| Other | 10.4 | 3.3 | 12.0 | 14.8 | 9.7 | 1.8 | 6.3 | 13.2 | 13.2 | 15.0 | 10.7 | 11.8 | 0.0 | 11.5 | 0.0 | 27.8 | 20.0 | 28.6 | 15.4 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 11

Energy Conservation Equipment Installations as Proportion of Respondents by Residence Characteristics

| Equipment | All respondents | Tenure | | If renter, | | Home type | | | | Home age | | | | Years at current address | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner | Renter | Pay utilities | Not pay utilities | Apt. | Duplex | Mobile home | Single family | Less than 5 | 5-19 | 20-39 | 40 or more | Less than 5 | 5-19 | 20-39 | 40 or more |
| | (280)[a] | (197) | (78) | (63) | (9) | (50) | (8) | (4) | (216) | (33) | (105) | (90) | (39) | (122) | (92) | (49) | (12) |
| Wall insulation | 22.9 | 27.9 | 10.3 | 12.7 | 0.0 | 10.0 | 37.5 | 50.0 | 25.0 | 69.7 | 18.1 | 17.8 | 12.8 | 35.2 | 14.1 | 12.2 | 8.3 |
| Attic insulation | 45.4 | 56.9 | 15.4 | 19.0 | 0.0 | 10.0 | 37.5 | 25.0 | 54.6 | 78.8 | 49.5 | 41.1 | 28.2 | 50.8 | 48.9 | 30.6 | 25.0 |
| Wood stove | 11.1 | 14.2 | 2.6 | 3.2 | 0.0 | 2.0 | 0.0 | 25.0 | 13.0 | 15.2 | 9.5 | 11.1 | 15.4 | 9.8 | 10.9 | 14.3 | 16.7 |
| Storm doors, windows | 36.4 | 45.2 | 15.4 | 17.5 | 11.1 | 10.0 | 50.0 | 50.0 | 42.1 | 60.6 | 35.2 | 31.1 | 41.0 | 40.2 | 35.9 | 26.5 | 50.0 |
| Passive solar | 2.1 | 2.0 | 2.6 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 2.8 | 6.1 | 1.0 | 1.1 | 5.1 | 3.3 | 1.1 | 2.0 | 0.0 |
| Active solar | 1.4 | 1.5 | 1.3 | 0.0 | 11.1 | 4.0 | 0.0 | 25.0 | .5 | 0.0 | 1.9 | 2.2 | 0.0 | 1.6 | 1.1 | 0.0 | 8.3 |
| Window plastic | 11.1 | 10.7 | 12.8 | 14.3 | 11.1 | 10.0 | 0.0 | 50.0 | 11.1 | 9.1 | 11.4 | 10.0 | 12.8 | 12.3 | 8.7 | 10.2 | 25.0 |
| Attic fan | 14.3 | 18.3 | 2.6 | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 18.5 | 15.2 | 15.2 | 17.8 | 7.7 | 10.7 | 15.2 | 24.5 | 8.3 |
| Weatherstripping | 30.7 | 37.6 | 15.4 | 19.0 | 0.0 | 10.0 | 37.5 | 25.0 | 35.6 | 42.4 | 31.4 | 28.9 | 30.8 | 35.2 | 29.3 | 24.5 | 33.3 |
| Fireplace cover | 18.9 | 23.9 | 5.1 | 6.3 | 0.0 | 2.0 | 0.0 | 0.0 | 24.1 | 27.3 | 19.0 | 20.0 | 15.4 | 22.1 | 18.5 | 14.3 | 16.7 |
| Caulking | 33.9 | 41.6 | 15.4 | 19.0 | 0.0 | 12.0 | 37.5 | 25.0 | 39.4 | 51.5 | 36.2 | 30.0 | 30.8 | 40.2 | 31.5 | 28.6 | 25.0 |
| Clock thermostat | 3.2 | 2.5 | 3.8 | 4.8 | 0.0 | 2.0 | 12.5 | 0.0 | 3.2 | 3.0 | 3.8 | 3.3 | 2.6 | 3.3 | 3.3 | 2.0 | 8.3 |
| Other | 10.4 | 13.2 | 3.8 | 4.8 | 0.0 | 2.0 | 0.0 | 0.0 | 13.0 | 21.2 | 10.5 | 8.9 | 7.7 | 13.9 | 7.6 | 10.2 | 0.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 12

Number of Equipment Installations as Proportion of Respondents by Demographic Characteristics

| Number equipment installations | All Respondents | Age | | | | | Race | | | Sex | | Education | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than 21 | 21-34 | 35-49 | 50-64 | Over 64 | Black | White | Other | Male | Female | Less than 12 years | High school | Vocation | Some college | College graduate |
| | (280)[a] | (6) | (87) | (68) | (61) | (58) | (8) | (261) | (1) | (195) | (76) | (39) | (40) | (11) | (62) | (125) |
| 0 | 26.1 | 50.0 | 28.7 | 23.5 | 13.1 | 36.2 | 50.0 | 24.1 | 0.0 | 19.0 | 42.1 | 41.0 | 7.5 | 18.2 | 35.5 | 23.2 |
| 1 | 17.1 | 0.0 | 14.9 | 14.7 | 19.7 | 22.4 | 25.0 | 17.2 | 100.0 | 17.9 | 15.8 | 23.1 | 20.0 | 9.1 | 11.3 | 17.6 |
| 2 | 14.6 | 0.0 | 9.2 | 13.2 | 24.6 | 15.5 | 12.5 | 15.3 | 0.0 | 14.4 | 15.8 | 7.7 | 25.0 | 36.4 | 11.3 | 13.6 |
| 3 | 10.0 | 0.0 | 9.2 | 8.8 | 14.8 | 8.6 | 0.0 | 10.3 | 0.0 | 10.8 | 6.6 | 7.7 | 7.5 | 9.1 | 8.1 | 12.0 |
| 4 | 12.9 | 33.3 | 12.6 | 16.2 | 11.5 | 8.6 | 12.5 | 13.0 | 0.0 | 15.9 | 5.3 | 10.3 | 22.5 | 9.1 | 8.1 | 13.6 |
| 5 | 9.3 | 0.0 | 13.8 | 10.3 | 9.8 | 1.7 | 0.0 | 9.2 | 0.0 | 11.8 | 3.9 | 2.6 | 10.0 | 0.0 | 12.9 | 10.4 |
| 6 | 5.7 | 0.0 | 6.9 | 7.4 | 4.9 | 3.4 | 0.0 | 6.1 | 0.0 | 6.2 | 5.3 | 2.6 | 5.0 | 9.1 | 11.3 | 4.0 |
| 7 | 2.9 | 0.0 | 4.6 | 2.9 | 0.0 | 3.4 | 0.0 | 3.1 | 0.0 | 2.6 | 3.9 | 2.6 | 2.5 | 9.1 | 1.6 | 3.2 |
| 8 | 1.1 | 16.7 | 0.0 | 1.5 | 1.6 | 0.0 | 0.0 | 1.1 | 0.0 | 1.0 | 1.3 | 2.6 | 0.0 | 0.0 | 0.0 | 1.6 |
| 9 | 0.4 | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 0.0 | .4 | 0.0 | .5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | .8 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 13

Number of Equipment Installations as Proportion of Respondents by Economic Characteristics

| Number equipment installations | All Respondents | Income | | | | Employment status | | | If employed, | | Occupation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than $10,000 | $10,000-19,999 | $20,000-39,999 | $40,000 or more | Retired/disabled | Unemployed | Employed | Full time | Part time | Sales | Crafts, foreman | Labor | Profession, technical | Service | Manager, admin'rs. | Clerical | Operative | Other |
| | (280)[a] | (61) | (92) | (88) | (31) | (56) | (16) | (205) | (174) | (20) | (28) | (17) | (5) | (104) | (8) | (18) | (10) | (6) | (13) |
| 0 | 26.1 | 44.3 | 31.5 | 11.4 | 12.9 | 30.4 | 62.5 | 22.0 | 19.5 | 40.0 | 25.0 | 11.8 | 20.0 | 23.1 | 62.5 | 5.6 | 20.0 | 0.0 | 23.1 |
| 1 | 17.1 | 18.0 | 18.5 | 13.6 | 22.6 | 25.0 | 6.3 | 16.1 | 14.9 | 25.0 | 14.3 | 17.6 | 20.0 | 16.3 | 0.0 | 11.1 | 20.0 | 0.0 | 38.5 |
| 2 | 14.6 | 14.8 | 16.3 | 11.4 | 22.6 | 19.6 | 12.5 | 13.7 | 16.1 | 0.0 | 17.9 | 17.6 | 0.0 | 10.6 | 25.0 | 11.1 | 10.0 | 28.6 | 15.4 |
| 3 | 10.0 | 6.6 | 4.3 | 18.2 | 9.7 | 7.1 | 0.0 | 10.7 | 10.9 | 10.0 | 14.3 | 11.8 | 0.0 | 16.3 | 0.0 | 11.1 | 20.0 | 14.3 | 15.4 |
| 4 | 12.9 | 8.2 | 7.6 | 21.6 | 12.9 | 7.1 | 6.3 | 15.1 | 15.5 | 10.0 | 7.1 | 17.6 | 60.0 | 11.5 | 0.0 | 16.7 | 20.0 | 20.6 | 0.0 |
| 5 | 9.3 | 1.6 | 8.7 | 13.6 | 12.9 | 1.8 | 0.0 | 12.2 | 12.1 | 10.0 | 21.4 | 5.9 | 0.0 | 6.7 | 0.0 | 16.7 | 10.0 | 14.3 | 7.7 |
| 6 | 5.7 | 4.9 | 7.6 | 3.4 | 6.5 | 5.4 | 6.3 | 5.9 | 6.3 | 0.0 | 0.0 | 11.8 | 0.0 | 2.9 | 12.5 | 11.1 | 0.0 | 0.0 | 0.0 |
| 7 | 2.9 | 1.6 | 3.3 | 4.5 | 0.0 | 3.6 | 6.3 | 2.4 | 2.3 | 5.0 | 0.0 | 5.9 | 0.0 | 1.0 | 0.0 | 11.1 | 0.0 | 0.0 | 0.0 |
| 8 | 1.1 | 0.0 | 2.2 | 1.1 | 0.0 | 0.0 | 0.0 | 1.5 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 5.6 | 0.0 | 14.3 | 0.0 |
| 9 | .4 | 0.0 | 0.0 | 1.1 | 0.0 | 0.0 | 0.0 | .5 | .6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 14

Number of Equipment Installations as Proportion of Respondents by Residence Characteristics

| Number equipment installations | All respondents | Tenure | | If renter, | | Home type | | | | Home age | | | | Years at current address | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner | Renter | Pay utilities | Not pay utilities | Apt. | Duplex | Mobile home | Single family | Less than 5 | 5-19 | 20-39 | 40 or more | Less than 5 | 5-19 | 20-39 | 40 or more |
| | (280)[a] | (197) | (78) | (63) | (9) | (50) | (8) | (4) | (216) | (33) | (105) | (90) | (39) | (122) | (92) | (49) | (12) |
| 0 | 26.1 | 12.2 | 61.5 | 55.6 | 77.8 | 72.0 | 25.0 | 25.0 | 15.3 | 15.2 | 21.0 | 24.4 | 35.9 | 32.0 | 17.4 | 26.4 | 16.7 |
| 1 | 17.1 | 18.3 | 14.1 | 15.9 | 11.1 | 10.0 | 37.5 | 25.0 | 17.6 | 6.1 | 21.0 | 18.9 | 15.4 | 8.2 | 22.8 | 24.5 | 33.3 |
| 2 | 14.6 | 17.3 | 7.7 | 7.9 | 11.1 | 8.0 | 0.0 | 0.0 | 17.1 | 3.0 | 14.3 | 17.8 | 20.5 | 9.0 | 18.5 | 20.4 | 25.0 |
| 3 | 10.0 | 12.7 | 2.6 | 3.2 | 0.0 | 2.0 | 0.0 | 0.0 | 12.5 | 18.2 | 10.5 | 11.1 | 2.6 | 8.2 | 15.2 | 4.1 | 8.3 |
| 4 | 12.9 | 15.7 | 6.4 | 7.9 | 0.0 | 2.0 | 25.0 | 25.0 | 14.8 | 12.1 | 18.1 | 13.3 | 0.0 | 13.1 | 15.2 | 12.2 | 0.0 |
| 5 | 9.3 | 11.2 | 5.1 | 6.3 | 0.0 | 2.0 | 0.0 | 0.0 | 11.6 | 12.1 | 8.6 | 7.8 | 15.4 | 13.1 | 7.6 | 6.1 | 0.0 |
| 6 | 5.7 | 7.6 | 0.0 | 3.2 | 0.0 | 4.0 | 12.5 | 25.0 | 5.6 | 18.2 | 3.8 | 5.6 | 2.6 | 9.0 | 3.3 | 4.1 | 0.0 |
| 7 | 2.9 | 3.0 | 2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 | 9.1 | 1.9 | 0.0 | 7.7 | 4.9 | 0.0 | 0.0 | 16.7 |
| 8 | 1.1 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.4 | 3.0 | 1.0 | 1.1 | 0.0 | 1.6 | 0.0 | 2.0 | 0.0 |
| 9 | .4 | .5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | .5 | 3.0 | 0.0 | 0.0 | 0.0 | .8 | 0.0 | 0.0 | 0.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Among the different age groups, one-half of those heads of households under 21 had made no installations to conserve energy in the past 5 years, and yet 16.7% reported seven to nine installations. All but 13.1% of those 50 to 64 years old reported at least one piece of equipment. A total of 82.7% of those over 64 made less than 4 equipment changes to conserve energy. No Black respondents had installed more than four pieces of equipment, and one-half reported no installations to conserve energy. A larger percentage of female household heads (42.1%) than male household heads (19.0%) reported no installations. Forty-one percent of those with less than 12 years of education and 35.5% of those who had attended some college reported no installations. The vocational school graduates represented the highest percentage (9.1) of respondents making more than six equipment installations.

Economic characteristics. Employed respondents reported installation of each piece of equipment except active solar systems more often than unemployed respondents. Among employed respondents, those employed part time reported installing wall and attic insulation less often than those employed full time. A smaller percentage of those earning less than $10,000 per year had installed attic insulation, wood stoves, storm windows and doors, attic fans, fireplace covers, weatherstripping, and caulking than had higher income groups. Middle income families reported the largest percentage of respondents installing all pieces of equipment except plastic window coverings and attic fans.

No installations were reported by 44.3% of those families whose income was below $10,000 annually. Among those earning $10,000 to

$19,999, 31.5% made no equipment changes. A total of 53.4% of those in the $20,000 to $39,999 income range made three to five equipment installations. No family making over $40,000 annually reported more than six equipment installations in the last 5 years. Of the unemployed respondents, 62.5% did not report any installations. Among retired and disabled household heads, 82.1% had made less than four installations. Meanwhile, 62.8% of those employed installed between one and six pieces of conservation equipment. Only 60.0% of those employed part time reported making any of the installations listed.

Residence characteristics. A smaller percentage of renters than owners reported installing all equipment except plastic window coverings, clock thermostats, and passive solar systems. Single family home residents reported more installations than apartment residents of insulation, storm windows and doors, attic fans, fireplace covers, clock thermostats, plastic window coverings, weatherstripping, and caulking. A relatively large percentage of those living in homes less than 5 years old reported installing all the conservation equipment except active solar systems. A larger proportion of those living in the oldest homes reported installing wood stoves (15.4%) and plastic window coverings (12.8%). Respondents who had lived at their current address less than 5 years were most likely to have installed wall insulation (35.2%), attic insulation (50.8%), fireplace covers (22.1%), weatherstripping (35.2%), and caulking (40.2%).

A majority of 61.5% of all renters reported no equipment installations. Renters paying their own utilities reported more installations than those who do not pay for their utilities directly.

Only 22.2% of renters not paying their utilities installed any equipment, and none installed more than two items. Among apartment dwellers, only 28.0 percent made any changes. All families who installed more than six items lived in single family dwellings. Reports of no conservation installations were highest among those living in homes 40 years old or more (35.9%). Those living in houses that were less than 5 years old reported making seven to nine changes most often (15.1%).

Conserver versus Nonconserver Characteristics

Discriminant analysis (see Chapter 23 of Nie et al., 1975, for an explanation of the statistical procedure) was used in an attempt to identify those variables which could be used to distinguish between two groups: those reportedly taking relatively large numbers of energy conservation actions and those taking relatively few actions. Behavior changes and equipment installations were considered both separately and combined. The variables under investigation as predictors of conservation behavior were: age, race, sex, education, employment status, occupation, income, tenure, and whether renters paid their utilities directly. Three methods were used to assess each variable's statistical contribution to the discriminant function distinguishing between conservers and nonconservers: the direct method, minimum Wilks' lambda, and largest minimum between-groups F (see Nie et al., 1975, for further explanation of each method).

According to all three methods, the amount of conservation behavior change was best predicted by age, sex, education, employment status, and whether renters paid for their utilities directly. The

number of energy conservation installations appeared related to age and tenure using the largest minimum between-groups F and minimum Wilks' lambda methods, while the direct method also selected income and occupation as discriminators. Age, race, tenure, employment status, and whether renters paid for their utilities directly were selected as significant variables for distinguishing between conservers and non-conservers based on total number of conservation actions using all three methods. Overall, the variables which were identified by each of the three methods as distinguishing characteristics of conservers and nonconservers were: age, tenure, and whether renters paid for their utilities directly. Other variables that contribute to the characterization to a lesser degree are employment status, education, income, occupation, sex, and race.

Summary of Conservation Activities

The respondents, in general, were more likely to have changed their behavior than to have installed equipment to conserve energy. Behavior changes were reported most often by young, better educated Whites employed in craftsman, foreman, professional, and technical positions. Higher income groups were more likely to report reducing their air conditioning use. Lower income groups were probably not using air conditioning as much if at all before. The retired and disabled were less likely to report having changed their manner of dress. Many probably already dressed appropriately for the weather.

Among renters, those who do not pay their utility bills directly reported fewer changes. These residents do not always share in the monetary savings available from conserving energy. Renters as a

group, however, reported having altered their manner of dress more often than other respondents. This is an adjustment which is easily undertaken and requires no investment in capital improvements to rented property. Apartment and duplex residents (mostly renters) also reported high numbers of behavior changes to reduce energy use.

Families living in older homes for at least 40 years reported adjusting their thermostats least often. Part of the lack of change could be a result of older homes having heating systems that do not have a thermostat. The lower number of behavior changes by this group could also be reflected in the age of homes and therefore probable need for weatherization. If the houses have serious infiltration problems, higher thermostat settings might be necessary to keep the homes at comfortable temperatures. Also, many of these residents are elderly and must maintain certain air temperatures for health reasons.

