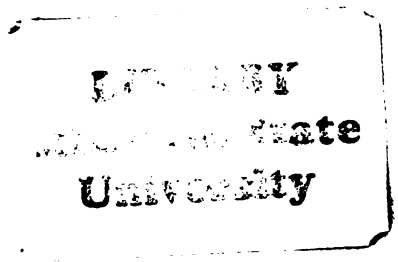

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A LANDLORD TARGETED NEEDS ASSESSMENT

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A LANDLORD TARGETED NEEDS ASSESSMENT

By

Glenn A. Stanton

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ABSTRACT

ENERGY CONSERVATION IN RENTAL HOUSING:
A LANDLORD TARGETED NEEDS ASSESSMENT

By

Glenn A. Stanton

Of the existing energy alternatives, only energy conservation has the potential for immediate production by nearly every individual. Because conservation has no clear constituency, public policy must aid in the development of this resource. Due to regional differences in housing stock and energy usage, policy decisions are probably best made at the local level. To increase the utility of the policy, input from potential beneficiaries of the policy is necessary. The tri-county rental housing was the area for the research, with landlords being the potential beneficiaries.

Two needs assessment approaches, social indicator analysis and surveys, were utilized. Participants were 140 members of the Landlords of Mid-Michigan. These owners held properties in the tri-county area surrounding greater Lansing.

A wide disparity existed between program awareness and utilization suggesting that available conservation programs did not meet owner needs. The initial investment required and existing cash flow were identified as both the most important factors in the retrofit decision, and as the most frequently encountered barriers. Landlords preferred low-interest loans over other conservation incentives such as audits or grants containing regulations.

To the memory of my father, Delos

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Janet, thank you for everything.

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CHAPTER 1

Introduction

A recent history of the energy problem

In 1973, Arab oil producers embargoed the U.S., creating what has been labeled the "energy crisis". By the end of 1974, the price per barrel for crude oil was eight times higher than five years earlier (Stobaugh & Yergin, 1979). Although this experience was painful and frightening, the prevailing attitude was that the crisis was a freak occurrence. In fact, survey research conducted in mid-1974 revealed that a majority of the public believed that "fuel shortages are not inevitable in the future and will most likely be solved within four or five years" (Murray et. al., 1974, p.259).

In April of 1977, President Carter declared the reliance on imported oil the "moral equivalent of war" and proposed his National Energy Plan. This plan, in its original form, cited conservation as its cornerstone and coal as its major alternative energy source. However, due to changing domestic issues and the hazards of the partisan political process, the momentum for a cohesive and workable national

energy policy was lost (Commoner, 1979). The immediacy of the energy crisis was past and most Americans adjusted to the higher costs required to drive their cars and heat their homes.

However, in 1979 the U.S. once again faced a potential energy crisis due to the fall of the Shah of Iran. Iran temporarily ceased its oil production, which at that time comprised 10 percent of the world's oil. This occurrence forced the world price for oil from approximately $12 to $35 per barrel by the end of 1979 (Stobaugh and Yergin, 1979).

Since 1979, oil demand in the non-communist world has dropped from 52.4 to approximately 45.5 million barrels per day, creating a world surplus of oil (The humbling of OPEC, 1983). Due in part to this surplus, world crude oil production fell from 63 million barrels per day in 1979 to 53 million in late 1982 (Workers are latest victims, 1983). With this surplus or oil "glut" has come several indications that public concern about energy is once again on the decline. Stanton (1981) presented the results of an attitude survey with teachers and students in Michigan, which showed a decline in the rated importance of the energy issue from 1979 to 1981. Meanwhile, the November, 1981 cover of Harper's magazine declared "The Energy Crisis is Over".

This optimism is unjustified for several reasons and continued optimism has the potential for disasterous consequences. First of all, a major reason for reduced world wide consumption was that the oil shock of 1979 sent the world economy into a slump. Higher prices for energy forced energy intensive industries to reduce or halt production. Thus energy usage has fallen, but only at the expense of higher unemployment. Second, the present popular energy resources, petroleum and natural gas, are nonrenewable and finite. The continued reliance, or perhaps more

accurately dependence, on these resources will inevitably lead to future shortages. In fact, evidence accumulates daily which demonstrates that the earth's energy supply is limited (Meadows et al., 1972).

One of the dangers of the lack of concern about energy consumption is the potential damage to the already faltering efforts to develop alternative energy sources. In this temporary period of declinig prices for fossil fuels, the economic incentive for the development and implementation of alternative sources is lost. A second danger is that conservation efforts may be undermined. These two dangers together could increase the likelihood of a return to an even greater dependence on unreliable foreign supplies of energy. A closer look at the existing data concerning domestic energy consumption and production reveals further flaws in the view that the energy problem has been or will soon be solved.

U.S. energy production and consumption

Data suggesting potential energy shortages has been available since the 1950's (Hubbert, 1956). Consumption of natural gas and petroleum began to exceed domestic production in the late 1950's and this demand was growing exponentially (Thompson, 1976). More recent statistics show that U.S. production of petroleum and natural gas peaked and began to decline in 1970 (Stobaugh and Yergin, 1979). Production curves published by the Energy Research & Development Administration suggest that within 60 years, nearly 80 percent of the world's crude oil supply will be gone (ERDA, 1975).

Although the aim of President Carter's National Energy Plan and other national policy initiatives was to reduce our dependence on foreign oil, between 1973 and 1979 U.S. oil imports nearly doubled

(Stobaugh and Yergin, 1979). In 1981, the U.S. had roughly five percent of the world's population but used about 30 percent of the world's energy Lash, 1981). Therefore, these past efforts at the federal level seem to have been relatively ineffective in reducing our dependency on finite energy sources. These data also suggest that the energy problem is still an important issue.

Consideration of the above data suggests the following conclusions. First, the U.S. remains dependent upon nonrenewable resources for which peak production has passed. Second, historical events of the 1970's provided painful evidence that this dependency has national security, economic, and political implications. Although the historical events discussed above were specific to oil production, these problems and dangers are equivalent for all finite resources. Witness the current rate hike battle concerning the importation of "stable" but extremely expensive Algerian gas by several Mid-west utilities (Pipeline asks area rate hike, 1983). Third, the concern of the American public in general tends to vary with critical events and existing supplies. Fourth, energy availability and consumption is an issue which effects Americans on all levels. Energy, or the threatened lack of it, has become a political weapon among nations. Importation of foreign energy sources affects the economy due to a direct loss of national income. The rising costs of home heating fuels effects the health of the poor and elderly in the northern regions of this country. Therefore, the energy issue is of pressing importance to us all. Finally, the previously mentioned factors demand that a long-term transition to renewable energy resources, such as solar energy, must be accomplished (Commoner, 1979; Stern and Gardner, 1981). The first phase of this transition is to

locate and develop short-term energy alternatives. The following section presents three of the most frequently cited short term alternatives.

Short-term energy alternatives

Coal

With the realization of the U.S.'s dependency on imported oil came the rediscovery of coal. In 1946 coal accounted for 50 percent of the total U.S. energy consumption. But by 1978 this percentage had fallen to 20 percent (Horwitch, 1979). After 1973, America was called the "Persian Gulf of Coal" and coal was deemed the "great black hope". In support of these labels are estimates that the U.S. possesses 27 percent of the earth's coal reserves (Horwitch, 1979). President Carter set coal production goals at 1.2 billion tons by 1985. This policy stimulated a great deal of hope for the energy source whose greatest positive attribute, as the General Accounting Office observed, is simply that "there is a lot of it". Unfortunately, sheer abundance does not eliminate the barriers associated with its use.

It is useful to view the use of coal as a system consisting of production, transportation, and consumption. Barriers appear at each component of the system. Production of coal from underground mines has the potential for acid drainage or black lung. Production from above ground mines (stripmining) without careful reclamation of the land can accelerate top soil erosion. Another potential barrier in production comes from the fact that coal is a "people intensive" industry. There has nearly always been a basic mistrust between coal production workers and management and national strikes have occurred as recently as 1977-78 (Horwitch, 1979).

Much of the low-sulfur coal preferred today is found in the western United States, while the largest coal users remain in the east. Therefore, transportation becomes a vital issue. The railroad is the primary candidate for coal transportation. However, the national rail system has deteriorated over the last few decades. Therefore, the future of the coal industry is dependent in part on the ability of the railroads to retool. additionally, railroads have their own set of social and environmental problems, such as the disruption of communities by the installation of new track.

The consumption of coal presents the most serious environmental hazards. The burning of coal results in the emission of sulfur dioxide, nitrogen oxide, and carbon dioxide into the atmosphere. Perhaps the most dangerous of these emissions is carbon dioxide. An increased release of carbon dioxide may result in a warming of the earth's atmosphere due to a "greenhouse" effect. This occurrence might pose a severe, long-term global threat (National Academy of Sciences, 1977). Another pollutant, sludge, is created by the very process of reducing sulfur dioxide emissions with the technology of scrubbers. Another harmful byproduct of the burning of coal is acid rain.

Due to these difficulties, attainment of President Carter's coal production goal is doubtful. Estimates now range from 800 million tons to 1.1 billion tons (Horwitch, 1979). Regardless of the abundance of coal, the cited hazards and barriers prevent it from becoming a reasonable short-term solution to the energy problem.

Nuclear power

A second alternative energy source that has received much attention is nuclear power. A national initiative for nuclear power was begun by President Nixon who proposed Project Independence. This plan called for atomic power to provide 30 to 40 percent of America's electricity by the end of the 1980's and up to 50 percent by the beginning of the twenty-first century (Bupp, 1979). However, it is extremely unlikely that those goals will be met because the nuclear industry also faces substantial barriers to its implementation.

A series of critical events beginning March 3, 1979 exemplifies one critical problem: how safe is nuclear power? On this date, a near disaster occurred at the "Three Mile Island" nuclear plant located near Harrisburg, Pennsylvania. This accident was a combination of technical and human failure which led the public and policy makers to question the safety of atomic power. One year later, the Nuclear Regulatory Commission was still developing plans for the safe removal of radioactive gas inside the reactor building. This incident started a battle between advocates and critics of nuclear power. This battle is still being fought and no clear concensus of established engineering judgement on nuclear safety has emerged.

A second issue is what to do with spent nuclear fuel? Reprocessing of spent nuclear fuel is an unproven technology and has the potential for the proliferation of nuclear weapons. Other storage alternatives suffer the political problem of the "not-in-my-backyard" syndrome. A final shortcoming with nuclear power is that its only end-use is the generation of electricity. Therefore, it would not provide a short-term solution for the transportation sector or for space heating in the northern United States.

Until the issues of safety and waste are addressed, nuclear energy is not a viable short-term solution. In fact, since the early 1970's there have been successive downward revisions in projections of future nuclear capacity in all western countries (Bupp, 1979).

Conservation energy

There is an energy source that produces no radioactive waste; produces very little pollution; that doesn't emit carbon dioxide; and millions of barrels of oil per day could be "produced" in the United States. That source is energy conservation. It has been suggested that this source be called conservation energy since it is no less an alternative energy source than oil, coal or nuclear (Yergin, 1979). It can be compared with other sources in terms of payback, ease of recovery and environmental effects. On the whole, it has been estimated that the U.S. could use 30-40 percent less energy than it does now and enjoy the same or higher standard of living (Yergin, 1979).

Conservation energy can be produced in each of the three energy consuming sectors. The transportation sector, which consumes 25 percent of the nation's energy, is an area which exerts a massive effect on energy consumption, through use of the car (Yergin, 1979). Additionally, cars are manufactured by relatively few producers. This fact makes regulation an easy tool for conservation. The federal government set fleet-average mileage standards which required that the average mpg rating increase from 18 mpg in 1978 to 27.5 mpg in 1985. The potential fuel savings of oil from these regulations could reach 20 billion barrels from 1975-2000, twice the reserves on Alaska's North Slope (Yergin, 1979).