Energy conserving equipment installations were reported most often by single family homeowners who lived in newer homes. They tended to be middle income White males under 64 years old. Since many lived in homes less than 5 years old, the equipment may have been installed when the home was built, rather than as a retrofit. Those living in older homes reported installing plastic over the windows and wood stoves.

The younger households cited installing caulking, weatherstripping, and fireplace covers more often. The oldest respondents reported the least insulation. Middle aged families appeared to be adding the most conserving equipment to their homes while the younger and older residents emphasized the least expensive improvements. The elderly reported fewer installations.

Black households reported installing plastic over their windows more often than Whites. The White families listed more installations than the lower income Black families. These results were based, however, on responses from only eight Black heads of household.

The 11 vocational school graduates reported high numbers of installations in their homes. This could be a result of the residents having gained training and experience in school which enabled them to make energy conservation improvements to their homes themselves.

Renters, especially those not paying for their utilities directly, were less likely to have installed conservation equipment. Once again, the reluctance of renters to invest in property they do not own is exemplified.

Sources of Information Used

The variety of energy information sources available to Knox County residents was reviewed in Chapter II. The use of eight existing sources was investigated through the questionnaire. The results are presented in Tables 15-17. Out of the 280 respondents, a fairly equal number used information enclosed with their monthly natural gas and/or electricity bill (40.0%), printed in newspapers (39.3%), and broadcast over television (36.3%). Only 19.3% of the residents had used the energy audit program, and .7% the Tennessee Energy Hotline. Other sources of information listed included friends and neighbors, magazines, books, the Cooperative Extension Service, and a garden fair.

Demographic characteristics. The source of information used by various age groups varied slightly. Among those households whose head was less than 21, television was used by two-thirds and newspapers by

Table 15

Energy Information Sources Used as Proportion of Respondents by Demographic Characteristics

| Information source | All respondents | Age | | | | | Race | | | Sex | | Education | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than 21 | 21-34 | 35-49 | 50-64 | Over 64 | Black | White | Other | Male | Female | Less than 12 years | High school | Vocation | Some college | College graduate |
| | (280)[a] | (6) | (87) | (68) | (61) | (58) | (8) | (261) | (1) | (195) | (76) | (31) | (40) | (11) | (62) | (125) |
| Utility bill enclosure | 40.0 | 33.3 | 42.5 | 47.1 | 31.1 | 37.9 | 12.5 | 41.4 | 0.0 | 41.0 | 39.5 | 30.8 | 35.0 | 54.5 | 45.2 | 40.8 |
| Newspaper | 39.3 | 50.0 | 40.2 | 41.2 | 42.6 | 31.0 | 25.0 | 40.6 | 0.0 | 40.5 | 38.2 | 20.5 | 27.5 | 27.3 | 51.6 | 44.0 |
| Television | 36.8 | 66.7 | 40.2 | 32.4 | 36.1 | 34.5 | 25.0 | 37.9 | 0.0 | 35.9 | 39.5 | 25.6 | 30.0 | 27.3 | 51.6 | 36.8 |
| TVA pamphlets | 16.8 | 0.0 | 20.7 | 19.1 | 14.8 | 12.1 | 0.0 | 17.2 | 0.0 | 20.0 | 10.5 | 10.3 | 10.0 | 9.1 | 17.7 | 20.8 |
| DOE pamphlets | 7.1 | 16.7 | 9.2 | 7.4 | 9.8 | 0.0 | 0.0 | 7.7 | 0.0 | 8.7 | 3.9 | 2.6 | 5.0 | 9.1 | 4.8 | 10.4 |
| Radio | 19.3 | 16.7 | 27.6 | 19.1 | 14.8 | 12.1 | 12.5 | 9.9 | 0.0 | 19.5 | 21.1 | 10.3 | 20.0 | 36.4 | 25.8 | 16.8 |
| Tenn. hotline | .7 | 0.0 | 0.0 | 1.5 | 1.6 | 0.0 | 0.0 | .4 | 100.0 | 1.0 | 0.0 | 2.6 | 0.0 | 0.0 | 0.0 | .8 |
| Energy audit | 19.6 | 0.0 | 20.7 | 23.5 | 24.6 | 10.3 | 0.0 | 20.3 | 0.0 | 23.6 | 11.8 | 7.7 | 15.0 | 18.2 | 22.6 | 23.2 |
| Other | 7.9 | 0.0 | 6.9 | 13.2 | 8.2 | 3.4 | 0.0 | 8.4 | 0.0 | 7.7 | 7.9 | 0.0 | 2.5 | 9.1 | 6.5 | 12.8 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 16

Energy Information Sources Used as Proportion of Respondents by Economic Characteristics

| Information source | All respondents | Income | | | | Employment status | | | If employed, | | Occupation | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than $10,000 | $10,000-19,999 | $20,000-39,999 | $40,000 or more | Retired/disabled | Unemployed | Employed | Full time | Part time | Sales | Crafts, foreman | Labor | Profession, technical | Service | Manager, admnstr. | Clerical |
| | (280)[a] | (61) | (92) | (88) | (31) | (56) | (16) | (205) | (174) | (20) | (28) | (17) | (5) | (104) | (8) | (18) | (10) |
| Utility bill enclosure | 40.0 | 34.4 | 40.2 | 42.0 | 48.4 | 35.7 | 37.5 | 40.0 | 43.1 | 45.0 | 35.7 | 47.1 | 60.0 | 42.3 | 62.5 | 44.4 | 60.0 |
| Newspaper | 39.3 | 24.5 | 38.0 | 44.3 | 51.6 | 35.7 | 41.2 | 39.7 | 41.4 | 25.0 | 28.6 | 41.2 | 20.0 | 44.2 | 25.0 | 55.6 | 50.0 |
| Television | 36.8 | 37.7 | 32.6 | 42.0 | 32.3 | 41.1 | 37.5 | 35.6 | 34.5 | 40.0 | 25.0 | 35.3 | 20.0 | 36.5 | 50.0 | 44.4 | 30.0 |
| TVA pamphlets | 16.8 | 11.5 | 15.2 | 20.5 | 22.6 | 12.5 | 6.3 | 18.5 | 21.3 | 5.0 | 14.3 | 35.3 | 0.0 | 21.2 | 12.5 | 16.7 | 10.0 |
| DOE pamphlets | 7.1 | 3.3 | 4.3 | 13.6 | 6.5 | 0.0 | 0.0 | 9.8 | 8.6 | 15.0 | 0.0 | 17.6 | 0.0 | 12.5 | 0.0 | 5.6 | 10.0 |
| Radio | 19.3 | 21.3 | 22.8 | 15.9 | 16.1 | 14.3 | 35.3 | 19.1 | 19.0 | 30.0 | 14.3 | 23.5 | 20.0 | 19.2 | 37.5 | 27.8 | 20.0 |
| Tenn. hotline | .7 | 0.0 | 0.0 | 2.3 | 0.0 | 0.0 | 5.9 | .5 | .6 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 5.6 | 0.0 |
| Energy audit | 19.6 | 6.6 | 16.3 | 30.7 | 25.8 | 10.7 | 12.5 | 22.4 | 25.3 | 5.0 | 25.0 | 29.4 | 20.0 | 25.0 | 12.5 | 33.3 | 10.0 |
| Other | 7.9 | 3.3 | 6.5 | 9.1 | 19.4 | 3.6 | 6.9 | 9.3 | 9.2 | 10.0 | 3.6 | 0.0 | 0.0 | 8.7 | 12.5 | 27.8 | 10.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 17

Energy Information Sources Used as Proportion of Respondents by Residence Characteristics

| Information source | All respondents | Tenure | | If renter, | | Home type | | | | Home age | | | | Years at current address | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner | Renter | Pay utilities | Not pay utilities | Apt. | Duplex | Mobile home | Single family | Less than 5 | 5-19 | 20-39 | 40 or more | Less than 5 | 5-19 | 20-39 | 40 or more |
| | (280)[a] | (197) | (78) | (63) | (9) | (50) | (8) | (4) | (216) | (33) | (105) | (90) | (39) | (122) | (92) | (49) | (12) |
| Utility bill enclosures | 40.0 | 43.1 | 34.6 | 41.3 | 0.0 | 28.0 | 37.5 | 50.0 | 43.1 | 30.3 | 37.1 | 46.7 | 38.5 | 39.3 | 37.0 | 49.0 | 33.3 |
| Newspaper | 39.3 | 40.6 | 37.2 | 41.3 | 22.2 | 40.0 | 37.5 | 25.0 | 39.4 | 36.4 | 42.9 | 38.9 | 35.9 | 41.0 | 37.0 | 42.9 | 33.3 |
| Television | 36.8 | 35.0 | 43.6 | 59.2 | 22.2 | 50.0 | 62.5 | 50.0 | 32.4 | 27.3 | 40.0 | 36.7 | 35.9 | 39.3 | 31.5 | 40.8 | 41.7 |
| TVA pamphlets | 16.8 | 19.3 | 10.3 | 11.1 | 0.0 | 6.0 | 25.0 | 25.0 | 19.0 | 21.2 | 17.1 | 17.8 | 12.8 | 17.2 | 15.2 | 20.4 | 16.7 |
| DOE pamphlets | 7.1 | 8.1 | 3.8 | 4.8 | 0.0 | 2.0 | 0.0 | 0.0 | 8.8 | 12.1 | 4.8 | 8.9 | 5.1 | 8.2 | 4.3 | 12.2 | 0.0 |
| Radio | 19.3 | 18.3 | 23.1 | 24.6 | 20.0 | 28.0 | 25.0 | 50.0 | 16.7 | 21.2 | 22.9 | 20.0 | 7.7 | 23.8 | 14.1 | 18.4 | 8.3 |
| Tenn. hotline | .7 | .5 | 1.3 | 0.0 | 10.0 | 0.0 | 0.0 | 25.0 | .5 | 0.0 | 0.0 | 2.2 | 0.0 | 0.0 | 0.0 | 2.0 | 8.3 |
| Energy audit | 19.6 | 25.4 | 5.1 | 6.3 | 0.0 | 0.0 | 25.0 | 0.0 | 24.5 | 21.2 | 23.8 | 22.2 | 7.7 | 19.7 | 21.7 | 22.4 | 0.0 |
| Other | 7.9 | 8.6 | 6.4 | 4.6 | 10.0 | 10.0 | 0.0 | 0.0 | 7.9 | 15.2 | 5.7 | 7.8 | 10.3 | 8.2 | 7.6 | 6.1 | 16.7 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

one-half. None of this age group reported using the hotline, TVA pamphlets, or the energy audit. Radio reached 27.6% of the 21-to-34-year-olds. Audits were cited most often by those 21 to 64 years old. Just 10.3% of those over 64 had used the energy audits, and none of them had called the hotline or used D.O.E. pamphlets.

Newspapers and television each reached one-fourth of the Black families. No Black households reported using TVA or D.O.E. pamphlets, the hotline, or energy audits. More male than female headed households used the energy audit and pamphlets. Among female heads of households, an equal number cited television and utility bill enclosures as energy information sources (39.5%). In addition, 38.2% used information from newspapers. Only 20.5% of those with less than 12 years of education used information reported in newspapers, and just 7.7% used information from energy audits. Newspapers reached 51.6% of those some some college education and 44.0% of college graduates. Energy audits were used by 22.6% of those with some college and 23.2% of college graduates.

Economic characteristics. The lowest income group used television most often for its information. Radio was used most often by those earning less than $20,000. An equal number of those earning between $20,000 and $39,999 used the energy audit and television (30.7%). The sources used most often by those making $40,000 or more were newspapers and utility bill inserts. Television was cited by 41.1% of those retired or disabled as an information source. An equal number of them (35.7%) used newspaper and utility bill inserts. Those employed used the energy audit, bill inserts, and pamphlets most often as sources of energy information.

Residence characteristics. Renters relied more heavily on television and radio than homeowners. Only 5.1% of the renters reported using information from an audit. Renters who paid their utility bills directly used all the sources listed except the hotline more often than those not paying directly for their energy use. No apartment dwellers reported using information received from an energy audit or the hotline.

## Summary of Information Sources Used

Many of the respondents have been using energy conservation information they received through the mass media. Television was used by females, college students, low to middle income families, renters, apartment and duplex residents, and those retired or disabled, unemployed, or employed part time. Radio also was reaching females, college students, low income families, renters, and the unemployed. Newspapers were being used more by better educated higher income respondents. Utility bill enclosures were also a popular source of energy information. They were cited most often by higher income respondents and vocational school graduates. Those employed full time used D.O.E. and TVA pamphlets most often. The energy audit program was used most often by better educated White middle income families whose household heads were between 21 and 64 years old and employed full time.

## Sources of Financing Used

Four sources of weatherization and alternative energy financial benefits were listed in the questionnaire. A large majority of the respondents had not used any of the sources listed, including those who had installed energy conservation equipment (see Tables 18-20).

Table 18

Energy Conservation Financial Benefits Received as Proportion of Respondents by Demographic Characteristics

| Financing source | All respondents | Age | | | | | Race | | | Sex | | Education | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than 21 | 21-34 | 35-49 | 50-64 | Over 64 | Black | White | Other | Male | Female | Less than 12 years | High school | Vocation | Some college | College graduate |
| | (280)[a] | (6) | (87) | (68) | (61) | (58) | (8) | (261) | (1) | (195) | (76) | (31) | (40) | (11) | (62) | (125) |
| CAC | 1.1 | 0.0 | 1.1 | 0.0 | 3.3 | 0.0 | 12.5 | .8 | 0.0 | .5 | 2.6 | 2.6 | 2.5 | 0.0 | 0.0 | .8 |
| Utility co. loan | 12.9 | 0.0 | 12.6 | 13.2 | 11.5 | 15.5 | 0.0 | 13.4 | 0.0 | 14.9 | 9.2 | 10.3 | 12.5 | 0.0 | 8.1 | 17.6 |
| Income tax credit | 12.9 | 16.7 | 16.1 | 13.2 | 14.8 | 5.2 | 0.0 | 13.8 | 0.0 | 14.9 | 9.2 | 7.7 | 12.5 | 18.2 | 9.7 | 16.0 |
| FmHA | .7 | 0.0 | 1.1 | 1.5 | 0.0 | 0.0 | 0.0 | .4 | 100.0 | 1.0 | 0.0 | 2.6 | 0.0 | 0.0 | 0.0 | .8 |

[a]The numbers in parentheses are the number or respondents in each category on which the proportions are based.

Table 19

Energy Conservation Financial Benefits Received as Proportion of Respondents by Economic Characteristics

| Financing source | All respondents | Income | | | | Employment status | | | If employed, | | Occupation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than $10,000 | $10,000-19,999 | $20,000-39,999 | $40,000 or more | Retired/disabled | Unemployed | Employed | Full time | Part time | Sales | Crafts, foreman | Labor | Profession, technical | Service | Manager, admin. | Clerical | Operative | Other |
| | (280)[a] | (61) | (92) | (88) | (31) | (56) | (16) | (206) | (174) | (20) | (28) | (17) | | (104) | (8) | (18) | (10) | (6) | (13) |
| CAC | 1.1 | 3.3 | 0.0 | 1.1 | 0.0 | 1.8 | 0.0 | 1.0 | 0.0 | 5.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 14.3 | 0.0 |
| Utility company loan | 12.9 | 6.6 | 9.8 | 20.5 | 16.1 | 8.9 | 12.5 | 14.1 | 13.8 | 20.0 | 10.7 | 11.8 | 20.0 | 19.2 | 12.5 | 5.6 | 20.0 | 0.0 | 7.7 |
| Income tax credit | 12.9 | 0.0 | 10.9 | 21.6 | 19.4 | 3.6 | 12.5 | 15.6 | 14.9 | 20.0 | 10.7 | 0.0 | 40.0 | 18.3 | 12.5 | 16.7 | 20.0 | 28.6 | 15.4 |
| FmHA | 0.7 | 0.0 | 0.0 | 2.3 | 0.0 | 0.0 | 6.3 | 0.5 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 20

Energy Conservation Financial Benefits Received as Proportion of Respondents by Residence Characteristics

| Financing source | All respondents | Tenure | | If renter, | | Home type | | | | Home age | | | | Years at current address | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner | Renter | Pay utilities | Not pay utilities | Apt. | Duplex | Mobile home | Single family | Less than 5 | 5-19 | 20-39 | 40 or more | Less than 5 | 5-19 | 20-39 | 40 or more |
| | (280)[a] | (197) | (78) | (63) | (9) | (50) | (8) | (4) | (216) | (33) | (105) | (90) | (39) | (122) | (92) | (49) | (12) |
| CAC | 1.1 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.4 | 0.0 | 0.0 | 1.1 | 5.1 | 1.6 | 1.1 | 0.0 | 0.0 |
| Utility company loan | 12.9 | 16.2 | 3.8 | 4.8 | 0.0 | 2.0 | 0.0 | 0.0 | 16.2 | 3.0 | 21.0 | 10.0 | 10.3 | 11.5 | 18.5 | 4.1 | 16.7 |
| Income tax credit | 12.9 | 18.3 | 0.0 | 0.0 | 0.0 | 0.0 | 12.5 | 0.0 | 16.2 | 15.2 | 15.2 | 12.2 | 7.7 | 13.9 | 12.0 | 16.3 | 0.0 |
| FmHA | .7 | .5 | 1.3 | 0.0 | 11.1 | 0.0 | 0.0 | 25.0 | .5 | 0.0 | 1.0 | 1.1 | 0.0 | .8 | 0.0 | 0.0 | 8.3 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Utility company no-interest loans and federal income tax credits were each used by 12.9% of the respondents. The Community Action Committee had financed weatherization for 1.1% of the respondents. Only .7% had received financial assistance through the Farmer's Home Administration.

Demographic characteristics. No families whose head was under 21 had used any of the financing programs except the tax credit. All other age groups had used the utility financing program. Respondents of all ages had used the federal income tax credit, but only 5.2% of those over 64 had used the credit. Black families indicated only using the CAC program. None had taken the tax credit nor financed weatherization through their monthly utility bills. Less use of the tax credit and the utility company program was reported by female headed households. The tax credit had been used most often by vocational school graduates (18.2%) and college graduates (16.0%). College graduates financed their weatherization efforts most often via utility company loans (17.6%). No vocational school graduates reported receiving utility company loans.

Economic characteristics. None of the respondents with incomes of less than $10,000 used the income tax credit. Among those earning $20,000 to $39,999, 21.6% had used the tax credit and 20.5% had financed weatherization with utility company loans. Just 16.1% of those with incomes of $40,000 or more reported receiving a utility company loan and 19.4% the federal income tax credit. Among retired and disabled respondents, only 3.6% had received the federal income tax credit and 8.9% the utility company loan. None of the craftsmen or foreman had taken the tax credit.

Residence characteristics. No renters had received income tax credits, but 3.8% had obtained utility company loans. Just 2.0% of the apartment dwellers had received loans. Three percent of those living in homes less than 5 years old had used the utility company loan program, whereas 21.0% of those residing in homes between 5 and 19 years old had used the program. Only 7.7% of residents of homes at least 40 years old received the income tax credit. None of the respondents who had lived in their homes for at least 40 years had taken the income tax credit. Only 4.1% of those who had resided at their current address between 20 and 39 years had taken out a utility company loan. Meanwhile, 18.5% of those who had lived in their homes 5 to 19 years had received a loan through their utility company.

## Summary of Financial Benefit Sources Used

Few of the respondents had received financial assistance for energy conservation improvements from any of the sources listed. There are qualifications which applicants must meet to participate in the CAC and FmHA programs under which a large majority of the population are made ineligible. The tax credit is available to anyone paying federal income taxes. The utility company loan program is open to all customers.

The tax credit seemed to be helping better educated, middle income respondents who were employed in professional, technical, clerical, labor, and operative positions. No Blacks, renters, or persons who had been at their current address 40 years reported using the tax credit. Few females, elderly, retired, disabled, or low income families had benefited from the program.

The same segment of the population appeared to be using the tax credit program as were using the utility company loans. No Blacks or vocational school graduates reported receiving loans from the utility company's program. Few females or those who had lived in their homes less than 5 years or between 20 and 39 years had used the program. Those who reported receiving loans tended to be middle income college graduates employed in professional, technical, clerical, and labor occupations. Their homes were between 5 and 40 years old and they had lived there 5 to 19 years.

Energy Conservation Interests

Respondents were asked to indicate whether they were interested in 16 topics related to home energy conservation. Additional topics of interest could be listed in the space labeled "other." Their responses are summarized in Tables 21-23.

The topic of solar energy interested the most respondents. Insulation interested 21.4%. Heat pumps and financing alternative energy systems were each indicated by 21.1% of the households. Wood stoves interested 17.9%; attic fans, 16.4%; and wind energy, 16.1%. Fifteen percent of the respondents indicated an interest in means of financing home weatherization. Caulking and plastic window coverings only interested 5.7% each. Other topics of interest listed by the respondents include ventilation and landscaping.

Demographic characteristics. Those respondents under 64 years old were most interested in solar energy and financing programs. Insulation interested those under 21 and over 49. Energy appliances were especially of interest to middle aged respondents. Black respondents

Table 21

Energy Topics of Interest as Proportion of Respondents by Demographic Characteristics

| Topics | All respondents | Age | | | | | Race | | | Sex | | Education | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than 21 | 21-34 | 35-49 | 50-64 | Over 64 | Black | White | Other | Male | Female | Less than 12 years | High school | Vocation | Some college | College graduate |
| | (280)[a] | (6) | (87) | (68) | (61) | (58) | (8) | (261) | (1) | (195) | (76) | (39) | (40) | (11) | (62) | (125) |
| Insulation | 21.4 | 33.3 | 16.1 | 27.9 | 21.3 | 20.7 | 12.5 | 22.2 | 0.0 | 20.5 | 23.7 | 12.8 | 32.5 | 27.3 | 21.0 | 20.0 |
| Attic fan | 16.4 | 0.0 | 19.5 | 25.0 | 14.8 | 5.2 | 0.0 | 17.6 | 0.0 | 17.4 | 14.5 | 5.1 | 5.0 | 27.3 | 21.0 | 20.8 |
| Solar energy | 31.1 | 33.3 | 42.5 | 39.7 | 27.9 | 6.9 | 12.5 | 32.2 | 0.0 | 32.3 | 30.3 | 5.1 | 25.0 | 9.1 | 32.3 | 42.4 |
| Storm doors, windows | 12.5 | 16.7 | 11.5 | 16.2 | 9.8 | 12.1 | 0.0 | 13.0 | 0.0 | 13.3 | 10.5 | 7.7 | 15.0 | 18.2 | 12.9 | 12.8 |
| Weatherstripping | 8.2 | 0.0 | 9.2 | 10.3 | 8.2 | 5.2 | 0.0 | 8.0 | 0.0 | 7.7 | 9.2 | 5.1 | 10.0 | 9.1 | 9.7 | 8.0 |
| Heat pump | 21.1 | 16.7 | 31.0 | 25.0 | 18.0 | 5.2 | 0.0 | 22.2 | 0.0 | 26.2 | 9.2 | 15.4 | 22.5 | 36.4 | 17.7 | 23.2 |
| Window plastic | 5.7 | 16.7 | 9.2 | 1.5 | 1.6 | 8.6 | 0.0 | 6.1 | 0.0 | 5.1 | 6.6 | 2.6 | 2.5 | 0.0 | 9.7 | 6.4 |
| Caulking | 5.7 | 0.0 | 6.9 | 4.4 | 4.9 | 6.9 | 0.0 | 6.1 | 0.0 | 5.6 | 5.3 | 2.6 | 7.5 | 0.0 | 9.7 | 4.8 |
| Wood stove | 17.9 | 16.7 | 28.7 | 19.1 | 14.8 | 3.4 | 0.0 | 18.8 | 0.0 | 19.5 | 14.5 | 7.7 | 12.5 | 18.2 | 16.1 | 24.0 |
| Clock thermostat | 10.4 | 33.3 | 13.8 | 17.6 | 4.9 | 0.0 | 0.0 | 11.1 | 0.0 | 12.8 | 5.3 | 0.0 | 5.0 | 9.1 | 14.5 | 13.6 |
| Wind energy | 16.1 | 16.7 | 24.1 | 22.1 | 11.5 | 1.7 | 0.0 | 16.5 | 100.0 | 19.0 | 9.2 | 2.6 | 12.5 | 18.2 | 19.4 | 20.0 |
| Fireplace cover | 8.2 | 0.0 | 8.0 | 7.4 | 9.8 | 8.6 | 0.0 | 8.4 | 0.0 | 9.7 | 5.3 | 5.1 | 5.0 | 0.0 | 9.7 | 10.4 |
| Wear proper clothes | 7.9 | 16.7 | 14.9 | 4.4 | 4.9 | 3.4 | 0.0 | 8.4 | 0.0 | 7.7 | 9.2 | 2.6 | 5.0 | 0.0 | 8.1 | 11.2 |
| Financing weatherization | 15.0 | 33.3 | 12.6 | 22.1 | 11.5 | 12.1 | 37.5 | 14.9 | 0.0 | 14.4 | 17.1 | 10.3 | 17.5 | 27.3 | 11.3 | 16.8 |
| Financing alternative energy | 21.1 | 0.0 | 31.0 | 30.9 | 13.1 | 5.2 | 12.5 | 21.5 | 0.0 | 22.1 | 19.7 | 5.1 | 20.0 | 27.3 | 21.0 | 26.4 |
| Energy audit | 13.2 | 16.7 | 19.5 | 14.7 | 8.2 | 6.9 | 12.5 | 13.0 | 0.0 | 13.8 | 14.5 | 2.6 | 12.5 | 0.0 | 16.1 | 16.8 |
| Other | 1.8 | 0.0 | 1.1 | 4.4 | 0.0 | 1.7 | 0.0 | 1.9 | 0.0 | 1.5 | 2.6 | 0.0 | 2.5 | 0.0 | 3.2 | 1.6 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 22

Energy Topics of Interest as Proportion of Respondents by Economic Characteristics

| Topics | All respondents | Income | | | | Employment status | | | If employed, | | Occupation | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than $10,000 | $10,000-19,999 | $20,000-39,999 | $40,000 or more | Retired/disabled | Unemployed | Employed | Full time | Part time | Sales | Crafts, foreman | Labor | Profession, technical | Service | Manager, admin.s. | Clerical |
| | (280)[a] | (61) | (92) | (88) | (31) | (56) | (16) | (205) | (174) | (20) | (28) | (17) | (5) | (104) | (8) | (18) | (10) |
| Insulation | 21.4 | 21.3 | 25.0 | 21.6 | 9.7 | 21.4 | 12.5 | 22.0 | 23.0 | 20.0 | 21.4 | 47.1 | 20.0 | 16.3 | 37.5 | 16.7 | 30.0 |
| Attic fan | 16.4 | 9.8 | 16.3 | 20.5 | 19.4 | 5.4 | 6.3 | 20.5 | 19.5 | 20.0 | 17.9 | 35.3 | 20.0 | 22.1 | 25.0 | 16.7 | 10.0 |
| Solar energy | 31.1 | 19.7 | 30.4 | 36.4 | 41.9 | 10.7 | 31.3 | 36.6 | 37.4 | 40.0 | 42.9 | 5.9 | 20.0 | 37.5 | 37.5 | 55.6 | 40.0 |
| Storm doors, windows | 12.5 | 13.1 | 15.2 | 11.4 | 6.5 | 14.3 | 0.0 | 13.2 | 13.8 | 15.0 | 25.0 | 11.8 | 20.0 | 10.6 | 0.0 | 5.6 | 10.0 |
| Weatherstripping | 8.2 | 8.2 | 7.6 | 8.0 | 6.5 | 5.4 | 6.3 | 9.3 | 9.2 | 10.0 | 17.9 | 5.9 | 0.0 | 4.8 | 12.5 | 0.0 | 10.0 |
| Heat pump | 21.1 | 11.5 | 19.6 | 34.1 | 9.7 | 7.1 | 12.5 | 25.9 | 26.4 | 30.0 | 17.9 | 41.2 | 60.0 | 26.0 | 50.0 | 22.2 | 10.0 |
| Window plastic | 5.7 | 8.2 | 5.4 | 6.8 | 0.0 | 5.4 | 0.0 | 6.3 | 5.2 | 20.0 | 3.6 | 5.9 | 20.0 | 9.6 | 0.0 | 0.0 | 0.0 |
| Caulking | 5.7 | 4.9 | 8.7 | 5.7 | 0.0 | 8.9 | 6.3 | 4.9 | 4.0 | 15.0 | 10.7 | 5.9 | 20.0 | 3.8 | 12.5 | 0.0 | 0.0 |
| Wood stove | 17.9 | 13.1 | 14.1 | 27.3 | 12.9 | 7.1 | 12.5 | 21.5 | 21.3 | 15.0 | 14.3 | 11.8 | 0.0 | 24.0 | 25.0 | 27.8 | 30.0 |
| Clock thermostat | 10.4 | 3.3 | 10.9 | 15.9 | 3.2 | 1.8 | 0.0 | 13.7 | 14.4 | 10.0 | 17.9 | 5.9 | 20.0 | 15.4 | 12.5 | 11.1 | 10.0 |
| Wind energy | 16.1 | 11.5 | 13.0 | 22.7 | 9.7 | 3.6 | 18.8 | 19.5 | 20.1 | 15.0 | 25.0 | 5.9 | 60.0 | 16.3 | 37.5 | 33.3 | 30.0 |
| Fireplace cover | 8.2 | 3.3 | 6.5 | 10.2 | 16.1 | 10.7 | 0.0 | 8.3 | 8.6 | 5.0 | 10.7 | 11.8 | 0.0 | 7.7 | 0.0 | 11.1 | 0.0 |
| Wear proper clothes | 7.9 | 9.8 | 10.9 | 4.5 | 6.5 | 3.6 | 12.5 | 8.8 | 7.5 | 20.0 | 17.9 | 0.0 | 20.0 | 8.7 | 0.0 | 5.6 | 10.0 |
| Financing weatherization | 15.0 | 16.4 | 12.0 | 18.2 | 9.7 | 12.5 | 12.5 | 16.1 | 17.2 | 10.0 | 14.3 | 11.8 | 20.0 | 15.4 | 0.0 | 27.8 | 20.0 |
| Financing alternative energy | 21.1 | 14.8 | 15.2 | 31.8 | 16.1 | 3.6 | 18.8 | 26.3 | 27.6 | 15.0 | 35.7 | 5.9 | 20.0 | 26.0 | 12.5 | 44.4 | 30.0 |
| Energy audit | 13.2 | 9.8 | 16.3 | 17.0 | 3.2 | 7.1 | 0.0 | 16.1 | 14.9 | 20.0 | 17.9 | 17.6 | 0.0 | 14.4 | 25.0 | 16.7 | 30.0 |
| Other | 1.8 | 1.6 | 2.2 | 2.3 | 0.0 | 1.8 | 0.0 | 2.0 | 1.7 | 5.0 | 7.1 | 0.0 | 0.0 | 0.0 | 0.0 | 11.1 | 0.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 23

Energy Topics of Interest as Proportion of Respondents by Residence Characteristics

| Topics | All respondents | Tenure | | If renter, | | Home type | | | | Home age | | | | Years at current address | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner | Renter | Pay utilities | Not pay utilities | Apt. | Duplex | Mobile home | Single family | Less than 5 | 5-19 | 20-39 | 40 or more | Less than 5 | 5-19 | 20-30 | 40 or more |
| | (280)[a] | (197) | (78) | (63) | (9) | (50) | (8) | (4) | (216) | (33) | (105) | (90) | (39) | (122) | (92) | (49) | (12) |
| Insulation | 21.4 | 22.3 | 20.5 | 25.4 | 0.0 | 18.0 | 25.0 | 0.0 | 22.7 | 12.1 | 21.0 | 24.4 | 23.1 | 20.5 | 23.9 | 22.4 | 16.7 |
| Attic fan | 16.4 | 17.3 | 14.1 | 14.3 | 11.1 | 10.0 | 12.5 | 25.0 | 17.1 | 15.2 | 12.4 | 22.2 | 12.8 | 16.4 | 17.4 | 16.3 | 8.3 |
| Solar energy | 31.1 | 28.9 | 35.9 | 34.9 | 55.6 | 42.0 | 12.5 | 25.0 | 29.6 | 42.4 | 35.2 | 27.8 | 17.9 | 41.8 | 27.2 | 20.4 | 0.0 |
| Storm doors, windows | 12.5 | 11.7 | 14.1 | 14.3 | 22.2 | 14.0 | 12.5 | 0.0 | 12.5 | 9.1 | 15.2 | 14.4 | 5.1 | 14.8 | 14.1 | 8.2 | 0.0 |
| Weatherstripping | 8.2 | 6.6 | 12.8 | 14.3 | 11.1 | 10.0 | 12.5 | 0.0 | 7.9 | 3.0 | 11.4 | 7.8 | 5.1 | 11.5 | 8.7 | 2.0 | 0.0 |
| Heat pump | 21.1 | 21.3 | 20.5 | 23.8 | 11.1 | 22.0 | 25.0 | 25.0 | 20.4 | 24.2 | 19.0 | 25.6 | 12.8 | 24.6 | 22.8 | 12.2 | 16.7 |
| Window plastic | 5.7 | 3.6 | 11.5 | 14.3 | 0.0 | 14.0 | 12.5 | 0.0 | 3.7 | 3.0 | 8.6 | 5.6 | 2.6 | 9.0 | 2.2 | 2.0 | 8.3 |
| Caulking | 5.7 | 5.1 | 7.7 | 9.5 | 0.0 | 6.0 | 12.5 | 0.0 | 5.6 | 3.0 | 6.7 | 7.8 | 2.6 | 6.6 | 6.5 | 4.1 | 0.0 |
| Wood stove | 17.9 | 16.8 | 21.8 | 20.6 | 33.3 | 24.0 | 12.5 | 25.0 | 15.7 | 21.2 | 21.9 | 14.4 | 10.3 | 24.6 | 13.0 | 12.2 | 8.3 |
| Clock thermostat | 10.4 | 10.4 | 11.5 | 12.7 | 0.0 | 14.0 | 0.0 | 0.0 | 9.7 | 24.2 | 8.6 | 7.8 | 2.6 | 14.8 | 7.6 | 6.1 | 0.0 |
| Wind energy | 16.1 | 15.7 | 17.9 | 20.6 | 11.1 | 20.0 | 12.5 | 50.0 | 14.8 | 18.2 | 19.0 | 17.8 | 7.7 | 19.7 | 15.2 | 10.2 | 16.7 |
| Fireplace cover | 8.2 | 9.6 | 5.1 | 6.3 | 0.0 | 4.0 | 0.0 | 0.0 | 9.7 | 12.1 | 7.6 | 8.9 | 5.1 | 8.2 | 7.6 | 8.2 | 16.7 |
| Wear proper clothes | 7.9 | 4.6 | 16.7 | 17.5 | 22.2 | 18.0 | 25.0 | 0.0 | 5.1 | 6.1 | 8.6 | 5.6 | 10.3 | 13.1 | 2.2 | 2.0 | 16.7 |
| Financing weatherization | 15.0 | 15.7 | 14.1 | 15.9 | 11.1 | 14.0 | 0.0 | 25.0 | 15.7 | 12.1 | 12.4 | 17.8 | 17.9 | 16.4 | 14.1 | 14.3 | 0.0 |
| Financing alternative energy | 21.1 | 21.3 | 20.5 | 23.8 | 11.1 | 20.0 | 0.0 | 25.0 | 22.2 | 27.3 | 25.7 | 18.9 | 12.8 | 29.5 | 18.5 | 10.2 | 0.0 |
| Energy audit | 13.2 | 10.7 | 20.5 | 25.4 | 0.0 | 22.0 | 12.5 | 0.0 | 11.6 | 12.1 | 14.3 | 13.3 | 7.7 | 18.0 | 9.8 | 10.2 | 0.0 |
| Other | 1.8 | 2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.3 | 6.1 | 1.0 | 1.1 | 2.6 | 1.6 | 3.3 | 0.0 | 0.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

were interested in a narrower range of topics than other respondents. Financing weatherization was indicated most often by Blacks, however. There was little difference in the responses of male and female household heads. Respondents with less than a high school education were less interested in the topics listed than other, more educated groups. Vocational school graduates were most interested in heat pumps (36.4%). Also, 27.3% were interested in attic fans, insulation, and financing weatherization. No vocational school graduates indicated an interest in caulking, plastic window coverings, fireplace covers, energy audits, or the effects of clothing on heating and cooling needs. Those with at least some college showed the greatest interest in solar and wind energy, plastic window covers, clock thermostats, fireplace covers, energy audits, and the effects of clothing.

Economic characteristics. Interest in solar energy and fireplace covers increased with income. Interest in wood stoves, wind energy, and financing alternative energy systems was concentrated in families earning $20,000 to $39,999 per year. Clock thermostats and heat pumps mainly interested families making between $10,000 and $39,999. Few families with incomes below $10,000 (9.8%) indicated an interest in attic fans. Interest in clothing's effects on space heating and cooling requirements was concentrated among families with incomes below $20,000. Relatively little interest was shown by households whose family incomes exceeded $40,000 in insulation (9.7%), storm doors and windows (6.5%), and financing weatherization (9.7%). No families in the highest income group were interested in caulking or plastic window coverings. Among the retired and disabled, insulation was the topic of greatest interest (21.4%).