The manufacturing industry, which uses 37 percent of the total energy consumption, is characterized by a large number of decision makers who are generally well informed concerning costs and alternatives. Because profit margins are the test of business activity, this sector is likely to respond to clear market signals. One frequently cited example of industrial conservation was Dow Chemical's "war on BTU's". When energy prices began to climb in 1973, Dow began a campaign to eliminate waste through better energy management and low-cost retrofitting. Dow was able to increase its energy productivity by 40 percent (Dow Chemical, 1981). Other companies have reported savings from 17 to 59 percent through conservation (Yergin, 1979).

The third sector, which accounts for 38 percent of the total energy consumption, is commercial/residential buildings. This sector includes millions of poorly informed decision makers. Twenty of the 38 percent of total energy consumed is used in the residential sector (Yergin, 1979). Research in this area has shown that a savings of 67 percent is possible with a few existing technologies (Socolow, 1978). Because of this diversity of decision makers and the enormous potential for the production of conservation energy, the present research will focus on the residential sector. The following section will present an in-depth review of the existing research in this sector.

The advantages of implementing conservation over the other short-term alternatives are many. First, there exists great flexibility in how this energy is tapped. It can come from any number of existing technologies or behaviors. Second, conservation relies on the known, the reliable, the tested, and the nonexotic. It doesn't require any additional technological breakthroughs. Third, conservation pays off

immediately. Fourth, it involves much less insult to environmental safety and health than does coal or nuclear. Fifth, it creates more jobs per dollar spent than most alternatives (Seven reasons, 1981). Sixth, and perhaps most importantly, it is one alternative that the individual can effect. Where as coal and nuclear depend on industries to provide energy, conservation can be produced by everyone.

This last advantage also signals a potential barrier to implementation. Because conservation has no clear constituency, other than perhaps the insulation industry, "public policy must be its champion" (Yergin, 1979, p. 227). Public policy must send clear signals that this alternative is desirable and provide incentives and information to the diverse group of decision makers. Because of this key role of policy in conservation, policy development will be a key component of the present research.

Characteristics of the residential sector make it particularly amenable to social science methodologies in the development of energy policy. One such characteristic was revealed by researchers at Twin Rivers, New Jersey (Sonderegger, 1978). They found large differences in energy usage within identical townhouses. Additionally, when turnover of residency occurred, the new tenants energy use was not consistent with previous occupants consumption. Finally, making energy efficient modifications to the houses did not reduce the variance in consumption. Since these townhouses were identical with respect to climate and physical structure, this variance must be due to the individual's energy usage behaviors (Mayer, 1983). A second characteristic of this sector is that altering these energy using behaviors, such as dialing down thermostats, is a key method for conservation. The argument that social

science can play a key role in public energy policy development has been discussed in detail elsewhere (Stanton, 1983; Tsuo & Geller, 1976; Winett et al. , 1978; Winett, 1979; Stern & Gardner, 1981; Eichen & Tukel, 1982). The following section will review the relevant behavioral research concerning conservation in the single family home.

In summary, conservation energy is the best short-term energy source available. The present research will focus on the production of conservation energy in the residential sector, with particular focus on the accompanying public policy.

Behavioral research concerning conservation in the residential sector

In general, there are two methods of reducing energy consumption: curtailment and efficiency (Stern & Gardner, 1981). Curtailment involves repeatable behaviors with relatively short-term effects, such as turning off lights or dialing down thermostats. Effeciency actions involve one-time, long-term efforts to improve the building's energy efficiency, such as adding insulation or furnace modifications. Both methods are of value and worthy of research.

Curtailment research

Behavioral research has focused almost exclusively on curtailment methods. This research has generally consisted of three types of interventions: information and prompts, feedback, and incentives.

Information on how to save energy has been used most often by governments or utilities in unsystematic campaigns (Stern & Gardner, 1981). Behavioral research suggests that general information alone is not sufficient to induce action (Herberlein, 1975; Hays & Cone, 1977;

Palmer, Lloyd, & Lloyd, 1978; Geller, Winett, & Everett, 1982). In one study in which information was compared with monetary incentives and feedback, information alone actually increased electrical usage (Winett et al., 1978).

Prompts have taken the form of dittoed letters reminding individuals to turn off lights (Luyben, 1980) and small signs placed near wall switches (Delprato, 1977). The results of these studies are congruent with traditional learning theory. Prompts tend to be most effective when they specify a particular target behavior and are presented in close proximity, temporally and spatially, to the location of the behavior to be performed. Overall, information and prompts are most effective when they are just one component of a broader program.

A technique which has been more effective in reducing energy usage is feedback. Seligman & Darley (1977) provided daily feedback, consisting of the percentage of actual over predicted electrical consumption, four times a week with homeowners. The results indicated that this group used 10.5 percent less electricity than predicted. Winett, Neale, Yokely, & Kauder (1978) using very similar techniques were able to reduce household energy consumption by about 13 percent. Validity of this method was provided by eight and 15 week follow-up data which demonstrated maintenance of effect. Self monitoring has been compared with feedback from an external source by Winett, Neale, & Grier (1979). They found savings of seven and 12 percent respectively with regards to previous usage. Two studies did not find savings due to feedback alone (Winett et al., 1978; Seaver & Patterson, 1976).

Feedback has also been shown to be effective when combined with other techniques. Palmer, Lloyd & Lloyd (1977) used a combination of feedback and daily prompts with four families in a reversal design experiment. The mean decrease from maximum to minimum consumption was 35 percent. Combining a difficult goal of a 20 percent reduction with feedback also provided moderate savings in electrical usage of 13.0 to 15.1 percent (Becker, 1978).

Based on these findings, feedback appears to be a practical technique for reducing energy consumption in single family homes. However, several questions remain to be answered. Is one type of feedback more effective than another? Is feedback effective with other fuel types and end uses? Most of the cited studies looked at electrical consumption due to air conditioning. Is feedback effective, or possible, in buildings where occupants don't pay for fuel costs?

A final technique that behavioral scientists have employed is incentives. Winett et al. (1978) compared the effects of high monetary rebates (240 percent price change in electricity), low monetary rebates (50 percent exchange), weekly feedback, and information. They found that only the high rebate condition significantly curtailed electricity use. The savings were approximately 12 percent as compared to projected use.

Hays & Cone (1977) also compared rebate conditions with feedback. They found the rebate to be the most effective in reducing electrical use. A key finding was that savings were recorded at all levels of the rebate. For example, the savings at 100 percent payment were 33 percent, while the savings at 10 percent payment were 23 percent. Therefore, smaller ,more cost-effective schedules may be appropriate.

Seaver & Patterson (1976) found that feedback alone was ineffective, but when combined with a sticker declaring, "We are saving oil", reductions in fuel oil usage were reported. They define the sticker as a social recognition incentive. Although social recognition could be a highly cost- effective incentive, this study must be replicated since it was conducted in early 1974. This time period may have added value to an otherwise unvalued sticker.

Finally, incentives in the area of transportation conservation have resulted in increased bus ridership (Everett, Hayward, & Meyers, 1974) and reduced driving (Foxx & Hake, 1977; Hake & Foxx, 1978). This lends further support for the use of incentives.

Although these findings are encouraging, further research is needed. For example, the cost benefit analysis of many of the rebate schedules has been discouraging. Witness the 240 percent price change required in the Winett et al. (1978) study. Future incentives with homeowners should not focus exclusively on direct payment but on social incentives or credits. A second research issue concerns the establishment of the incentive. Are externally or internally chosen incentives more effective? A third problem has been the concentration on electrical consumption. Electricity has the highest cost per unit of energy. Therefore, a substantial financial incentive already exists and large monetary savings can be accrued with little effort. Would similar results be found with other fuel types? A fourth problem has been that nearly all of the studies cited were conducted during 1974-1976, a period of heightened awareness due to the "energy crisis".

In summary, the most promising strategies for inducing curtailment actions with homeowners are feedback and incentives. Information and prompts are most likely to be useful when combined with feedback or incentives. Additional research is needed in all areas.

Efficiency research

Efficiency actions, often called retrofit, can be defined as " the upgrading of a complex system through the insertion of improved components " (Yergin, 1979, p. 210). Energy retrofit refers to the insertion of conservation components to the home. Retrofit is important for residential buildings for two reasons. First, the building population turns over very slowly. In 1972, a record year for housing starts, new houses accounted for less than 3.5 percent of the total housing stock (Yergin, 1979). Therefore, market penetration of new energy efficient designed homes will occur very slowly. Second, housing itself may be viewed as a renewable resource (Housing as a renewable resource, 1982). Rehabilitation of existing buildings reduces the need for new construction materials, transportation systems, and the like.

Efficiency actions have two advantages over curtailment. One advantage is that efficiency is a one time, long-term behavior. One shortcoming of the behavioral research on curtailment has been that few studies have shown maintenance of effect. Most efficiency actions avoid this issue.

A second advantage is that the savings potential for efficiency actions may be greater than for curtailment. For example, setting back the thermostat from 72 degrees to 68 degees Farenheit during the day and 65 degrees Farenheit nights results in a four percent savings. However, installing more energy efficient heating equipment could result in a

eight percent savings (Stern & Gardner, 1981). This is not to argue that curtailment actions are not useful or effective. It does argue for research on efficiency actions.

Unfortunately, behavioral research on efficiency actions is almost nonexistent (Stern & Gardner, 1981; Geller et al., 1982). However, the exceptions were two studies conducted in the State of Michigan. The first was an examination of the relationship of retrofit and subsequent actions and behaviors (Mayer, 1983). Mayer employed a post-only, control group design to test the effect of information in conjunction with feedback on elderly homeowners who had recently had their homes weatherized. Both groups received informational packets containing further conservation behaviors. In addition, the experimental group received feedback as to their energy usage. No significant differences were found between the groups regarding subsequent actions. In addition, significant negative correlations were reported between proconservation attitudes and home efficiency, as well as between proconservation actions and home efficiency. This suggests that those who had their homes weatherized were compensating behaviorally for their home's improved efficiency. This study demonstrated that curtailment and efficiency were interrelated.

The second study was the Michigan Residential Conservation Service (RCS) Program evaluation (Kushler & Saul, 1982). The RCS program is a federally mandated, class A utility audit program. The intent of the program is to induce both curtailment and efficiency actions by providing homeowners with detailed information on the efficiency of their home, the associated payback periods of various actions, and a packet of five conservation items (ie. water flow restrictors).

Overall, they found that significantly more actions were reported by the audit group than by the control. The largest differences between groups were the number of low-cost efficiency actions (ie. caulking) and the number of kit actions. Thus, this evaluation suggested that audit programs may be useful in inducing homeowners to make low-cost retrofit. This study did however possess a common problem of audit evaluations. Participation in the program was voluntary. Thus, self-selection may have biased the results since these people may have already had a heightened energy awareness. Further research is needed where customers are randomly assigned to one of several programs to control for self-selection.

Further behavioral research in the area of efficiency actions is warranted for several reasons. First, greater savings with fewer efforts are possible. Second, a relationship between behaviors and retrofit exists. Some technologies, such as clock thermostats, require behaviors to activate them. Third, further research is needed to determine which inducements lead to efficiency actions by what types of individuals. Behavioral needs assessment approaches could aid in the development of these incentives.

The present research, in addition to focusing on conservation and its associated policy, will focus on this primarily neglected area of retrofit. The research cited thus far has dealt exclusively with the homeowner portion of the residential sector. The second portion of this sector has unique properties which distinguish it from the first. That subsector is rental housing.

Rental Housing

Rental housing accounts for 35 percent of the nation's residential housing stock (Department of Commerce, 1982). Renters account for roughly one-third of all residential energy consumption, more than the total consumption of New York State (Bleviss, 1982). Rental housing also tends to be older and less energy efficient than homeowner housing. Fourty-one percent of the nation's rental housing was built before 1939 and nearly 33 percent of these have no ceiling insulation, while 41 percent have no wall insulation (Levine & Raab, 1981). Therefore, rental housing represents a target for potentially large energy savings.