Residence characteristics. Renters indicated interest in weatherstripping, plastic window coverings, wood stoves, clothing, and energy audits more often than homeowners. Renters not paying their utilities directly showed interest in solar energy (50.0%), wood stoves (30.0%), storm doors and windows (20.0%), and clothing's effects on heating and cooling needs (20.0%). Solar energy was the most popular topic among apartment dwellers (42.0%) and those respondents in single family homes (29.6%). Those residing in apartments reported interest more frequently than those in single family homes in the topics of plastic window coverings, wood stoves, wind energy, clock thermostats, and the effects of clothing.

Solar energy was the major topic of interest to residents of homes built after 1940. Residents of homes at least 40 years old were most interested in insulation. Residents of newer homes were relatively more interested in fireplace covers, clock thermostats, wood stoves, solar energy, and financing alternative energy systems. Those whose homes were between 5 and 40 years old showed the most frequent interest in attic fans, storm doors and windows, weatherstripping, caulking, and plastic window coverings. Residents of older homes were interested in insulation, clothing, and financing weatherization.

Among those respondents who had lived at their present address less than 20 years, solar energy was the most prevalent topic of interest. Those who had lived at the same address 20 to 39 years were more interested in insulation (22.4%). Those who had been at the same address at least 40 years showed interest in fireplace covers (16.7%) and clothes (16.7%) more frequently than the rest of the respondents. No one who had lived at the same address 40 years or more was interested

in solar energy, storm doors or windows, weatherstripping, caulking, clock thermostats, energy audits, financing alternative energy systems, or financing weatherization.

Information Delivery Mechanism Preferred

The subjects were asked to indicate in what forms they would like to receive information on the topics in which they were interested (see Tables 24-29). Of the 230 respondents, 53.2% wanted to receive the information in a newsletter. One suggested that the newsletter be sent only upon request. Newspapers were suggested as the medium of delivery by 38.9%. There was support for articles in both Sunday and daily editions. Television shows were suggested by 21.4%. Although there was a fairly even split between those preferring weekday and weekend programs, 73.9% of those expressing a preference wanted broadcasts in the evening. Only 7.5% wanted displays in shopping centers, and 10.4% wanted radio broadcasts. One respondent suggested using station WUOT to broadcast radio programs. Other forms of delivery suggested include a central energy office supplying brochures, home shows, direct advice, and pamphlets.

Demographic characteristics. Members of all age groups asked most frequently for a newsletter. The interest in newspaper articles, however, decreased with age, whereas the interest in television broadcasts increased with age. Black respondents favored using the newspapers, television, and radio more than a newsletter. The newsletter idea was preferred by 54.4% of the White respondents. Although the newsletter was the most popular delivery mechanism among all education

Table 24

Energy Information Delivery Mechanisms Preferred as Proportion of Respondents by Demographic Characteristics

| Delivery mechanism | All respondents | Age | | | | | Race | | | Sex | | Education | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than 21 | 21-34 | 35-49 | 50-64 | Over 64 | Black | White | Other | Male | Female | Less than 12 years | High school | Vocation | Some college | College graduate |
| | (280)[a] | (6) | (87) | (68) | (61) | (58) | (8) | (261) | (1) | (195) | (76) | (39) | (40) | (11) | (62) | (125) |
| Newsletter | 53.2 | 66.7 | 58.6 | 64.7 | 49.2 | 34.5 | 12.5 | 54.4 | 0.0 | 56.9 | 43.4 | 25.6 | 57.5 | 54.5 | 59.7 | 57.6 |
| Radio | 10.4 | 0.0 | 14.9 | 10.3 | 6.6 | 8.6 | 37.5 | 9.6 | 100.0 | 9.2 | 10.5 | 12.8 | 7.5 | 9.1 | 11.3 | 9.6 |
| Newspaper | 38.9 | 50.0 | 44.8 | 41.2 | 42.6 | 22.4 | 62.5 | 38.7 | 0.0 | 41.5 | 34.2 | 23.1 | 42.5 | 45.5 | 35.5 | 44.0 |
| Shopping center display | 7.5 | 0.0 | 12.6 | 7.4 | 6.6 | 1.7 | 0.0 | 7.7 | 0.0 | 6.7 | 9.2 | 5.1 | 5.0 | 0.0 | 8.1 | 9.6 |
| Television | 21.4 | 16.7 | 16.1 | 23.5 | 23.0 | 25.9 | 50.0 | 20.7 | 0.0 | 22.1 | 19.7 | 20.5 | 25.0 | 27.3 | 17.7 | 21.6 |
| Other | 3.6 | 0.0 | 3.4 | 5.9 | 3.3 | 1.7 | 0.0 | 3.8 | 0.0 | 3.1 | 5.3 | 0.0 | 5.0 | 0.0 | 3.2 | 4.8 |
| Workshop | 60.2 | 83.3 | 62.7 | 67.2 | 59.6 | 44.9 | 20.0 | 61.9 | 100.0 | 65.6 | 46.4 | 35.3 | 58.3 | 33.3 | 72.4 | 64.2 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 25

Energy Information Delivery Mechanisms Preferred as Proportion of Respondents by Economic Characteristics

| Delivery mechanism | All respondents | Income | | | | Employment status | | | If employed, | | Occupation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than $10,000 | $10,000-19,999 | $20,000-39,999 | $40,000 or more | Retired/disabled | Unemployed | Employed | Full time | Part time | Sales | Crafts, foreman | Labor | Profession, technical | Service | Manager admin. |
| | (280)[a] | (61) | (92) | (88) | (31) | (56) | (16) | (205) | (174) | (20) | (28) | (17) | (5) | (104) | (8) | (18) |
| Newsletter | 53.2 | 36.1 | 59.8 | 59.1 | 48.4 | 33.9 | 25.0 | 61.0 | 61.5 | 55.0 | 53.6 | 76.5 | 40.0 | 57.7 | 87.5 | 77.8 |
| Radio | 10.4 | 11.5 | 12.0 | 10.2 | 3.2 | 8.9 | 25.0 | 9.3 | 9.2 | 10.0 | 10.7 | 5.9 | 0.0 | 9.6 | 25.0 | 5.6 |
| Newspaper | 38.9 | 31.1 | 38.0 | 46.6 | 32.3 | 32.1 | 43.8 | 40.5 | 42.0 | 25.0 | 32.1 | 35.3 | 60.0 | 38.5 | 50.0 | 55.6 |
| Shopping center display | 7.5 | 4.9 | 9.8 | 6.8 | 3.2 | 7.1 | 12.5 | 7.3 | 8.0 | 5.0 | 10.7 | 0.0 | 0.0 | 7.7 | 0.0 | 11.1 |
| Television | 21.4 | 27.9 | 21.7 | 17.0 | 22.6 | 33.9 | 18.8 | 18.0 | 16.7 | 20.0 | 10.7 | 11.8 | 40.0 | 15.4 | 37.5 | 33.3 |
| Other | 3.6 | 3.3 | 2.2 | 4.5 | 6.5 | 1.8 | 0.0 | 4.4 | 4.0 | 5.0 | 3.6 | 0.0 | 0.0 | 4.8 | 0.0 | 11.1 |
| Workshop | 60.2 | 42.3 | 61.2 | 71.4 | 60.0 | 47.1 | 57.1 | 64.1 | 65.5 | 64.7 | 76.9 | 50.0 | 40.0 | 64.6 | 87.5 | 72.2 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 26

Energy Information Delivery Mechanisms Preferred as Proportion of Respondents by Residence Characteristics

| Delivery mechanism | All respondents | Tenure | | If renter, | | Home type | | | | Home age | | | | Years at current address | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner | Renter | Pay utilities | Not pay utilities | Apt. | Duplex | Mobile home | Single family | Less than 5 | 5-19 | 20-39 | 40 or more | Less than 5 | 5-19 | 20-39 | 40 or more |
| | (280)[a] | (197) | (78) | (63) | (9) | (50) | (8) | (4) | (98) | (33) | (105) | (90) | (39) | (122) | (92) | (49) | (12) |
| Newsletter | 53.2 | 56.9 | 43.6 | 46.0 | 44.4 | 52.0 | 37.5 | 0.0 | 54.6 | 51.5 | 54.3 | 56.7 | 38.5 | 52.5 | 56.5 | 49.0 | 50.0 |
| Radio | 10.4 | 9.1 | 14.1 | 11.1 | 33.3 | 14.0 | 0.0 | 75.0 | 8.8 | 9.1 | 5.7 | 15.6 | 12.8 | 12.3 | 6.5 | 14.3 | 8.3 |
| Newspaper | 38.9 | 38.6 | 39.7 | 39.7 | 44.4 | 44.0 | 37.5 | 25.0 | 37.5 | 42.2 | 39.0 | 40.0 | 35.9 | 43.4 | 40.2 | 24.5 | 41.7 |
| Shopping center display | 7.5 | 5.6 | 12.8 | 12.7 | 22.2 | 10.0 | 0.0 | 25.0 | 6.5 | 9.1 | 11.4 | 5.6 | 2.6 | 12.3 | 3.3 | 4.1 | 8.3 |
| Television | 21.4 | 20.8 | 23.1 | 23.8 | 22.2 | 26.0 | 12.5 | 25.0 | 20.8 | 15.2 | 20.0 | 23.3 | 28.2 | 21.3 | 21.7 | 20.4 | 25.0 |
| Other | 3.6 | 4.1 | 2.6 | 1.6 | 11.1 | 4.0 | 0.0 | 0.0 | 3.7 | 3.0 | 3.8 | 3.3 | 5.1 | 4.1 | 5.4 | 0.0 | 0.0 |
| Workshop | 60.2 | 63.9 | 51.4 | 55.9 | 44.4 | 58.0 | 28.6 | 75.0 | 61.7 | 71.0 | 68.0 | 56.6 | 42.9 | 61.5 | 61.3 | 60.9 | 36.4 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 27

Mass Media Times Preferred as Proportion of Respondents by Demographic Characteristics

| Time | All respondents | Age | | | | | Race | | | Sex | | Education | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than 21 | 21-34 | 35-49 | 50-64 | Over 64 | Black | White | Other | Male | Female | Less than 12 years | High school | Vocation | Some college | College graduate |
| **Radio** | | | | | | | | | | | | | | | | |
| | (18)[a] | (0) | (8) | (6) | (2) | (2) | (2) | (16) | (0) | (10) | (6) | (2) | (2) | (1) | (5) | (7) |
| Weekday | 83.3 | - | 75.0 | 100.0 | 50.0 | 100.0 | 0.0 | 93.8 | - | 90.0 | 66.7 | 50.0 | 100.0 | 0.0 | 100.0 | 85.7 |
| Weekend | 16.7 | - | 25.0 | 0.0 | 50.0 | 0.0 | 100.0 | 6.3 | - | 10.0 | 33.3 | 50.0 | 0.0 | 100.0 | 0.0 | 14.3 |
| | (22) | (0) | (10) | (6) | (2) | (4) | (2) | (19) | (1) | (13) | (6) | (4) | (3) | (1) | (5) | (9) |
| Morning | 36.4 | - | 40.0 | 50.0 | 50.0 | 0.0 | 0.0 | 42.1 | 0.0 | 46.2 | 33.3 | 50.0 | 33.3 | 0.0 | 40.0 | 33.0 |
| Afternoon | 18.2 | - | 20.0 | 0.0 | 50.0 | 25.0 | 100.0 | 10.5 | 0.0 | 23.1 | 0.0 | 0.0 | 33.3 | 100.0 | 20.0 | 11.1 |
| Evening | 45.5 | - | 40.0 | 50.0 | 0.0 | 75.0 | 0.0 | 47.4 | 100.0 | 30.8 | 66.7 | 50.0 | 33.3 | 0.0 | 40.0 | 55.6 |
| **Newspaper** | | | | | | | | | | | | | | | | |
| | (67) | (2) | (34) | (14) | (14) | (3) | (3) | (62) | (0) | (45) | (20) | (3) | (10) | (4) | (13) | (36) |
| Daily | 53.7 | 50.0 | 38.2 | 50.0 | 85.7 | 100.0 | 33.3 | 54.8 | - | 46.7 | 65.0 | 33.3 | 90.0 | 50.0 | 46.2 | 47.2 |
| Sunday | 46.3 | 50.0 | 61.8 | 50.0 | 14.3 | 0.0 | 66.7 | 45.2 | - | 53.3 | 35.0 | 66.7 | 10.0 | 50.0 | 53.8 | 52.8 |
| **Television** | | | | | | | | | | | | | | | | |
| | (32) | (0) | (8) | (12) | (6) | (6) | (2) | (29) | (0) | (25) | (6) | (3) | (6) | (2) | (6) | (15) |
| Weekday | 56.3 | - | 50.0 | 66.7 | 33.3 | 66.7 | 0.0 | 62.1 | - | 60.0 | 50.0 | 0.0 | 83.3 | 50.0 | 83.3 | 46.7 |
| Weekend | 43.8 | - | 50.0 | 33.3 | 66.7 | 33.3 | 100.0 | 37.9 | - | 40.0 | 50.0 | 100.0 | 16.7 | 50.0 | 16.7 | 53.3 |
| | (46) | (0) | (13) | (14) | (10) | (9) | (2) | (42) | (0) | (32) | (12) | (5) | (5) | (3) | (10) | (22) |
| Morning | 13.0 | - | 30.8 | 14.3 | 0.0 | 0.0 | 0.0 | 11.9 | - | 9.4 | 16.7 | 20.0 | 20.0 | 0.0 | 0.0 | 18.2 |
| Noon | 2.2 | - | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 2.4 | - | 3.1 | 0.0 | 20.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Afternoon | 10.9 | - | 15.4 | 0.0 | 10.0 | 22.2 | 50.0 | 9.5 | - | 12.5 | 8.3 | 0.0 | 20.0 | 33.3 | 10.0 | 9.1 |
| Evening | 73.9 | - | 53.8 | 85.7 | 80.0 | 77.8 | 50.0 | 76.2 | - | 75.0 | 75.0 | 60.0 | 60.0 | 66.7 | 90.0 | 72.7 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 28

Mass Media Times Preferred as Proportion of Respondents by Economic Characteristics

| Time | All respondents | Income | | | | Employment status | | | If employed, | | Occupation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than $10,000 | $10,000-19,999 | $20,000-39,999 | $40,000 or more | Retired/disabled | Unemployed | Employed | Full time | Part time | Sales | Crafts, foreman | Labor | Profession, technical | Service | Manager, admnrs. | Clerical | Operative | Other |
| **Radio** | | | | | | | | | | | | | | | | | | | |
| | (18)[a] | (4) | (9) | (3) | (1) | (2) | (2) | (13) | (12) | (1) | (1) | (1) | (0) | (6) | (2) | (1) | (0) | (1) | (1) |
| Weekday | 83.3 | 100.0 | 77.8 | 100.0 | 100.0 | 50.0 | 100.0 | 84.6 | 83.3 | 100.0 | 100.0 | 100.0 | - | 83.3 | 100.0 | 100.0 | - | 0.0 | 100.0 |
| Weekend | 16.7 | 0.0 | 22.2 | 0.0 | 0.0 | 50.0 | 0.0 | 15.4 | 16.7 | 0.0 | 0.0 | 0.0 | - | 16.7 | 0.0 | 0.0 | - | 100.0 | 0.0 |
| | (22) | (6) | (7) | (9) | (0) | (3) | (3) | (16) | (13) | (2) | (3) | (1) | (0) | (7) | (2) | (1) | (0) | (2) | (0) |
| Morning | 36.4 | 33.3 | 42.9 | 33.3 | - | 0.0 | 33.3 | 43.8 | 53.8 | 0.0 | 66.7 | 100.0 | - | 28.6 | 0.0 | 100.0 | - | 0.0 | - |
| Afternoon | 18.2 | 16.7 | 28.6 | 11.1 | - | 33.3 | 0.0 | 18.8 | 15.4 | 0.0 | 0.0 | 0.0 | - | 14.3 | 0.0 | 0.0 | - | 100.0 | - |
| Evening | 45.5 | 50.0 | 28.6 | 55.6 | - | 66.7 | 66.7 | 37.5 | 30.8 | 100.0 | 33.3 | 0.0 | - | 57.1 | 100.0 | 0.0 | - | 0.0 | - |
| **Newspaper** | | | | | | | | | | | | | | | | | | | |
| | (67) | (14) | (20) | (27) | (5) | (6) | (6) | (54) | (47) | (5) | (8) | (2) | (1) | (27) | (3) | (7) | (2) | (2) | (2) |
| Daily | 53.7 | 64.3 | 50.0 | 40.7 | 100.0 | 83.3 | 66.7 | 48.1 | 44.7 | 60.0 | 27.5 | 50.0 | 0.0 | 48.1 | 66.7 | 57.1 | 50.0 | 50.0 | 50.0 |
| Sunday | 46.3 | 35.7 | 50.0 | 59.3 | 0.0 | 16.7 | 33.3 | 51.9 | 55.3 | 40.0 | 62.5 | 50.0 | 100.0 | 51.9 | 33.3 | 42.9 | 50.0 | 50.0 | 50.0 |
| **Television** | | | | | | | | | | | | | | | | | | | |
| | (32) | (4) | (11) | (12) | (4) | (9) | (1) | (22) | (18) | (2) | (3) | (0) | (1) | (12) | (1) | (4) | (0) | (1) | (1) |
| Weekday | 56.3 | 75.0 | 36.4 | 75.0 | 50.0 | 55.6 | 100.0 | 54.5 | 55.6 | 100.0 | 66.7 | - | 100.0 | 50.0 | 100.0 | 50.0 | - | 0.0 | 100.0 |
| Weekend | 46.3 | 25.0 | 63.6 | 25.0 | 50.0 | 44.4 | 0.0 | 45.5 | 44.4 | 0.0 | 33.3 | - | 0.0 | 50.0 | 0.0 | 50.0 | - | 100.0 | 0.0 |
| | (46) | (11) | (17) | (11) | (6) | (12) | (3) | (30) | (25) | (4) | (3) | (1) | (1) | (13) | (3) | (5) | (9) | (1) | (2) |
| Morning | 13.0 | 27.3 | 5.9 | 18.2 | 0.0 | 8.3 | 0.0 | 16.7 | 20.0 | 0.0 | 0.0 | 0.0 | 0.0 | 15.4 | 33.3 | 20.0 | 33.3 | 0.0 | 0.0 |
| Noon | 2.2 | 0.0 | 0.0 | 9.1 | 0.0 | 0.0 | 0.0 | 3.3 | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 33.3 | 0.0 | 0.0 |
| Afternoon | 10.9 | 9.1 | 23.5 | 0.0 | 0.0 | 16.7 | 0.0 | 10.0 | 8.0 | 25.0 | 0.0 | 0.0 | 0.0 | 7.7 | 0.0 | 0.0 | 0.0 | 100.0 | 50.0 |
| Evening | 73.9 | 63.6 | 70.6 | 72.7 | 100.0 | 75.0 | 100.0 | 70.0 | 68.0 | 75.0 | 100.0 | 100.0 | 100.0 | 76.9 | 66.7 | 80.0 | 33.3 | 0.0 | 50.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 29

Mass Media Times Preferred as Proportion of Respondents by Residence Characteristics

| Time | All respondents | Tenure | | If renter, | | Home type | | | | Home age | | | | Years at current address | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner | Renter | Pay utilities | Not pay utilities | Apt. | Duplex | Mobile home | Single family | Less than 5 | 5-19 | 20-39 | 40 or more | Less than 5 | 5-19 | 20-39 | 40 or more |
| **Radio** | | | | | | | | | | | | | | | | | |
| | (18)[a] | (10) | (8) | (5) | (2) | (5) | (0) | (2) | (11) | (2) | (5) | (7) | (4) | (10) | (5) | (3) | (0) |
| Weekday | 83.3 | 90.0 | 75.0 | 80.0 | 50.0 | 80.0 | - | 100.0 | 81.8 | 100.0 | 100.0 | 85.7 | 50.0 | 80.0 | 80.0 | 100.0 | - |
| Weekend | 16.7 | 0.0 | 25.0 | 20.0 | 50.0 | 20.0 | - | 0.0 | 18.2 | 0.0 | 0.0 | 14.3 | 50.0 | 20.0 | 20.0 | 0.0 | - |
| | (22) | (14) | (8) | (5) | (2) | (4) | (0) | (3) | (15) | (3) | (4) | (11) | (3) | (12) | (4) | (5) | (1) |
| Morning | 36.4 | 42.9 | 25.0 | 20.0 | 0.0 | 0.0 | - | 66.7 | 40.0 | 100.0 | 25.0 | 27.3 | 33.3 | 50.0 | 50.0 | 0.0 | 0.0 |
| Afternoon | 18.2 | 21.4 | 12.5 | 20.0 | 0.0 | 0.0 | - | 0.0 | 26.7 | 0.0 | 0.0 | 27.3 | 33.3 | 16.7 | 25.0 | 20.0 | 0.0 |
| Evening | 45.5 | 35.7 | 62.5 | 60.0 | 100.0 | 100.0 | - | 33.3 | 33.3 | 0.0 | 75.0 | 45.5 | 33.3 | 33.3 | 25.0 | 80.0 | 100.0 |
| **Newspaper** | | | | | | | | | | | | | | | | | |
| | (67) | (42) | (23) | (19) | (3) | (16) | (2) | (1) | (47) | (12) | (28) | (18) | (7) | (44) | (18) | (3) | (2) |
| Daily | 53.7 | 54.8 | 47.8 | 42.1 | 66.7 | 50.0 | 50.0 | 0.0 | 57.4 | 25.0 | 63.6 | 61.1 | 85.7 | 43.2 | 72.2 | 100.0 | 50.0 |
| Sunday | 46.3 | 45.2 | 52.2 | 57.9 | 33.3 | 50.0 | 50.0 | 100.0 | 42.6 | 75.0 | 46.4 | 38.9 | 14.3 | 56.8 | 27.8 | 0.0 | 50.0 |
| **Television** | | | | | | | | | | | | | | | | | |
| | (32) | (25) | (7) | (6) | (1) | (3) | (0) | (1) | (28) | (3) | (14) | (9) | (6) | (15) | (11) | (5) | (0) |
| Weekday | 56.3 | 60.0 | 42.9 | 50.0 | 0.0 | 33.3 | - | 0.0 | 60.7 | 33.3 | 78.6 | 55.6 | 16.7 | 53.3 | 63.6 | 60.0 | - |
| Weekend | 43.8 | 40.0 | 57.1 | 50.0 | 100.0 | 66.7 | - | 100.0 | 39.3 | 66.7 | 21.4 | 44.4 | 83.3 | 46.7 | 36.4 | 40.0 | - |
| | (46) | (29) | (16) | (13) | (2) | (12) | (0) | (1) | (33) | (5) | (17) | (15) | (7) | (23) | (15) | (6) | (1) |
| Morning | 13.0 | 10.3 | 18.8 | 23.1 | 0.0 | 16.7 | - | 0.0 | 12.1 | 0.0 | 29.4 | 6.7 | 0.0 | 21.7 | 6.7 | 0.0 | 0.0 |
| Noon | 2.2 | 3.4 | 0.0 | 0.0 | 0.0 | 0.0 | - | 0.0 | 3.0 | 0.0 | 0.0 | 6.7 | 0.0 | 0.0 | 0.0 | 16.7 | 0.0 |
| Afternoon | 10.9 | 10.3 | 12.5 | 7.7 | 50.0 | 8.3 | - | 0.0 | 12.1 | 0.0 | 5.9 | 13.3 | 28.6 | 13.0 | 6.7 | 16.7 | 0.0 |
| Evening | 73.9 | 75.9 | 68.8 | 69.2 | 50.0 | 75.0 | - | 100.0 | 72.7 | 100.0 | 64.7 | 73.3 | 71.4 | 65.2 | 86.7 | 66.7 | 100.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

groups, just one-fourth of those with less than 12 years of education favored a newsletter and newspaper articles. The television option was checked least often by those with some college education (17.7%).

Economic characteristics. A newsletter was the preferred information delivery mechanism of all income groups. Television was most popular among those earning less than $10,000 annually. Among the retired and disabled, approximately one-third favored a newsletter, television broadcasts, and newspaper articles. The unemployed preferred using the newspapers (43.8%). The shopping center displays was suggested most often by unemployed respondents (11.8%). None of the craftsmen, foremen, laborers, or service workers wanted shopping center displays. No laborers or clerical workers were interested in radio shows.

Residence characteristics. A newsletter was the preferred information delivery mechanism among both owners and renters. Of the nine renters who did not pay their utilities directly, an equal number preferred the newsletter and newspaper articles (44.4%). No mobile home residents favored a newsletter, whereas no duplex residents suggested radio broadcasts. The newsletter was the most popular medium among residents of all age homes. The interest in a newsletter did not vary much as the length of time residents had spent in their present homes increased.

## Workshop Interest

Respondents were asked if they would attend a free workshop on home energy conservation. Out of the 280 responses, 60.2% stated that they would attend such a workshop (see Tables 24-26).

Demographic characteristics. The youngest age group reported most often that they would attend (83.3%), while those over 64 years old were least likely to attend (44.9%). Only 20.0% of the Black respondents indicated that they would attend. Those with at least some college education indicated they would attend most frequently.

Economic characteristics. Those families with incomes between $20,000 and $39,999 reported most often that they would attend (71.4%).

Residence characteristics. A lower percentage of renters than owners indicated they would attend (51.4% versus 63.9%). The residents of newer homes were more likely to indicate they would attend a workshop. Only one-third of those persons who had lived at their current address at least 40 years reported they would participate in a free workshop.

## Reasons for Not Attending Workshop

Those who indicated they would not attend a free home energy conservation workshop were asked the reason why. Of these 102 households, 84 listed a reason. The responses appear in Table 30. One-third of those who would not attend said they lacked the time to participate. Reasons given which were classified as "other" include residents planning to move, fear of false advertising, unable to drive, doubt of succeeding in reducing KUB bills, lack of confidence in MPC, and belief workshop would deal in generalities rather than in a specific subject in which the respondent would be interested.

## Summary of Energy Information Interests

The major topics of interest to the survey respondents were solar energy, insulation, heat pumps, and financing alternative energy

Table 30

Reason Given For Not Attending Energy Conservation Workshop

| Reason | Respondents | |
|---|---|---|
| | % | (No.) |
| Lack of time | 33.3 | 34 |
| Medical problems | 15.7 | 16 |
| Already conserving | 6.9 | 7 |
| Elderly | 5.9 | 6 |
| Already knowledgeable | 5.9 | 6 |
| Not worthwhile | 5.9 | 6 |
| Renter | 5.9 | 6 |
| Other | 4.9 | 5 |
| None given | 15.7 | 16 |

systems. Other topics indicated were wood stoves, attic fans, wind energy, and financing weatherization. Less interest was expressed in the less expensive, less exotic topics such as caulking and plastic window coverings. Higher income and better educated respondents were more interested in alternative energy systems. Elderly residents were more interested in insulation and inexpensive retrofits. The Blacks who responded were especially interested in ways of financing weatherization. Energy conservation appliances were of more interest to middle aged respondents who earned more than $10,000 annually.

The preferred medium for relaying this information was a newsletter. Newspapers and television were also popular, especially among Blacks and the retired and disabled. A majority of the respondents also said they would attend a free neighborhood energy conservation workshop. Young, well educated White respondents who earned $10,000 or more annually were the most likely to attend.

Attitudes toward Energy Conservation Strategies

The respondents were asked to consider five strategies to conserve energy that were suggested by the Energy Project subcommittees and indicate whether they favored, disfavored, were indifferent, or needed more information on each strategy. The results are presented in Tables 31-33.

Among the five strategies listed, altering building codes so that they reflect energy efficiency performance standards was favored by the largest majority of respondents (85.8%). Also, 71.5% favored holding workshops on alternative energy sources, even though some of them indicated that they themselves might not attend. A little less than half

Table 31

Opinions on Energy Conservation Strategies as Proportion of Respondents by Demographic Characteristics

| Opinion | All respondents | Age | | | | | Race | | | Sex | | Education | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than 21 | 21-34 | 35-49 | 50-64 | Over 64 | Black | White | Other | Male | Female | Less than 12 years | High school | Vocation | Some college | College graduate |
| **Energy Efficiency Building Codes** | | | | | | | | | | | | | | | | |
| | (260)[a] | (6) | (86) | (66) | (57) | (45) | (5) | (248) | (1) | (190) | (64) | (30) | (35) | (11) | (60) | (122) |
| Strongly favor | 52.3 | 33.3 | 54.7 | 47.0 | 56.1 | 53.3 | 60.0 | 52.0 | 0.0 | 50.5 | 57.8 | 46.7 | 54.3 | 63.6 | 58.3 | 49.2 |
| Favor | 33.5 | 50.0 | 32.6 | 33.3 | 31.6 | 35.6 | 20.0 | 34.7 | 0.0 | 35.8 | 26.6 | 33.3 | 31.4 | 18.2 | 31.7 | 36.9 |
| Indifferent | 3.5 | 16.7 | 2.3 | 4.5 | 1.8 | 4.4 | 20.0 | 2.8 | 100.0 | 3.2 | 4.7 | 6.7 | 5.7 | 9.1 | 0.0 | 3.3 |
| Disfavor | 3.5 | 0.0 | 3.5 | 7.6 | 0.0 | 2.2 | 0.0 | 3.6 | 0.0 | 4.2 | 1.6 | 0.0 | 0.0 | 0.0 | 3.3 | 4.9 |
| Strongly disfavor | 1.5 | 0.0 | 3.5 | 0.0 | 1.8 | 0.0 | 0.0 | 1.6 | 0.0 | 2.1 | 0.0 | 0.0 | 0.0 | 9.1 | 3.3 | .8 |
| Need more information | 5.8 | 0.0 | 3.5 | 7.6 | 8.8 | 4.4 | 0.0 | 5.2 | 0.0 | 4.2 | 9.4 | 13.3 | 8.6 | 0.0 | 3.3 | 4.9 |
| **Local Energy Office** | | | | | | | | | | | | | | | | |
| | (249) | (6) | (86) | (64) | (52) | (41) | (6) | (236) | (1) | (182) | (62) | (25) | (35) | (10) | (58) | (119) |
| Strongly favor | 5.2 | 0.0 | 5.8 | 3.1 | 1.9 | 12.2 | 16.7 | 5.1 | 0.0 | 3.3 | 11.3 | 8.0 | 5.7 | 0.0 | 6.9 | 4.2 |
| Favor | 22.1 | 50.0 | 27.9 | 12.5 | 25.0 | 17.1 | 33.3 | 21.2 | 0.0 | 20.9 | 27.4 | 20.0 | 28.6 | 40.0 | 19.0 | 21.0 |
| Indifferent | 17.7 | 33.3 | 23.3 | 15.6 | 13.5 | 12.2 | 16.7 | 18.2 | 0.0 | 18.7 | 14.5 | 16.0 | 8.6 | 30.0 | 13.8 | 21.0 |
| Disfavor | 24.9 | 0.0 | 17.4 | 34.4 | 21.2 | 34.1 | 0.0 | 25.8 | 100.0 | 27.5 | 17.7 | 20.0 | 25.7 | 10.0 | 24.1 | 26.9 |
| Strongly disfavor | 14.1 | 0.0 | 9.3 | 21.9 | 17.3 | 9.8 | 0.0 | 14.0 | 0.0 | 15.4 | 8.1 | 16.0 | 11.4 | 20.0 | 12.1 | 15.1 |
| Need more information | 16.1 | 16.7 | 16.3 | 12.5 | 21.2 | 14.6 | 33.3 | 15.7 | 0.0 | 14.3 | 21.0 | 20.0 | 20.0 | 0.0 | 24.1 | 11.8 |
| **Multifamily Housing** | | | | | | | | | | | | | | | | |
| | (241) | (6) | (86) | (65) | (50) | (34) | (4) | (231) | (1) | (178) | (58) | (25) | (31) | (10) | (56) | (117) |
| Strongly favor | 4.1 | 0.0 | 3.5 | 6.2 | 2.0 | 5.9 | 0.0 | 3.5 | 100.0 | 3.9 | 3.4 | 12.0 | 3.2 | 10.0 | 3.6 | 2.6 |
| Favor | 12.0 | 0.0 | 16.3 | 6.2 | 18.0 | 5.9 | 50.0 | 11.7 | 0.0 | 10.7 | 17.2 | 12.0 | 16.1 | 0.0 | 5.4 | 14.5 |
| Indifferent | 22.4 | 50.0 | 29.1 | 20.0 | 12.0 | 20.6 | 25.0 | 22.5 | 0.0 | 23.6 | 19.0 | 24.0 | 12.9 | 10.0 | 17.9 | 28.2 |
| Disfavor | 31.1 | 33.3 | 26.7 | 29.2 | 34.0 | 41.2 | 0.0 | 32.0 | 0.0 | 30.9 | 34.5 | 20.0 | 35.5 | 20.0 | 35.7 | 30.8 |
| Strongly disfavor | 20.7 | 0.0 | 17.4 | 24.6 | 24.0 | 20.6 | 0.0 | 21.2 | 0.0 | 23.0 | 15.5 | 20.0 | 16.1 | 50.0 | 26.8 | 17.1 |
| Need more information | 9.5 | 16.7 | 7.0 | 13.8 | 10.0 | 5.9 | 25.0 | 9.1 | 0.0 | 7.9 | 10.3 | 12.0 | 16.1 | 10.0 | 10.7 | 6.8 |

Table 31 (continued)

| Opinion | All respondents | Age | | | | | Race | | | Sex | | Education | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than 21 | 21-34 | 35-49 | 50-64 | Over 64 | Black | White | Other | Male | Female | Less than 12 years | High school | Vocation | Some college | College graduate |
| **Emergency Fuel Council** | | | | | | | | | | | | | | | | |
| | (249) | (6) | (85) | (66) | (54) | (38) | (5) | (239) | (1) | (182) | (63) | (24) | (35) | (11) | (57) | (120) |
| Strongly favor | 11.2 | 0.0 | 4.7 | 15.2 | 11.1 | 21.1 | 20.0 | 11.3 | 0.0 | 9.9 | 14.3 | 25.0 | 11.4 | 18.2 | 12.3 | 7.5 |
| Favor | 35.7 | 66.7 | 38.8 | 27.3 | 35.2 | 39.5 | 20.0 | 35.6 | 100.0 | 32.4 | 46.0 | 45.8 | 45.7 | 27.3 | 33.3 | 32.5 |
| Indifferent | 10.8 | 33.3 | 18.8 | 4.5 | 7.4 | 5.3 | 20.0 | 10.5 | 0.0 | 10.4 | 9.5 | 4.2 | 11.4 | 9.1 | 8.8 | 12.5 |
| Disfavor | 16.5 | 0.0 | 12.9 | 22.7 | 13.0 | 21.1 | 0.0 | 17.2 | 0.0 | 19.2 | 9.5 | 4.2 | 14.3 | 9.1 | 19.3 | 19.2 |
| Strongly disfavor | 9.6 | 0.0 | 10.6 | 13.6 | 9.3 | 2.6 | 0.0 | 10.0 | 0.0 | 11.5 | 4.8 | 0.0 | 5.7 | 27.3 | 8.8 | 11.7 |
| Need more information | 16.1 | 0.0 | 14.1 | 16.7 | 24.1 | 10.5 | 40.0 | 15.5 | 0.0 | 16.5 | 15.9 | 20.8 | 11.4 | 9.1 | 17.5 | 16.7 |
| **Alternative Energy Workshop** | | | | | | | | | | | | | | | | |
| | (246) | (6) | (86) | (65) | (53) | (36) | (4) | (234) | (1) | (182) | (57) | (26) | (34) | (11) | (55) | (118) |
| Strongly favor | 23.6 | 33.3 | 25.6 | 21.5 | 22.6 | 22.2 | 50.0 | 22.6 | 0.0 | 22.0 | 24.6 | 30.8 | 14.7 | 18.2 | 30.9 | 21.2 |
| Favor | 48.0 | 50.0 | 48.8 | 50.8 | 41.5 | 50.0 | 25.0 | 48.7 | 0.0 | 50.0 | 42.1 | 42.3 | 61.8 | 36.4 | 43.6 | 48.3 |
| Indifferent | 17.1 | 16.7 | 18.6 | 18.5 | 17.0 | 11.1 | 25.0 | 17.5 | 0.0 | 18.7 | 14.0 | 11.5 | 14.7 | 45.5 | 9.1 | 20.3 |
| Disfavor | 5.3 | 0.0 | 4.7 | 3.1 | 7.5 | 8.3 | 0.0 | 5.6 | 0.0 | 4.9 | 7.0 | 0.0 | 2.9 | 0.0 | 9.1 | 5.9 |
| Strongly disfavor | 1.6 | 0.0 | 0.0 | 1.5 | 3.8 | 2.8 | 0.0 | .9 | 100.0 | 1.6 | 1.8 | 7.7 | 0.0 | 0.0 | 1.8 | .8 |
| Need more information | 4.5 | 0.0 | 2.3 | 4.6 | 7.5 | 5.6 | 0.0 | 4.7 | 0.0 | 2.7 | 10.5 | 7.7 | 5.9 | 0.0 | 5.5 | 3.4 |