Unfortunately, this market has generally been ignored by policy makers at all levels (Bleviss, 1980; Counihan & Nemtzow, 1981; Levine & Raab, 1981; Bleviss, 1982). Although many programs exist for homeowner property, very few exist for rental housing. Those programs that have been implemented have received poor response from the rental sector. For example, a home insulation and audit program, offered by the Tennesee Valley Authority to both rental and homeowner properties, received a negligible response from renters and landlords. Only 1.4 percent of the program participants were from rental housing (Ozenne & Reisner, 1980).

Policy makers tend to use past history, in the form of past programs or technologies, as the guide to policy alternatives (Baker, Michaels & Preston, 1975). This holds true for energy conservation policy as well. Key differences between the homeowner and rental housing markets make a transfer of homeowner programs and strategies difficult if not impossible.

One key difference is the diversity of dwelling types that may be rental. While the homeowner market consists almost exclusively of single, detached units, rental housing includes single units, duplexes, buildings of three or more units, and mobile homes. Since conservation actions that are applicable and cost effective to any building is dependent upon the energy system type and the construction and condition of the building envelope, rental housing will require a wider range of actions than those used in the homeowner sector. For example, the envelope of high rise apartments is mostly wall surface, which is more difficult and costly to insulate than ceiling or attic space (the most frequently taken action of homeowners).

A second key difference is that rental housing is characterized by a split between those who occupy a building and those who own it. In the homeowner market, a single individual or family is responsible for energy use, energy costs, and maintenance of the buildings energy efficiency. In the rental market, these responsibilities may be distributed among tenants, landlords and in some cases property managers. "Tenants control much of the pattern of energy use, while landlords establish the efficiency of consumption" (Counihan & Nemtzow, 1981, p. 1104). Thus, the relationship of curtailment and efficiency actions is a complex one in rental housing. Curtailment actions taken by tenants will have little or no effect if the building's efficiency is poor. Likewise, efficiency improvements, such as clock thermostats or storm windows will be ineffective if not used properly by tenants. Rental housing can be viewed as having some of the same characteristics of the manufacturing sector discussed previously. It is a business and therefore owners should be receptive to cost variables. However, the

most important implication of the owner-occupant split is that tenants or owners may be responsible for energy costs. Payment of energy costs provides two vital components that influence the decision to conserve. The first is informational feedback in the form of monthly bills. Previously, feedback was shown to be somewhat effective in reducing electricity consumption with homeowners. However, this strategy is not applicable for influencing tenants when energy costs are paid by the landlord. Likewise, it is not appropriate for influencing rental owners when tenants pay the costs.

The second vital component provided is a direct financial incentive to conserve. Without this financial incentive, market forces such as price will have no effect on behavior. Nationally, tenants pay for all utility costs in 59 percent of occupied rental units. Landlords pay for all energy costs in 13 percent of the cases and costs are shared in 28 percent of the cases (Counihan & Nemtzow, 1981). Based on these figures, energy conservation is in the tenant's self interest. However, two factors deter tenants from making investments in energy conservation. They are lack of financial resources and lack of long-term commitment to the housing unit. Nationally in 1977, 56.4 percent of renters had incomes below $10,000 (Levine & Raab, 1981). Lack of commitment is reflected by the fact that tenant turnover is approximately 50 percent per year (Booz, Allen & Hamilton, 1979). Few if any efficiency investments could be recovered in such a short time. These deterrents suggest that tenants are unwilling or unable to make high cost, high potential efficiency improvements.

Owners of rental property also experience dis-incentives due to the payment of energy costs. Owners who pass on energy costs directly to the tenants have no financial incentive to make their building energy efficient, nor are they receiving feedback regarding consumption. When owners are responsible for energy costs, these costs are often passed on to the tenants through higher fixed rents. Additionally, existing tax dis-incentives inhibit the owner's efficiency investment. Landlords are now able to deduct energy costs on their federal taxes as operating expenses. If the owner is in a high income bracket, this deduction can result in close to total subsidation of the energy expenditures (Bleviss, 1980). Therefore, rental owners who are responsible for energy costs do not incur the "real" cost of energy.

The owner-occupant split is further complicated by the existence of several different rental ownership types. Each of these types probably reflects a different set of motives, needs and preferences. For example, a limited partnership involves general partners who make decisions and limited partners who are passive investors. These passive investers receive tax write-offs for depreciation and expenses. These owners may prefer tax credits as conservation incentives while single owners may prefer loans or other up-front financing (Levine & Raab, 1981).

In summary, rental housing is a complex housing market with characteristics that distinguish it from the homeowner market. These characteristics suggest that past strategies and programs developed for homeowners may not be applicable to rental housing. Two variables of critical importance are the method of utility payment and ownership type. Research must be done to aid policy makers in the development of

new and appropriate incentives for curtailment and efficiency improvements for rental housing. The following section will discuss the existing behavioral research in the rental market.

Behavioral Research on Rental Housing Conservation

As was true for behavioral research in the homeowner market, the two most frequent independent variables have been feedback and monetary incentives. Katzev et al. (1981) compared the effect of daily contingent feedback, three day contingent feedback plus decal, three day noncontingent feedback plus decal, and a no treatment control. An ABA design with 11 all electric apartments allowed both within and between group comparisons. The overall finding was that none of the feedback groups differed significantly from the control. However, the daily contingent group did use significantly less energy ($p < .035$) for one of the experimental periods. The findings of this study do not corroborate Seaver and Patterson's (1976) finding that social commendation in the form of a sticker in conjunction with feedback was effective in reducing fuel oil usage. This may be due in part to the time of the research. Seaver and Patterson conducted their research in 1974 during the energy crisis. Katzev's et al. research was done in 1977. One explanation for the lack of a feedback effect was that tenants in the Katzev et al. study already recieved feedback in the form of monthly bills.