[a] The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 32

Opinions on Energy Conservation Strategies as Proportion of Respondents by Economic Characteristics

| Opinion | All respondents | Income | | | | Employment status | | | If employed, | | Occupation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than $10,000 | $10,000-19,999 | $20,000-39,999 | $40,000 or more | Retired/disabled | Unemployed | Employed | Full time | Part time | Sales | Crafts, foreman | Labor | Profession, technical | Service | Manager, adminis. | Clerical | Operative | Other |
| **Energy Efficiency Building Codes** | | | | | | | | | | | | | | | | | | | |
| | (260)[a] | (49) | (87) | (86) | (31) | (46) | (14) | (198) | (171) | (18) | (27) | (17) | (5) | (102) | (7) | (17) | (10) | (5) | (12) |
| Strongly favor | 52.3 | 55.1 | 49.4 | 53.5 | 54.8 | 54.3 | 28.6 | 53.5 | 53.8 | 50.0 | 59.3 | 52.9 | 80.0 | 53.9 | 42.9 | 42.3 | 40.0 | 100.0 | 41.7 |
| Favor | 33.5 | 28.6 | 35.6 | 38.4 | 19.4 | 28.3 | 57.1 | 33.3 | 32.7 | 38.9 | 37.0 | 29.4 | 20.0 | 31.4 | 42.9 | 29.4 | 50.0 | 0.0 | 50.0 |
| Indifferent | 3.5 | 2.0 | 1.1 | 5.8 | 6.5 | 6.5 | 7.1 | 2.5 | 2.9 | 0.0 | 0.0 | 0.0 | 0.0 | 2.9 | 0.0 | 11.8 | 10.0 | 0.0 | 0.0 |
| Disfavor | 3.5 | 0.0 | 4.6 | 1.2 | 12.9 | 0.0 | 7.1 | 3.5 | 4.1 | 0.0 | 3.7 | 0.0 | 0.0 | 4.9 | 0.0 | 5.9 | 0.0 | 0.0 | 8.3 |
| Strongly disfavor | 1.5 | 0.0 | 2.3 | 1.2 | 0.0 | 0.0 | 0.0 | 2.0 | 1.8 | 0.0 | 0.0 | 11.8 | 0.0 | 1.0 | 0.0 | 5.9 | 0.0 | 0.0 | 0.0 |
| Need more information | 5.8 | 14.3 | 6.9 | 0.0 | 6.5 | 10.9 | 0.0 | 5.1 | 4.7 | 11.1 | 0.0 | 5.9 | 0.0 | 5.9 | 14.3 | 5.9 | 0.0 | 0.0 | 0.0 |
| **Local Energy Office** | | | | | | | | | | | | | | | | | | | |
| | (249) | (44) | (83) | (85) | (30) | (39) | (14) | (194) | (167) | (18) | (28) | (17) | (5) | (101) | (6) | (17) | (8) | (5) | (11) |
| Strongly favor | 5.2 | 11.4 | 4.8 | 4.7 | 0.0 | 12.8 | 7.1 | 3.6 | 4.2 | 0.0 | 7.1 | 0.0 | 0.0 | 4.0 | 0.0 | 5.9 | 0.0 | 0.0 | 0.0 |
| Favor | 22.1 | 25.0 | 26.5 | 17.6 | 20.0 | 12.8 | 7.1 | 25.3 | 24.0 | 27.8 | 17.9 | 35.3 | 20.0 | 25.7 | 33.3 | 11.8 | 12.5 | 60.0 | 18.2 |
| Indifferent | 17.7 | 15.9 | 19.3 | 17.6 | 16.7 | 12.8 | 28.6 | 17.5 | 18.0 | 22.2 | 14.3 | 35.3 | 20.0 | 22.8 | 0.0 | 11.8 | 12.5 | 0.0 | 0.0 |
| Disfavor | 24.9 | 15.9 | 18.1 | 29.4 | 46.7 | 30.8 | 21.4 | 23.7 | 23.4 | 27.8 | 14.3 | 11.8 | 20.0 | 24.8 | 33.3 | 29.4 | 37.5 | 20.0 | 45.5 |
| Strongly disfavor | 14.1 | 6.8 | 13.3 | 16.5 | 16.7 | 15.4 | 0.0 | 14.9 | 16.2 | 5.6 | 28.6 | 5.9 | 40.0 | 10.9 | 0.0 | 17.6 | 0.0 | 20.0 | 27.3 |
| Need more information | 16.1 | 25.0 | 18.1 | 14.1 | 0.0 | 15.4 | 35.7 | 14.9 | 14.4 | 16.7 | 17.9 | 11.8 | 0.0 | 11.9 | 33.3 | 23.5 | 37.5 | 0.0 | 9.1 |
| **Multifamily Housing** | | | | | | | | | | | | | | | | | | | |
| | (241) | (42) | (78) | (84) | (30) | (35) | (14) | (190) | (166) | (18) | (26) | (16) | (5) | (100) | (6) | (17) | (9) | (4) | (11) |
| Strongly favor | 4.1 | 2.4 | 6.4 | 3.6 | 0.0 | 5.7 | 7.1 | 3.7 | 4.2 | 0.0 | 11.5 | 0.0 | 0.0 | 4.0 | 0.0 | 0.0 | 0.0 | 25.0 | 0.0 |
| Favor | 12.0 | 19.0 | 12.8 | 4.8 | 20.0 | 11.4 | 21.4 | 11.1 | 11.4 | 11.1 | 11.5 | 12.5 | 0.0 | 12.0 | 16.7 | 11.8 | 0.0 | 0.0 | 9.1 |
| Indifferent | 22.4 | 28.6 | 19.2 | 22.6 | 23.3 | 17.1 | 14.3 | 24.2 | 22.9 | 33.3 | 23.1 | 25.0 | 60.0 | 24.0 | 16.7 | 23.5 | 33.3 | 0.0 | 18.2 |
| Disfavor | 31.1 | 21.4 | 33.3 | 35.7 | 26.7 | 31.4 | 50.0 | 29.5 | 30.7 | 22.2 | 19.2 | 25.0 | 40.0 | 33.0 | 16.7 | 29.4 | 44.4 | 25.0 | 27.3 |
| Strongly disfavor | 20.7 | 19.0 | 16.7 | 23.8 | 26.7 | 25.7 | 7.1 | 21.1 | 21.1 | 22.2 | 15.4 | 25.0 | 0.0 | 22.0 | 0.0 | 17.6 | 22.2 | 25.0 | 36.4 |
| Need more information | 9.5 | 9.5 | 11.5 | 9.5 | 3.3 | 8.6 | 0.0 | 10.5 | 9.6 | 11.1 | 19.2 | 12.5 | 0.0 | 5.0 | 50.0 | 17.6 | 0.0 | 25.0 | 9.1 |

Table 32 (continued)

| Opinion | All respondents | Income | | | | Employment status | | | If employed, | | Occupation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Less than $10,000 | $10,000-19,999 | $20,000-39,999 | $40,000 or more | Retired/disabled | Unemployed | Employed | Full time | Part time | Sales | Crafts, foreman | Labor | Profession, technical | Service | Manager, admin. | Clerical | Operative | Other |
| **Emergency Fuel Council** | | | | | | | | | | | | | | | | | | | |
| | (249) | (45) | (82) | (86) | (30) | (38) | (14) | (196) | (170) | (17) | (28) | (17) | (5) | (99) | (7) | (17) | (10) | (5) | (11) |
| Strongly favor | 11.2 | 17.8 | 13.4 | 8.2 | 3.3 | 18.4 | 14.3 | 9.7 | 11.2 | 0.0 | 21.4 | 11.8 | 20.0 | 6.1 | 14.3 | 5.9 | 10.0 | 20.0 | 0.0 |
| Favor | 35.7 | 48.9 | 42.7 | 22.4 | 33.3 | 34.2 | 50.0 | 36.9 | 33.5 | 41.2 | 25.0 | 41.2 | 40.0 | 33.3 | 71.4 | 29.4 | 30.0 | 40.0 | 54.5 |
| Indifferent | 10.8 | 11.1 | 8.5 | 17.6 | 0.0 | 5.3 | 7.1 | 11.8 | 11.2 | 23.5 | 14.3 | 17.6 | 20.0 | 12.1 | 0.0 | 11.8 | 20.0 | 0.0 | 9.1 |
| Disfavor | 16.5 | 4.4 | 17.1 | 18.8 | 26.7 | 23.7 | 7.1 | 15.9 | 17.1 | 5.9 | 3.6 | 17.6 | 20.0 | 19.2 | 14.3 | 17.6 | 10.0 | 0.0 | 18.2 |
| Strongly disfavor | 9.6 | 4.4 | 7.3 | 11.8 | 16.7 | 5.3 | 7.1 | 10.8 | 10.6 | 11.8 | 14.3 | 5.9 | 0.0 | 14.1 | 0.0 | 5.9 | 0.0 | 0.0 | 9.1 |
| Need more information | 16.1 | 13.3 | 11.0 | 21.2 | 20.0 | 13.2 | 14.3 | 16.9 | 16.5 | 17.6 | 21.4 | 5.9 | 0.0 | 15.2 | 0.0 | 29.4 | 30.0 | 40.0 | 9.1 |
| **Alternative Energy Workshop** | | | | | | | | | | | | | | | | | | | |
| | (246) | (41) | (81) | (87) | (30) | (36) | (12) | (196) | (170) | (18) | (28) | (15) | (5) | (100) | (8) | (18) | (10) | (4) | (11) |
| Strongly favor | 23.6 | 31.7 | 18.5 | 26.4 | 13.3 | 25.0 | 41.7 | 21.9 | 21.8 | 27.8 | 28.6 | 6.3 | 40.0 | 21.0 | 50.0 | 33.3 | 10.0 | 25.0 | 18.2 |
| Favor | 48.0 | 41.5 | 55.6 | 47.1 | 43.3 | 50.0 | 41.7 | 48.0 | 50.0 | 33.3 | 39.3 | 62.5 | 60.0 | 45.0 | 50.0 | 33.3 | 70.0 | 75.0 | 45.5 |
| Indifferent | 17.1 | 14.6 | 14.8 | 13.8 | 33.3 | 8.3 | 0.0 | 19.9 | 18.8 | 27.8 | 25.0 | 25.0 | 0.0 | 20.0 | 0.0 | 22.2 | 10.0 | 0.0 | 27.3 |
| Disfavor | 5.3 | 2.4 | 6.2 | 4.6 | 10.0 | 8.3 | 0.0 | 5.1 | 4.7 | 5.6 | 3.6 | 6.3 | 0.0 | 6.0 | 0.0 | 5.6 | 0.0 | 0.0 | 9.1 |
| Strongly disfavor | 1.6 | 2.4 | 1.2 | 2.3 | 0.0 | 5.6 | 8.3 | .5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Need more information | 4.5 | 7.3 | 3.7 | 5.7 | 0.0 | 2.8 | 8.3 | 4.6 | 4.7 | 5.6 | 3.6 | 0.0 | 0.0 | 6.0 | 0.0 | 5.6 | 10.0 | 0.0 | 0.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

Table 33

Opinions on Energy Conservation Strategies as Proportion of Respondents by Residence Characteristics

| Opinion | All respondents | Tenure | | If renter, | | Home type | | | | Home age | | | | Years at current address | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner | Renter | Pay utilities | Not pay utilities | Apt. | Duplex | Mobile home | Single family | Less than 5 | 5-19 | 20-39 | 40 or more | Less than 5 | 5-19 | 20-39 | 40 or more |
| **Energy Efficiency Building Codes** | | | | | | | | | | | | | | | | | |
| | (260)[a] | (185) | (70) | (57) | (7) | (46) | (8) | (4) | (200) | (33) | (99) | (84) | (32) | (117) | (84) | (45) | (9) |
| Strongly favor | 52.3 | 51.4 | 57.1 | 63.2 | 28.6 | 56.5 | 62.5 | 25.0 | 51.5 | 60.6 | 56.6 | 39.3 | 59.4 | 54.7 | 54.8 | 44.4 | 44.4 |
| Favor | 33.5 | 34.6 | 28.6 | 26.3 | 42.9 | 28.3 | 37.5 | 0.0 | 35.5 | 27.3 | 30.3 | 46.4 | 25.0 | 30.8 | 33.3 | 44.4 | 22.2 |
| Indifferent | 3.5 | 3.8 | 2.9 | 1.8 | 14.3 | 2.2 | 0.0 | 25.0 | 3.0 | 3.0 | 4.0 | 3.6 | 0.0 | 2.6 | 3.6 | 2.2 | 22.2 |
| Disfavor | 3.5 | 3.8 | 2.9 | 1.8 | 0.0 | 4.3 | 0.0 | 0.0 | 3.5 | 6.1 | 2.0 | 3.6 | 6.3 | 4.3 | 2.4 | 4.4 | 0.0 |
| Strongly disfavor | 1.5 | 2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 1.0 | 3.6 | 0.0 | 1.7 | 1.2 | 2.2 | 0.0 |
| Need more information | 5.8 | 4.3 | 8.6 | 7.0 | 14.3 | 8.7 | 0.0 | 50.0 | 4.5 | 3.0 | 6.1 | 3.6 | 9.4 | 6.0 | 4.8 | 2.2 | 11.1 |
| **Local Energy Office** | | | | | | | | | | | | | | | | | |
| | (249) | (177) | (67) | (53) | (8) | (45) | (7) | (4) | (191) | (33) | (93) | (80) | (32) | (115) | (81) | (41) | (8) |
| Strongly favor | 5.2 | 5.6 | 4.5 | 3.8 | 12.5 | 2.2 | 14.3 | 25.0 | 5.2 | 3.0 | 5.4 | 5.0 | 9.4 | 4.3 | 4.9 | 7.3 | 0.0 |
| Favor | 22.1 | 20.3 | 26.9 | 30.2 | 12.5 | 28.9 | 0.0 | 0.0 | 21.5 | 24.3 | 19.4 | 22.5 | 21.9 | 23.5 | 17.3 | 26.8 | 25.0 |
| Indifferent | 17.7 | 18.6 | 13.4 | 13.2 | 12.5 | 11.1 | 14.3 | 50.0 | 18.8 | 18.2 | 20.4 | 13.8 | 18.8 | 19.1 | 21.0 | 9.8 | 12.5 |
| Disfavor | 24.9 | 26.0 | 23.9 | 22.6 | 25.0 | 22.2 | 42.9 | 25.0 | 24.6 | 27.3 | 30.1 | 20.0 | 25.0 | 23.5 | 29.6 | 17.1 | 37.5 |
| Strongly disfavor | 14.1 | 15.8 | 10.4 | 5.7 | 25.0 | 13.3 | 0.0 | 0.0 | 15.2 | 15.2 | 15.1 | 12.5 | 12.5 | 10.4 | 16.0 | 19.5 | 12.5 |
| Need more information | 16.1 | 13.6 | 20.9 | 24.5 | 12.5 | 22.2 | 28.6 | 0.0 | 14.7 | 12.1 | 9.7 | 26.3 | 12.5 | 19.1 | 11.1 | 19.5 | 12.5 |
| **Multifamily Housing** | | | | | | | | | | | | | | | | | |
| | (241) | (169) | (67) | (54) | (7) | (44) | (6) | (4) | (185) | (33) | (93) | (76) | (28) | (115) | (77) | (37) | (7) |
| Strongly favor | 4.1 | 3.0 | 7.5 | 5.6 | 28.6 | 9.1 | 0.0 | 25.0 | 2.7 | 6.1 | 3.2 | | 3.6 | 5.2 | 0.0 | 5.4 | 28.6 |
| Favor | 12.0 | 11.2 | 11.9 | 13.0 | 14.3 | 11.4 | 16.7 | 0.0 | 12.4 | 18.2 | 11.8 | 10.5 | 7.1 | 13.9 | 14.3 | 5.4 | 0.0 |
| Indifferent | 22.4 | 21.9 | 25.4 | 27.8 | 0.0 | 25.0 | 50.0 | 50.0 | 20.5 | 27.3 | 21.5 | 22.5 | 25.0 | 23.5 | 22.1 | 24.3 | 14.3 |
| Disfavor | 31.1 | 32.0 | 29.9 | 29.6 | 14.3 | 34.1 | 16.7 | 25.0 | 31.4 | 21.2 | 32.3 | 28.9 | 39.3 | 30.4 | 32.5 | 32.4 | 28.6 |
| Strongly disfavor | 20.7 | 24.3 | 11.9 | 9.3 | 28.6 | 6.8 | 0.0 | 0.0 | 24.3 | 18.2 | 22.6 | 23.7 | 14.3 | 16.5 | 23.4 | 21.6 | 28.6 |
| Need more information | 9.5 | 7.7 | 13.4 | 14.8 | 14.3 | 13.6 | 16.7 | 0.0 | 8.6 | 9.1 | 8.6 | 10.5 | 10.7 | 10.4 | 7.8 | 10.8 | 0.0 |

Table 33 (continued)

| Opinion | All respondents | Tenure | | If renter, | | Home type | | | | Home age | | | | Years at current address | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Owner | Renter | Pay utilities | Not pay utilities | Apt. | Duplex | Mobile home | Single family | Less than 5 | 5-19 | 20-39 | 40 or more | Less than 5 | 5-19 | 20-39 | 40 or more |
| **Emergency Fuel Council** | | | | | | | | | | | | | | | | | |
| | (249) | (177) | (67) | (54) | (7) | (45) | (7) | (4) | (191) | (33) | (94) | (81) | (31) | (116) | (79) | (42) | (7) |
| Strongly favor | 11.2 | 10.7 | 11.9 | 9.3 | 14.3 | 11.1 | 14.3 | 25.0 | 9.9 | 6.1 | 11.7 | 11.1 | 16.1 | 8.6 | 8.9 | 19.0 | 28.6 |
| Favor | 35.7 | 33.3 | 41.8 | 42.6 | 42.9 | 46.7 | 42.9 | 50.0 | 33.0 | 36.4 | 31.9 | 37.0 | 38.7 | 33.6 | 38.0 | 38.1 | 42.9 |
| Indifferent | 10.8 | 10.2 | 13.4 | 16.7 | 0.0 | 8.9 | 0.0 | 0.0 | 12.0 | 9.1 | 13.8 | 9.9 | 6.5 | 13.8 | 7.6 | 11.9 | 0.0 |
| Disfavor | 16.5 | 16.4 | 16.4 | 14.8 | 14.3 | 15.6 | 14.3 | 0.0 | 17.3 | 24.2 | 14.9 | 18.5 | 12.9 | 17.2 | 17.7 | 11.9 | 0.0 |
| Strongly disfavor | 9.6 | 11.3 | 6.0 | 3.7 | 28.6 | 8.9 | 0.0 | 0.0 | 10.5 | 9.1 | 12.8 | 7.4 | 9.7 | 9.5 | 10.1 | 7.1 | 14.3 |
| Need more information | 16.1 | 18.1 | 10.4 | 13.0 | 0.0 | 8.9 | 28.6 | 25.0 | 17.3 | 15.2 | 14.9 | 16.0 | 16.1 | 17.2 | 17.7 | 11.9 | 14.3 |
| **Alternative Energy Workshop** | | | | | | | | | | | | | | | | | |
| | (246) | (174) | (67) | (54) | (9) | (45) | (7) | (4) | (188) | (31) | (94) | (80) | (29) | (116) | (77) | (42) | (6) |
| Strongly favor | 23.6 | 21.8 | 28.4 | 29.6 | 33.3 | 31.1 | 57.1 | 0.0 | 20.7 | 19.4 | 22.3 | 21.3 | 34.5 | 28.4 | 16.9 | 23.8 | 33.3 |
| Favor | 48.0 | 48.3 | 47.8 | 50.0 | 33.3 | 44.4 | 28.6 | 75.0 | 48.9 | 45.2 | 56.4 | 45.0 | 41.4 | 45.7 | 51.9 | 45.2 | 50.0 |
| Indifferent | 17.1 | 19.5 | 10.4 | 11.1 | 0.0 | 13.3 | 14.3 | 0.0 | 18.6 | 25.8 | 14.9 | 17.5 | 6.9 | 16.4 | 24.7 | 9.5 | 0.0 |
| Disfavor | 5.3 | 5.2 | 6.0 | 5.6 | 11.1 | 6.7 | 0.0 | 0.0 | 5.3 | 3.2 | 3.2 | 5.0 | 17.2 | 6.0 | 2.6 | 7.1 | 0.0 |
| Strongly disfavor | 1.6 | 1.1 | 3.0 | 0.0 | 11.1 | 2.2 | 0.0 | 25.0 | 1.1 | 0.0 | 0.0 | 3.8 | 0.0 | 0.0 | 1.3 | 4.8 | 16.7 |
| Need more information | 4.5 | 4.0 | 4.5 | 3.7 | 11.1 | 2.2 | 0.0 | 0.0 | 5.3 | 6.5 | 3.2 | 7.5 | 0.0 | 3.4 | 2.6 | 9.5 | 0.0 |

[a]The numbers in parentheses are the number of respondents in each category on which the proportions are based.

of the respondents favored an emergency fuel council, whereas the remainder was equally split between those who disfavored the council and those who were indifferent or needed more information to make a decision. Similarly, the proportion of respondents that disfavored establishing a local energy office was about equal to the proportion who were indifferent or needed more information. Although 51.8% of the respondents disfavored constructing more multifamily housing, 22.4% were indifferent about the subject.

Demographic characteristics. None of the respondents under 21 years old disfavored any of the strategies except expanding multifamily housing. A larger percentage of those over 35 disfavored creating a local energy office and holding alternative energy workshops. None of the Black respondents disfavored any of the strategies. Half favored the local energy office and constructing more multifamily housing. A larger proportion of the households with male heads favored the alternative energy workshops. The local energy office and emergency fuel council were favored more often by female household heads. None of the respondents with 12 years or less education disfavored the emergency fuel council. Although 45.5% of those who attended vocational school were indifferent about offering alternative energy workshops, none of them disfavored that conservation strategy.

Economic characteristics. None of the families earning less than $10,000 disfavored the building code strategy. The alternative energy workshop strategy was favored least by those with incomes of $40,000 or more (56.6%). One-third of the highest income families were

indifferent or needed more information. Favorable opinions about the local energy office and the emergency fuel council were more prevalent among lower income families. None of the retired or disabled respondents disfavored the energy conservation building codes, but they did disfavor the alternative energy workshop most often (13.9%). All those listing their occupations as laborer or operative favored the building code strategy, with all the operatives strongly favoring. Also, none of the service or clerical workers disfavored the strategy. All of the labor, operative, and service workers favored the alternative energy workshop. None of the clerical workers indicated that they disfavored the workshop strategy.

Residence characteristics. Owner and renter opinions on the strategies varied little. Three-fourths of the mobile home residents were indifferent toward the energy efficiency building codes. All the duplex residents favored the codes. Multifamily development was disfavored by 55.7% of single family home residents. Multifamily development was also disfavored by 40.9% of apartment dwellers. One-half of duplex and mobile home residents were indifferent about this strategy. Opinions appeared to vary little with home age. One-third of those who had lived at the same address at least 40 years were indifferent or needed more information about the building codes. The workshop strategy was disfavored more by those who had been at the same address longest, but still 83.3% of them favored alternative energy workshops.

## Additional Comments Offered by Respondents

The respondents were provided with a space for any additional comments they chose to make. Of the 280 respondents, 56 listed comments

in that space. A complete list of the comments is contained in Appendix B. They covered a wide range of subjects related to energy use, conservation, regulation, and study.

One respondent suggested forcing developers to build apartment complexes within the city where services already exist to serve them. Another wanted reduced lighting on playgrounds in the winter. Billboard lighting was cited as a wasteful use of energy. Federally funded housing, businesses, and industry were listed as targets for energy conservation. Another person suggested home insulation programs that could use recipients of public assistance to provide the labor needed.

A wide variety of attitudes were reflected in the general comments. One person contended there is no energy problem. Another expressed concern that conservation was necessary to ensure a decent future for her child. Others expressed their opinions about nuclear power, imported oil, environmental regulations, and power rates.

The problem of financing weatherization and alternative energy systems was addressed by several respondents. One suggested state funds to assist the elderly. Another wanted to use the money being spent on Expo '82 for assistance. Direct financial help to pay bills for the elderly and handicapped was recommended by two respondents. Larger federal income tax credits were suggested. Several respondents pointed out the importance of economic incentives to conserve.

Three respondents reflected the problems of many renters. The expense and long payback period of conserving investments were cited. They suggested that landlords be required to make their rental properties more energy efficient without increasing the rent they charged.

A number of respondents expressed a general dissatisfaction with any energy conservation program which would increase the size of local government staff or spending. Workshops were suggested using volunteer staffs. Others recommended that any public funds be directed toward financial assistance for conservation rather than staff or instruction.

Those favoring more public information programs gave some suggestions for design and content. One respondent believed energy consciousness should be the main goal. Several respondents wanted the cost effectiveness and economic benefits of conservation stressed. Another wanted people made more aware of existing programs related to energy conservation and false claims by some companies in the name of conservation.

One respondent called for more instruction on conservation in the school system. Another wanted information delivered through a newsletter, television, and newspapers for individuals to make their own decisions. Another person cited the role television plays in many households. Workshops were seen by one respondent as a good way for pooling knowledge on the purchase and installation of energy conservation items. A deaf respondent noted the importance of written material to the hearing impaired.

## Summary of Results

The results of the analysis conducted on the survey findings revealed several target groups that were interested in the same topics and preferred the same information delivery mechanism. This information could be used to define audiences for various types of public information programs.

The Black community presents quite a challenge to an energy information program. Their lack of response to the questionnaire may demonstrate a low level of interest in the subject matter or mistrust of the agency administering the study. The low number of responses makes generalizations difficult. Those who did respond tended to have taken fewer actions to conserve energy than White respondents. None had used the energy audit program to obtain information or financing, nor had any Blacks received the income tax credit. Interest in learning about financing weatherization efforts was high. Mass media approaches were more attractive to Black respondents. Their energy awareness probably needs to be raised before much effective action can be expected. Existing programs and the opportunities they provide for financing conservation actions are evidently not well known or understood.

Low income residents, quite understandably, reported fewer energy conservation actions that require investment in equipment. Their interests reflected their income limitations, with more interest shown in low cost plastic window coverings, caulking, and clothing's effect on heating and cooling requirements. There is some interest in topics such as insulation and storm windows which could be financed through existing programs. Television and radio were preferred means of information delivery. Information on actions that do not require substantial investment is essential for this group. Existing financing programs could be used by more low income families to install more expensive equipment.

Elderly residents have also been hesitant to use the energy audit program. Often living on fixed incomes, these people need information

on low cost weatherization, financing, and reliable workers who can install needed equipment. Many of the elderly have limited mobility. The needed information must be brought to the resident. Television was rather popular as a means of information dissemination.

Renters, many of whom are college students, have been reluctant to invest in energy conservation equipment to be installed in homes they do not own. Those paying their utility bills directly rather than through their rent have been somewhat more responsive. Others expressed fears that if they made their homes more energy efficient or insisted that their landlords do so, their rent might be raised beyond their reach. Temporary, low cost energy conservation actions are of special interest to renters. Joint education of landlords and tenants might help owners and residents discover the most cost-effective measures to control energy use. All forms of information delivery were rather popular. Many of those favoring shopping mall displays rented their homes. Young apartment dwellers expressed an interest in alternative energy sources. Education on energy efficient homes and alternative energy systems could produce a better informed home building and buying public in the future.

The middle aged, middle income White households reported taking energy conservation actions most often in the past 5 years. This group could be expected to be doing the most to conserve because they are sensitive to energy costs, and yet they can afford some improvements. Many own their own homes and are therefore willing to invest in some capital improvements. These residents were most likely to have taken advantage of the utility company audits and loans, and the federal

income tax credit. Many of these respondents indicated they were still interested in learning more about energy conservation. Topics of interest included alternative energy systems and financing programs, and equipment such as heat pumps and attic fans. Many of the middle income families were already interested in energy conservation but need more specific information on equipment installation, costs, and financing. The newsletter, newspapers, and workshops appeared to be ways to delivery information to members of this group.

Just as the members of the audience vary, so must the content and method of delivery of energy information programs. Presenting topics of interest at the level of detail and instruction that residents desire would enhance interest and participation. Using channels to deliver the information which residents indicate they have used in the past or would use in the future would help ensure that the information would reach the audiences for which it was intended.

# CHAPTER V

# SUMMARY AND CONCLUSIONS

## Information Program Needs

### Information Needs

In general, the segment of the local population which still needs to develop general energy awareness and receive information on easy low cost conservation measures, instructions, and financial assistance include Blacks, low income residents, renters, owners of rental property, and the elderly. Many of these people face similar financial problems and therefore need detailed information on low cost actions they can take as well as instructions on how to apply for and receive financial assistance to take more expensive conservation actions.

Many middle aged, middle income families have already taken low cost actions to reduce their fuel bills and are interested, or could easily be interested, in somewhat more expensive and exotic energy topics. These people often want detailed information on costs, savings, repairs, installation, and financing. The experiences of other homeowners, they feel, is the best form of education.

### Existing Program Use

Several sources of general energy conservation information already exist in Knox County or are easily accessible to area residents. Their lack of use can be interpreted in several ways. First, most of the government agencies provide information only upon request. The resident must locate the proper address or telephone number and make the

effort to contact the proper person. The person would have to be interested enough in the subject to take the initiative to obtain the information if the proper source could be found. Secondly, results of earlier studies show the importance of reliability to use of energy information (Craig & McCann, 1978; Gottlieb & Matre, 1976; Zentner, 1976). Utility companies were generally not perceived as accurate and reliable sources of information. The subjects seemed to place more trust in the mass media and established programs such as the Cooperative Extension Service for reliable information. Although the participants in the Craig and McCann study regarded the Federal Energy Administration as an expert on energy, the results of their study and also Zentner's work show low levels of confidence in information from the federal government. Also, the special needs of some area residents are not always addressed by these programs. The elderly, blind, and illiterate have limited use for printed information. Many less educated persons need additional help to interpret and understand printed materials. Often the poor and elderly fear persons they do not know who try to deliver information, worrying that it might be a con game to steal their money or home. Deaf residents must receive information in a readable form. In addition, lack of publicity probably hampers some of the information programs. Residents may not even know they exist.

Future Program Preferences

Although the survey results did not represent the views of the entire community, they did reveal a substantial segment of the population interested in receiving more information on energy conservation and alternative energy sources. Those indicating an interest in learning

more about saving energy in their homes also preferred the use of information delivery mechanisms which do not exist at the present time in Knox County, a newsletter and workshops.

## Recommendations for Public Information Programs

Knox County is in a unique situation well suited to energy planning. No comprehensive community energy plan would be complete without some means of educating the residential sector on actions they could take to conserve energy. The existing information programs in Knox County present an underutilized reservoir of energy information which if organized and presented in a manner acceptable to the public could help the community reach its objectives of increasing the efficiency of energy use and increasing the use of renewable resources in the community as developed in the comprehensive community energy management planning process. All new programs should utilize existing staff and facilities to the maximum extent possible to prevent duplication and confusion. Coordination with community events and established mailings could also help reduce costs.

### Recommended Programs

Mass media. To raise the community's energy awareness and develop interest in more specific energy conservation and alternative energy actions, energy information should be delivered to the general public using established information delivery systems. The mass media are appropriate to reach large numbers of persons dispersed throughout the community. The main targets of such a program would be the less informed segment of the population who have taken few actions to conserve energy

in their homes. Such programs would emphasize low cost energy conservation actions, the effects of behavior changes on energy use, monetary savings potential, the energy audit program, and sources of financial assistance. The persons and agencies providing the information should be ones perceived as reliable and honest by the targets of the information program. Established community social service agencies, clergymen, and volunteer groups are possible helpful supporters. These programs would be directed toward Blacks, low income residents, the elderly, and renters.

Newsletter. A newsletter could be used as a bridge between developing general energy awareness through the mass media and gaining participation in energy conservation and alternative energy workshops. The newsletter can be used to reach residents throughout the county in a form residents can save for reference and consultation when they are ready to take more expensive and complicated energy conservation actions. The newsletter could be used to list sources of more detailed information, addresses, telephone numbers, hours of operation, and costs involved. Readers' questions regarding energy could be answered with information obtained from existing information sources. Energy activities in the community, including workshops and utility company energy audits, could be advertised. Each issue might be devoted to a specific topic, using national news, local contacts, financing sources and eligibility, and local experiences as content. An existing agency such as The University of Tennessee's Energy, Environment, and Resource Center would be a possible sponsor of such a program, with cooperation and financial support from the local governments, KUB, LCUB, TVA, the Department of

Energy, and the Tennessee Energy Authority. The presentation of impartial information by a respected source would be necessary to prevent the misinterpretation of the newsletter as an advertisement. The targets of such a newsletter would include conservers and nonconservers throughout the community.

Workshop. When residents have become interested in energy conservation and desire to take actions to reduce their energy use, most need detailed information on costs, availability of materials, and instructions for installation or information on contractors to install the equipment. Much of this information can be obtained through a utility company energy audit. Thus far, however, many area residents have not taken advantage of this free program. Neighborhood workshops could provide a means for community residents to share their experiences and help answer questions about existing programs. The workshops could emphase one topic and provide detailed information on costs, materials, installation, financing, and common problems. Demonstrations could be presented to encourage residents to undertake energy conservation improvements on their own to save money. Those in attendance could then be encouraged to have an energy audit conducted on their homes to determine their particular needs. The residents could also learn about other sources of information available to them, including the newsletter. Much of the workshop preparation and operation could be handled by volunteers and existing staff at the utility companies. Local builder associations, banking organizations, the University, and technical societies could provide speakers who could answer questions the participants may have. Support from environmental groups, neighborhood

associations, tenant organizations, realtors, clergymen, social service agencies, and youth groups could help arrange meetings and publicize the workshops. The workshops would best be held in popular community gathering places and participants' homes. The workshop programs could be altered to address the needs of any audience. The first series of meetings would be targeted toward community residents who have already expressed an interest and willingness to conserve. Middle aged, middle income homeowners would be a major audience for such a program. Also, programs involving both renters and their landlords could be developed. As the other programs raise community interest in conservation, the workshops could be taken into low income communities, Black neighborhoods, and subsidized housing developments. Special programs could be developed for the elderly which emphasize the availability of financing and sources of low cost labor such as summer youth programs.

Program Coordination

These programs should be conducted in cooperation with ongoing and planned energy activities such as lectures at The University of Tennessee and Sun Day. Mutual support could produce free advertising and shared audiences. Scheduling of workshops and newsletter contents to coincide with Earth Day, Sun Day, local fairs and festivals, and regular meetings of local societies would increase visibility of the programs and, hopefully, increase support and attendance. The support and participation of local professional and volunteer groups could be helpful in generating additional complementary energy programs with little public expenditure. Community awards for energy conservation, recognition of youth groups for helping the elderly weatherize their

homes, instruction of youths in basic weatherization and other topics through the local school system, and block parties to celebrate retrofit programs could then be initiated. These could help raise the energy awareness of similar groups and neighborhoods and develop interest in their own workshops.

### Summary

These recommendations were designed to address the particular needs of Knox County residents concerning energy conservation and alternative energy information to achieve the objectives of the comprehensive community energy plan to increase the efficiency of energy use and increase the use of alternative energy sources in Knox County. The residential sector provides a unique problem in terms of its diversity and dispersion. The potential for energy conservation in space heating and cooling the area's homes is substantial, but the decision to conserve must be made by each individual household. To ensure that their decisions are wise and energy efficient, residents must receive detailed information in a form they can use from a source that they trust. Implementing a program to provide the local residents with the information they need to make decisions as to the most efficient ways to use energy in their homes will help in the community's efforts to plan a secure and abundant energy future.

## Summary of the Study

### Need for Conservation

The source and type of fuels used by Americans to supply their energy needs have varied through the years. The dwindling supplies of

fossil fuels have prompted a tremendous rise in fuel prices. The large increases in fuel costs, especially in the last decade, have renewed Americans' interest in renewable fuel sources, and have spurred new investigation into experimental technologies to find alternatives to expensive fossil fuels.

The search for more fuel supplies has raised other issues as well. Environmental and social concerns have slowed acceptance of new technologies. Yet Americans fear the economic and political effects of increased reliance on foreign sources of fuel.

One method of ensuring that the nation has the time to carefully study all the alternatives and plan the nation's future without causing irreparable environmental and health problems is to promote the more efficient use of present energy sources through conservation and through expanded use of alternative energy systems which have already been tested for their safety and reliability.

For a conservation program to be truly effective, cooperation would be required among public officials at all levels of government, business and industry, and private citizens. All sectors of the economy would have to participate. The relative impact which each sector could have depends on the quantity and efficiency of its current energy use. The costs involved would also vary with the ease with which operations could be altered to reduce energy consumption or to use alternative fuels.

## Residential Energy Use

The U.S. residential sector accounts for over one-fourth of the nation's energy use. Much of this energy is derived from coal, oil, and

natural gas. The major energy-using appliance in most homes is the space heater. The potential for energy savings in home heating and cooling varies with the type of construction materials used in the home, its size, design, location, and orientation. The residents of the home can also affect the amount of energy used for space heating and cooling. The sector as a whole presents a significant potential for reduced use of fossil fuels and expanded use of alternative energy sources.

Need for Information

Barriers of many kinds block the way to efficient energy use in American homes. There are political, financial, cultural, and informational impediments to discovering and using the most energy efficient systems for heating and cooling. If efficient energy use is to be achieved throughout the residential sector, these barriers must be overcome.