A second attempt at employing feedback was done by Hayes and Cone (1977). These researchers also employed an ABA design and were concerned with electricity use. They found feedback alone to produce moderate reductions of 18 percent below baseline.

Hayes and Cone (1977) also employed monetary payments as an independent variable. They found that payments, based on the reduction from baseline, produced substantial reductions in electricity use. The mean reduction from baseline was 33 percent. Even when the formula to compute payments was revised to produce lower payments, the savings were substantial.

In a study by Walker (1979), tenants whose apartments were checked at random, were paid cash rewards of 5 dollars if their apartments met the following curtailment criteria: 1) all windows and doors were closed unless the heating/cooling unit was off; 2) the cooling thermostat was set to 74 F or above; and 3) the heating thermostat was set at 69 F or below. Significant changes in behavior were reported for the experimental group whose average reduction relative to the contol was 4.9 percent.

Slavin et al. (1981) conducted two studies evaluating the effects of monetary payments based on the ratio of actual to predicted energy usage by employing an ABA design. The first study looked at three towers in an apartment complex. Two of the towers produced moderate savings while the third did not. The average reduction from baseline was 6.2 percent. The second study employed the same treatment except that 50 percent of the savings were rebated rather than 100 percent. This study produced savings in three different towers with a mean reduction of 6.9 percent from baseline. Thus, all three studies employing direct payment resulted in moderate savings.

Newsom and Makraczy (1978) compared an energy contest (where the group as a whole shared the prize) with a contest raffle (one person in the winning group retained the prize). This study differed from the

earlier monetary research in that the present financial incentive was contingent upon the group rather than the individual tenant. The participants in this study were students in on-campus dormitories. Although by definition, dormitories are considered group-quarters and therefore not rental housing, research in these buildings does have limited relevancy for rental housing since residents do not pay energy costs in master-metered buildings. An ABA with control group design revealed that electrical consumption was lower for the contest (-6.15%) and contest raffle (-4.35%) conditions than for the control (+2.8%) throughout the treatment period.

McClelland and Cook (1980) replicated the use of the energy contest in university family rental housing. Six two week contests in which one of four groups of apartments would win $80 were conducted. Over the 12 week period, savings averaged 6.6 percent. Some behavioral changes were reported by the tenants, but knowledge of the contest was minimal.

McClelland's (1980) evaluation of the Residential Utility Billing System (RUBS) does not fall clearly within feedback or incentive research, but incorporated components of both. RUBS is a monthly cost allocation method used in master metered buildings in which tenants receive a monthly bill of two parts: a fixed charge for the base rent and a variable charge representing the tenants share of the utility costs. This share is based on the square footage of space the tenant occupies. Therefore, RUBS may be seen as a negative incentive for tenants to conserve or as feedback, since the cost for energy usage is variable from month to month. McClelland evaluated the impact of RUBS in 14 properties in Dallas, Denver, Charlotte (North Carolina), and Atlanta using an ABA design with two year follow-up. They found

effectiveness (5-8%) to be fairly stable across end uses and that savings tended to increase in the second year.

One final study targeted at rental housing was done by the National Apartment Association(NAA). The NAA conducted a survey of its members to assess owner attitudes and activities related to energy conservation (Booz, Allen & Hamilton, 1979). This study revealed that a lack of accurate and reliable information regarding conservation measures and their savings was the primary barrier to retrofit; tax credits and low interest loans were the most preferred incentives; and landlords demanded a short return on investment (payback periods) of two to four years.

This study was useful because it was included as input for recommendations to the Department of Energy for future rental housing energy policy. Interventions, such as feedback, billing method, and monetary incentives with tenants may be provided by the owners of rental properties. However, the technical information regarding retrofit and the large amounts of capital required for landlords is most likely to be provided by government or utility programs. Fairweather and Tornatzky (1977) have suggested that programs are most effective and more likely to be used when potential users participate in the initial planning stages. This argument has been made specifically for the development of energy programs (Egel, 1982; Stanton, 1983).

Based on the above results, feedback may have effects on electrical consumption, but being billed for energy usage , or receiving direct payments for eductions seem to produce moderate savings more reliably. Unfortunately, these studies suffer from several practical, methodological, and economic difficulties.

One practical issue is that all but one of these studies produced low to moderate savings. Hays and Cone (1977) produced substantial reductions of 33 percent from baseline. The remaining savings ranged from no savings (Katzev, 1981) to eight percent (McClelland, 1980). This finding is not unexpected since the target of the intervention in all but one case was tenants. Although only the Walker (1979) study specified curtailment actions, as noted earlier, tenants are most likely to engage in low cost, low potential curtailment behaviors. Thus, research concerning landlords and higher potential efficiency actions is needed.

The NAA study which did target landlords and efficiency actions had several deficiencies. The survey was sent to multifamily building owners and managers. By excluding single family rental units, 31 percent of the nation's rental market was excluded (Department of Commerce, 1982). Secondly, of the 700 surveys mailed, only 106 were returned(15%). It is unlikely that these 106 respondents represent the wide range of interests of all landlords nationwide. A second problem with the research in general was that tenants were responsible for energy costs in only one study (Katzev et al., 1981). Tenants may have self selected these rental properties simply because they would not be responsible for energy costs. As a result of this self selection, tenants may have made minimal efforts resulting in minimal savings. Additionally, these studies may not be representative since they don't reflect the payment schedule of the majority of the rental market where tenants are responsible for costs (Counihan and Nemtzow, 1981).

One economical problem is that efforts employing direct payment as incentives to tenants were generally not cost-effective. Of the five studies employing direct rebates or energy contests, only two (Slavin et al., 1981; Walker, 1979) had favorable cost benefit ratios. For example, McClelland and Cook awarded $780 in prizes, but only $488 of energy was saved. Additionally, while all of the monetary incentives were contingent on reductions from baseline, no negative incentives existed. An increase from baseline did not result in additional payments by the tenants. Future incentive programs employing direct rebates to tenants should incorporate both positive and negative incentives.