The general public needs substantial reliable information on energy supply, use, and conservation if residents are to be expected to make wise energy decisions. The information needs to come from a source that the public perceives as expert, reliable, and impartial to better ensure the public's acceptance and use of the information. Statistics should reflect local conditions, costs, and savings. Also, the mechanism chosen to deliver the energy information should be easily obtainable and usable by the consumer. The various channels of communication available can reach different audiences with varied results.

## Local Energy Planning

Energy planning is well suited to planning on the local level for several reasons. Local planning mechanisms are already in place in many localities which have data on community energy use, supply, and alternatives available to them. Local governments have tools at their disposal to affect local energy usage. These include building codes, property taxes, zoning and subdivision regulations, and established communications channels with the local populace. Consumers appear to have more trust in local sources of information.

The Comprehensive Community Energy Management Program has been an experimental attempt at using these tools to develop comprehensive community energy plans. The Knoxville-Knox County Metropolitan Planning Commission has undertaken the task of developing an energy plan for Knox County, one of the pilot program communities.

## Knox County Residential Energy Use

The local population can be separated into two segments based on energy awareness and interest in conservation. The residents who have already taken some conservation actions reported more interest in alternative energy sources and more expensive conservation equipment. The other segment of the community is less interested in energy conservation topics. They have, for various reasons, taken fewer actions to conserve energy and are less interested in specific energy topics. Based on the survey results, those who have attempted fewer actions to conserve energy in space heating and cooling tended to be older, renters not paying their utilities directly, not employed full time, Blacks,

females, and those with less education. Conservers were most often White, young to middle aged, middle income male household heads.

Those who have not already taken the low cost energy conservation efforts would be more interested in receiving general information on energy conservation actions, their effects on energy use, costs, and means of financing. More sophisticated audiences, that is, those who have already taken some actions to conserve energy in their homes and are interested in receiving more information, would be more interested in alternative energy systems, energy conserving appliances, instructions for installation, and financing sources.

Recommendations for Information Programs

This information could be delivered through mechanisms tailored to the needs of these groups. It is recommended that a three stage public information program be undertaken as part of the community's Energy Project. Relying on cooperation and support from existing energy information programs, the mass media, a newsletter, and neighborhood workshops can be designed to reach residential energy users. The mass media would be used to raise energy consciousness among the general public and to stimulate interest in more detailed information. A newsletter could serve as a directory of other information sources and a more indepth presentation than mass media reports. Energy conservation and alternative energy workshops would provide the personal attention needed to provide instruction and answer individual questions as background and encouragement for taking energy conservation actions.

## Recommendations for Further Study

The field of energy research has greatly expanded in the last decade. Whereas previously only the technical aspects of resource supply and use were under investigation, now the social and psychological aspects of energy use and conservation are arousing interest. Thus far the data are conflicting regarding energy conservation behavior and socioeconomic characteristics. The relationship between conservation actions and the desire to save money has been established, however, in several studies. The majority of the studies being conducted about energy conservation behavior have asked what conservation actions people are taking without asking their motivation for these actions or the reasons they chose to take those actions rather than others which would have allowed them to conserve.

The study of energy information delivery systems has revealed that perceived reliability can affect the consumer's confidence in information received. The actual effect on energy use has rarely been measured because of the difficulty of establishing causal relationships. It would be interesting to see if consumers might respond to information even though it comes from a source not deemed reliable and impartial.

The lack of interest and action on the part of low income residents, the elderly, and Blacks can partially be attributed to lack of financial means to undertake energy conservation actions. Research is needed, however, to determine the most effective ways of reaching this large segment of the society to help in the nation's conservation effort and to aid those least able to afford rising energy prices.

The role which local government can play in energy planning and management is still relatively unexplored. The ability of local governments to provide unbiased information which reflects local conditions has been cited as a means of pursuing community energy objectives. Thus far, studies have approached the problems of land use controls, building codes, and energy use, but more data is needed to determine the best course of action under varying local climates and legal situations. The effects of local taxation and its potential as an incentive for efficient energy use could also be investigated. Yet another area which warrants investigation is the effect of residential energy efficiency ratings and requirements on the housing industry and local land use regulations.

The importance of wise energy use and planning has been emphasized by the interruptions in supply, escalation of prices, and political problems associated with energy resources in the past decade. The local planner has an important role to play to help provide the information needed for local officials and citizens to make wise energy decisions to ensure abundant supplies of energy for the local community.

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# APPENDIXES

# APPENDIX A

# SURVEY MATERIALS

THE ENERGY PROJECT

A COMPREHENSIVE COMMUNITY ENERGY MANAGEMENT PROGRAM

May 7, 1980

Dear Knox County Resident,

Rising fuel costs and shortages in supply have affected all our lives in the last few years. To better understand how the energy situation has affected Knox County residents and plan for our community's future, you have been selected at random to participate in a survey of Knox County residents' opinions and interests about energy conservation as part of the current Knoxville-Knox County Energy Project. This is a chance for you to have input as to how you think public monies should be spent in the future.

Would you please take a few moments of your time to complete the attached questionnaire? It is important that you complete and return the questionnaire promptly so that your opinion will be heard. Your name is not required. Please list any comments or concerns you may have regarding energy in Knox County in the space provided or on additional sheets.

When you have completed the questionnaire, please return it in the enclosed stamped envelope. If you have any questions, feel free to contact me at 588-8198 or 974-5159, or at the address listed below.

Thank you for helping us to plan for Knox County's energy future.

Sincerly,

Karen Martin

KNOXVILLE/KNOX COUNTY METROPOLITAN PLANNING COMMISSION • SUITE 403 • 400 MAIN AVE. CITY/COUNTY BUILDING • KNOXVILLE, TENNESSEE 37902 • DONALD H. PARNELL, AICP, EXECUTIVE DIRECTOR • SUSAN F. ADAMS, AICP, DEPUTY EXECUTIVE DIRECTOR • MRS. THOMAS STONE, CHAIRMAN • FREDDIE BRASFIELD, VICE-CHAIRMAN • JAMES A. SPENCER, AICP, SECRETARY

QUESTIONNAIRE

Please check the appropriate blank(s) by each question. Additional comments are welcome.

Head of household's

1. Age:
   - ___Under 21
   - ___21 - 34
   - ___35 - 49
   - ___50 - 64
   - ___Over 64

2. Race:
   - ___Black
   - ___White
   - ___Other

3. Sex
   - ___Male
   - ___Female

4. Educational level:
   - ___Less than 12 years
   - ___High school graduate
   - ___Vocational school
   - ___Some college
   - ___College graduate

5. Employment status:
   - ___Employed
     - ___Part-time
     - ___Full-time
   - ___Unemployed
   - ___Retired/Disabled

6. Occupation:
   - ___Sales
   - ___Craftsman, foreman
   - ___Farm laborer
   - ___Nonfarm laborer
   - ___Farmer, farm manager
   - ___Professional, technical
   - ___Service
   - ___Manager, administrator
   - ___Clerical
   - ___Operative
   - ___Other

   _____

7. Family annual gross income:
   - ___Less than $10,000
   - ___$10,000 - $19,999
   - ___$20,000 - $39,999
   - ___$40,000 or more

8. Tenure:
   - ___Renter
     - ___Pay own utilities
     - ___Do not pay own utilities
   - ___Owner
   - ___Leaseholder

9. Type of home:
   - ___Apartment
   - ___Townhouse
   - ___Condominium
   - ___Duplex
   - ___Mobile home
   - ___Single family home
   - ___Other

   _____

10. Age of home, if known:
    - ___Less than 5 years
    - ___5 - 19 years
    - ___20 - 39 years
    - ___40 years or more

11. Years at present address:
    - ___Less than 5 years
    - ___5 - 19 years
    - ___20 - 39 years
    - ___40 years or more

---

12. In the last 5 years have your installed in your present home, or built or purchased a home with any of the following?
    - ___Insulation in walls
    - ___Insulation in ceiling/attic
    - ___Wood stove
    - ___Storm windows, doors
    - ___Solar
      - ___Passive heat/cool
      - ___Active heat/cool
    - ___Plastic window coverings
    - ___Attic fan
    - ___Weatherstripping
    - ___Fireplace cover
    - ___Caulking
    - ___Clock thermostat
    - ___Other

    _____

13. In the last 5 years have you started doing any of the following?
    - ___Lower heating thermostat setting
    - ___Close off unused rooms
    - ___Use blinds, shades, curtains to heat/cool
    - ___Raise air conditioner thermostat setting
    - ___Wear warmer clothes indoors in winter, cooler in summer
    - ___Other

    _____

14. Have you used energy conservation information from any of the following?
    - ___KUB bill flyers
    - ___Newspaper
    - ___KUB-TVA energy audit
    - ___Television
    - ___TVA pamphlets
    - ___Department of Energy-Oak Ridge pamphlets
    - ___Radio
    - ___Tennessee energy hotline
    - ___Other

    _____

15. Have you obtained financial benefits for weatherization from any of the following?
    - ___Community Action Committee
    - ___Utility company programs
    - ___Federal income tax credit
    - ___Farmer's Home Administration
    - ___Other

    _____

16. What areas related to home heating and cooling are you interested in learning more about?
__Insulation
__Attic fans
__Solar heating/cooling
__Storm windows, doors
__Home energy audits
__Weatherstripping
__Heat pumps
__Plastic window coverings
__Caulking
__Wood stoves
__Clock thermostats
__Wind power
__Fireplace covers
__Clothing's effects on heating and cooling requirements in the home
__Financial assistance for weatherization
__Financial assistance for alternative energy sources
__Other
_____

17. In what forms would you like to receive this information?
__Newsletter
__Radio show
__ Weekends
__Weekdays
__
__Morning
__Noon
__Afternoon
__Evening
__Newspaper
__ Daily
__Sunday
__Shopping mall displays
__Television show
__ Weekends
__Weekdays
__
__Morning
__Noon
__Afternoon
__Evening
__Other
_____

18. Would you participate in a free neighborhood workshop on home energy conservation?
__Yes
__No Why not? _____

---

The following strategies have been discussed as part of the Energy Project. Please check the blank that best represents you opinion of each of the strategies.

| | Strongly Favor | Favor | Indifferent | Disfavor | Strongly Disfavor | Need more Information |
|---|---|---|---|---|---|---|
| 19. Increase energy efficiency in new homes through building code requirements | ____ | ____ | ____ | ____ | ____ | ____ |
| 20. Provide staff and funding for an energy office in local government. | ____ | ____ | ____ | ____ | ____ | ____ |
| 21. Increase residential density through more multi-family development. | ____ | ____ | ____ | ____ | ____ | ____ |
| 22. Establish local fuel council with decision making powers during an emergency. | ____ | ____ | ____ | ____ | ____ | ____ |
| 23. Provide community/neighborhood workshops on the use of alternative energy sources. | ____ | ____ | ____ | ____ | ____ | ____ |

---

24. Other comments and suggestions:

Two weeks ago the Metropolitan Planning Commission sent you an energy conservation survey. We are very interested in your opinions, so would you please take the time to complete and return the questionnaire? If you need another form, just call me at 974-5159 or 588-8198.

Thank you,

Karen Martin

# APPENDIX B

# RESPONDENTS' COMMENTS

RESPONDENTS' COMMENTS

We need energy consciousness above anything else right now. Of course, as energy costs go up, people will become more aware. Easily understood information distributed through mass media (especially television, given its place in most households) should, along with the higher prices, prompt people to action. Then is the time for financial assistance, especially loans to make homes more energy efficient.

Workshops as such are fine for pooling knowledge—actual information on consumer usable (purchase/installation) energy conservation items.

The most important thing you can teach consumers is the cost/benefit ratio. In other words—how much certain measures would take and how long it would take for them to recover this cost through their savings. Not all measures are good for everyone. Most people would rather do projects themselves, without government interference, or supervision, they just need plans and a way to get things done. Windmills, solar, watermills, deadwood on government land—free plans on how to build some of the above, with some financial aid.

Information must be provided in writing for the deaf.

Start teaching conservation in school.

I think that people should be made more aware of programs that help them in fuel and energy conservation. Also to be aware of the shams that some companies will try in the name of conservation.

I don't think anyone at this point needs additional information on saving energy, and I strongly disfavor spending any tax monies for such projects. We need more energy—not information—and nuclear energy seems the only feasible, long term solution.

As most of the people do not learn anything they did not already know at a tax money-funded workshop and so are a waste of time and money. The money would be more efficiently used in some other ways such as providing loans for insulation, solar units, or other effective energy saving techniques.

People already know what to do and how if they want to do it.

I would like to learn more about energy conservation because I want my daughter to have a decent future. I don't feel that her generation will have any future unless we help conserve.

How about solar heat for a 25-year-old home.

We need less government and more action. KUB and newspapers can get message across. After that energy conservation is an individual decision.

It isn't necessary to "sell" people on strategy that is cost effective. Energy conservation can best be effected by economic means. I like the energy audit best.

State funds should be used toward helping senior citizens conserve energy because they can hardly afford to live on their income. They can't afford to have storm windows, insulation, heat pumps, etc. installed in their homes.

Do more in the way of offering assistance to lower and middle income family groups, so that they may be able to avail themselves of the numerous energy saving methods which they cannot afford at this time. Spend some Expo money on help, not on useless buildings to please only a few rich!

Help people on low income or sick people pay their heat bills. Set up a special fund—check people out thoroughly first.

Provide the elderly and handicapped with utility bill assistance, without all hassle and argument.

Make older homes get insulation put in by helping pay for it by government.

Consider using recipients of public funds in home insulation projects, building fireplaces, etc. Contribute labor hours in exchange for welfare check. Installing insulation and mixing mud is not that difficult.

I'm all for conservation but it must be up to the individual to choose—you can't force someone to conserve. If the economic incentive is there—he'll conserve.

Renting limits what you can do and in many ways long term and expensive things don't seem worth it when you're renting.

Funding for energy conservation for owners of rental properties—renters do not feel justified in spending their money and fear a raise in rent by asking for weatherproofing means. Also I think all dwellings to be rented must pass stricter energy standards.

Apartment owners should be forced to insulate windows, without increasing rent.

Federally funded housing projects are abusing all conservation efforts in my opinion. Windows, unrepaired doors, etc., lights on day and night, apartments at 80° plus in the winter.

Businesses do not seem to be too energy conscious (flood lights, open doors, etc.).

Closer supervision of industry's waste of power.

Turn off all high energy flood lights in the recreational playgrounds before 11 p.m. and never turn them on when raining and no youths present. In the months of November, December, and January do not use the flood lighting system when the temperature is uncomfortably low for park use.

Conserve energy by cutting out all billboard lighting, etc.—this is not essential and is very wasteful. We have to be uncomfortable in our homes—but these non-essential items are all allowed to use energy.

A giant step forward in energy conservation can be made by simply forcing developers to build these apartment complexes within the city close to shopping centers and where bus service, utilities, sewers and roads are already available. Presently the developers are allowed to build anywhere—usually out in the county where there are few restrictions and no services . . . then the taxpayers have to pay to provide same.

Get people in local and federal government that represent the poor and working people.

I am against any more people on the tax payroll such as the local energy office and local emergency fuel council indicate. I believe most people can read and make their own decisions without advice from a staff in any government or a council. We can make our own decisions with the information made available through a newsletter and etc. (newspapers, tv). We only want information.

Workshops only if they were run by volunteer staff.

Bureaucratic "red tape" will not solve any problems.

If the strategies do not require additional staffpersons that eventually raises the energy cost I favor them or utilize existing energy—but create no more agencies!!

No local energy office as I think there is adequate personnel through KUB, TVA, etc. without local government getting into it.

Keep government out of our business as much as possible.

The strategies suggest or require increased governmental or quasi-governmental intrusion into the lives of individuals already overburdened with such intrusion. Some of the proposals are not economically feasible by those who would be primarily affected.

People who pay their own bills are conscious of the energy crisis by the high cost and are adapting as quickly as possible to change it. Whatever we need it is not more bureaucracy at any level. Each of the strategies only require more of our money for more control over our lives.

I believe TVA and all local, state, and federal governments are ridiculously overstaffed and overpaid!

Big government needs to stay out! Also, I don't want my taxes being spent on wasteful programs.

No additional government agency.

More emphasis on citizen conservation rather than local and federal funds that for the most part are only helping KUB and TVA and at the same time defeating the purpose of conservation.

Stop trying to develop energy related activities by creating new bigger government agencies. Provide assistance, information, and guidance through old government agencies.

KUB's interest-free loans are wonderful. The federal government should be urged to give larger tax credits for installation of heating units that make use of renewable resources.

Get government out of energy. Regulation at unrealistically low prices is what created our current energy problems.

Repeal windfall profit tax and allow oil companies to invest in exploration and development. Trim the fat out of TVA and confine its purpose and activities to the production of energy at lower cost. Declare a ten-year moritorium on all clean air environmental activities. Proceed with the development of nuclear energy including breeders.

Return TVA and its expenditures to energy only. Reduce its activities in social services, EEO (except on the job), governmental assistance (except in energy) to zero.

Why should people try to conserve energy and TVA raise its rate so your bill is the same.

The biggest fuel saver that needs to be done is to change driving age from 16 to 18. It would not only save fuel but also lives and money.

This country should get on the ball—build the nuclear plant—build the breeder reactor—learn about nuclear plant safety—we have wasted time and money—this is the only way to go! Save oil for other things.

Interested in reduction of cost of government and sharp reduction of interest rates. Increase social security retirement age to 68. Encourage people to save for retirement instead of depending on government to support them.

Strong legislation to stop imports of foreign oil and utilize our own energy; i.e., coal, oil, etc. Relax EPA requirements and make land usable for building rather than reclaiming to "original contour." Do housing developers follow "original contour?"

In regards to the fuel shortage, there is no shortage and there hasn't been one. Only to the dance of the oil company. The truth just hasn't been told.

I feel MPC is an expense we can no longer afford and this aptly demonstrates how the taxpayers' money is wasted.

What about mass transit to reduce dependence on foreign oil. I'd like to see the MPC do a survey and work done on transportation and energy conservation. I think mass transit should be the chief emphasis. The bus is great!

I think more research should be done on low-cost solar applications. I think the high cost programs are prohibitive to most homeowners and builders. Have we coordinated our efforts and taken advantage of solar research in other parts of the U.S.?

Studies should be made on how to develop and maintain self-sufficient communities to conserve energy in travel and utilize wasted energy.

# VITA

Karen Martin was born in Louisville, Kentucky, on October 9, 1956. She attended elementary schools in Owensboro and Daviess County, Kentucky, graduating as valedictorian from Daviess County High School in June 1974. The following August she enrolled at Murray State University where she received a Bachelor of Arts degree in Urban and Regional Planning in May 1978. In the fall of 1978 she accepted an assistantship at The University of Tennessee Graduate School of Planning, Knoxville, and received the Master of Science in Planning degree in March 1981.

The author is a member of Phi Kappa Phi, the Collegiate Institute of Planners, and the American Planning Association.