A second economical problem was that the size of the rebates or prizes was not sufficient for retrofit investment. For example, the five dollar prize of Walker (1979) is not sufficient to make the smallest of retrofit improvements. Substantially larger payments are probably necessary for retrofit inducement.

Another problem with this research was that only two of the studies (Slavin et al., 1981; McClelland, 1980) reported a maintenance of effect. Energy usage returned to or surpassed baseline consumption for the other studies. Since the targets were tenants engaging in repeatable curtailment action, this lends further support for research on efficiency improvements which require little or no maintenance.

A problem that this research shared with the homeowner research reviewed earlier was that electricity was the primary energy source targeted. As discussed previously, electricity has the highest cost per unit and therefore provides an additional incentive. This focus on electricity also reduces the utility of the findings for northern states

where natural gas and fuel oil are the primary sources of energy.

A final issue not addressed by the research on rental housing was that energy policy needs to be developed at the state and local levels due to regional differences in dwelling types, fuel types and energy consumption (Levine & Raab, 1981). For example, 9 percent of the northeast census region's rental units are single detached units, while 21 percent of the northcentral's units are single detached. Dwelling type plays a major role in determining which retrofit actions are useful and cost-effective for a given building. Fifty-three percent of Americans as compared with 76 percent of Michigan's residents use natural gas for space heating (Department of Commerce, 1982). Multifamily housing in the northeast consumes more than twice the annual energy per unit consumed by similar housing in the west. In addition to regional differences, there is evidence that local efforts to induce energy conservation can be effective (Danke & Lagassa, 1980). In summary, the research on rental housing conservation has been flawed by its exclusive focus on low-cost, low potential curtailment actions by tenants. These actions have been costly to induce and tend to dissipate over time. Research is needed concerning higher potential efficiency improvements. Since landlords establish the efficiency of consumption, they must be the targets for future interventions. Future research should ask the following questions. Does providing information or direct payments to landlords lead to retrofit? Will other incentives, such as tax credits, induce retrofit among landlords? What are the specific barriers encountered by landlords when retrofit is attempted?

Based on these findings, the present research attempted to provide useful information for local policy development in the area of rental housing retrofit. It included the potential beneficiaries of this policy in the process and was done by developing and utilizing a systematic method of gathering data which is to be used for later action.

Rationale for the Current Research

The discussion up to this point has attempted to demonstrate the need for policy relevant research aimed at inducing high-potential, long-term conservation, particularly in rental housing.

Because conservation has no clear constituency, "public policy must be its champion" (Yergin, 1979, p. 227). Policy must send clear signals that conservation is desirable. Since the technical information and financial incentives for rental retrofit is most likely to come from government and utility programs, input from the potential beneficiaries of this policy is necessary. Due to regional differences in housing stock and energy consumption, these policy decisions are probably best made on the local level (Stanton, 1983; Levine & Raab, 1981).

Rental housing in Michigan accounts for 27.3 percent of all occupied housing units, and is currently growing at a faster rate than homeowner housing. Approximately 31 percent of Michigan's rental units were built prior to 1940, and are likely to be less energy efficient than housing in general. Additionally, an estimated 22.8 percent (170 TBtu) of Michigan's total residential energy is consumed by rental units at a cost of 1 billion dollars annually. Therefore, significant potential exists for the production of conservation energy in Michigan.

If multifamily housing energy costs were reduced by 30 percent, the savings would approach 150 million dollars annually (Stanton, 1982).

The purpose of the current research was to utilize needs assessment technologies to provide input for future energy policy related to rental housing in Michigan. It was expected that by including the potential users of future programs in the initial planning stages, greater utilization and more effective programs will be produced (Fairweather & Tornatzky, 1977).

The current research asked the following questions:

1) To what extent have landlords in the tri-county area already engaged in retrofit activity?

2) What are the factors in the landlord's decision to take retrofit action?

3) What were the barriers experienced by landlords when they attempted to take retrofit action?

4) What were the utilization patterns of existing conservation incentive programs for landlords?

5) Which of five example incentive programs was most preferred by tri-county landlords?

6) What were the relationships of key demographics, such as number of holdings, dwelling type and space heating payment, with actions, barriers and program preferences?

7) What were the interrelationships among actions, barriers, and program preferences?

CHAPTER 2

Method

Sample

Participants in the present study were 140 of the 322 members of the Landlords of Mid-Michigan (LM-M), the regional chapter of the Michigan Landlord Association. Membership in this organization entitles the landlord to a monthly, statewide newsletter, reduced charges for tenant reference checks, and the opportunity to meet with other members at monthly meetings. This organization, due in part to its location in the state capitol, has a legislative analyst who observes and actively lobbies state legislation concerning rental housing. Therefore, membership dues also provide for political advocacy.

Properties owned by these landlords are located in the three counties surrounding the city of Lansing, Michigan. They are Ingham, Clinton, and Eaton counties. This sample was chosen for two reasons. First, the percentage of occupied housing units in the tricounty area that were rental was higher than the state average (32 percent). Therefore, research concerning conservation could have a substantial

effect both in terms of market penetration and energy savings. Secondly, previous efforts to include landlords in energy needs assessment have resulted in poor participation (Roitman, 1980). Therefore, to increase participation and legitimazation, an existing organization was sought (Warheit et. al., 1979). The LM-M represents the only such organization in the Lansing area.

Instrumentation and data collection

Roitman (1982) has aptly noted that within the area of energy conservation, no systematic data gathering technique for policy input exists. Because of this deficiency, Roitman borrowed a package of needs assessment techniques from the field of mental health in a research effort to identify community energy conservation programming needs. Based on the success of that effort, the current research effort also borrowed needs assessment technologies from mental health.

Needs assessment is a process of collecting valid information regarding citizen needs and utilization patterns and channeling that input into the program planning process. Therefore, needs assessments are percieved to be a logical first step in programming (Kimmel, 1977). They are most likely to produce interpretable and useful data when they are focused on specific problem areas and employ multiple methods of measurement (Warheit et al., 1979).

Warheit et al. (1979) identified four basic needs assessment approaches. They were: the key informant approach; the social indicators approach; the community forum approach; and the survey approach. The current research employed two of these approaches: social indicators and surveys.

Social indicators

Social indicators are descriptive statistics of a communtiy, such as census data or other public records. Secondary analysis of this data provides a method of providing in-depth understanding of the community context in which programming takes place (Roitman, 1980). Fields such as public safety, education, and recreation have utilized social indicators for program planning purposes (Cochran, 1979). The relationship of energy usage and demographics, such as social-economic status, education, and age have been documented (Olson, 1976). Information regarding the housing stock and condition is vital for conservation policy since the cost-effectiveness and utility of any retrofit action is dependent upon dwelling type. Based on these facts, it is essential for a preliminary needs assessment on rental housing retrofit to include secondary analysis of social indicator data (Roitman, 1980). This data was collected from U.S. Department of Commerce publications of the 1980 Census of Population and Housing, and 1980 Census data tapes available at Michigan State University. The purpose of collecting this data was to establish the representativeness of the sample; to document the availability of data concerning rental housing and its energy usage on a local level; and if possible, to document the existing condition of rental housing in the tricounty area.

Survey

The survey approach is a widely utilized needs assessment technique. Fairweather and Tornatzky (1977) have identified surveys as being worthwile in the initial planning of new models, particularly when the "problem population" is comprised of normal people. Surveys have the advantages of gathering data which is easily amenable to analysis

and allowing a broad range of individuals to provide input. Finally, and most importantly, "...when carefully designed and conducted, they (surveys) provide the most scientifically valid and reliable informantion about individuals regarding their needs and utilization patterns" (Warheit et. al., 1979, p40)..

A written survey was chosen over telephone or personal interviews because of administrative agreements with the LM-M. See Appendix 1 for administrative agreements. This was agreed to since the LM-M felt that personal or telephone interviews presented an unneccessary intrusion into its members affairs. In addition to the agreements, written surveys may be completed at the participant's discretion. This fact also avoided unneccessary intrusion and negated the need for repeated attempts at contacting participants.

The initial survey is presented in Appendix 2. This instrument was pretested with 23 members of the LM-M. Based on the responses to the pilot, several modifications were made. First, the open-ended items pertaining to barriers and program components (sections 3&5) were restructured to forced choice items due to poor response rates. Second, ratings of conservation decision factors (section 3, item 4) were changed to ranks because of lack of variance. Third, a fifth program summary (section 5) was added to include a better representation of available programs. Finally, ratings of potential incentives (section 6) were deleted due to lack of variance.

The final survey is presented in Appendix 3. The survey consisted of seven sections: 1)a demographic section; 2)a conservation action table; 3) a finacial decisions table; 4)a barrier section; 5) a checklist of existing conservation programs for landlords in Michigan at

the time of the research; 6) a section presenting five summaries of nationally existing or proposed programs to encourage rental retrofit; 7) and and open-ended section for comments. A discussion of each follows.

demographics

This six item section had two purposes. The first was to establish the external validity of the sample. This was to be done by comparing ownership and dwelling type and method of utility payment (items 2,3,4) with the archival data on the national, state and tricounty levels. The second purpose was to assess the relationship of characteristics that were identified as important in the literature with other survey sections,particularly actions and program preferences. Some demographic variables, such as income and education, which may be of importance were judged to be intrusive and therefore were excluded.

conservation action table

The purpose of this section was to assess the extent to which landlords report to have engaged in retofit activities and what future retrofit plans they may have. Owners were asked to list the number of buildings to which the actions were made to assess the extensiveness of retrofit efforts. This list of 10 items were taken from the Residential Conservation Service, utility supplied, energy audit forms and the 1979 National Apartment Association survey (Booz, Allen & Hamilton, 1979). Although this table was not a complete duplication of either source, it did contain a mixture of high and low-cost efficiency actions.

financial decisions

Levine et al (1982) reported that when landlords take conservation action, they do so to save money rather than energy. This section attempted to establish which factors were most important in the decision to do retrofit by asking owners to rank order decision factors identified by two local landlords and the literature. Of particular interest was the influence of payback periods. Payback period refers to the amount of time a given retrofit action takes to save enough energy to recover the initial investment. Previous work with landlords has identified payback considerations as crucial to retrofit (Booz, Allen & Hamilton, 1979; Levine & Raab, 1981). The current survey attempted to extend the concept of payback by assuming that reasonable payback periods would vary with the amount of the initial investment. Three levels of initial investment of $100, $500, and $1000 were identified by the LM-M.

barriers

Based on the pilot test responses and the literature, eight specific barriers and two open-ended choices were presented to the landlords in the form of a checklist. They were asked to indicate which problems had inhibited their decision to retrofit. The purpose of this section was to identify which barriers were most prevalent in Mid-Michigan and to examine the relationships between barriers, demographics, prior and planned actions, and program preferences.

checklist of conservation programs

This section was developed to assess the extent to which rental owners were aware of existing conservation programs and the extent to which they had utilized them. Levine and Raab (1981) and Bleviss (1980)

both cited a lack of dissemination of available programs as a key barrier to rental owner retrofit. This section attempted to examine this problem in Mid-Michigan. This list was compiled from interviews with the East Lansing Housing Office and telephone contacts with the Energy Administration's toll free, Energy Hot Line.

program summaries

This section presented summaries of four existing and one proposed conservation program designed to facilitate rental housing retrofit. These programs can generally be viewed as incentive programs. Incentive programs were chosen because the residential sector is particularly receptive to incentives (Yergin, 1979; Skinner, 1979). The purpose was to allow landlords to evaluate a variety of "real" programs and their components and to select one which would most likely lead them to action. It also allowed an examination of the relationship of various ownership and payment types with program preferences. More importantly, it provided useful information to owners on three programs available in Michigan.

Each program was summarized in three to five sentences followed by: 1) one 5 point item to assess the likelihood of utilization; 2) a dichotomous variable to assess program awareness; and 3) a breakdown of the program components to be rated on a three point Likert scale. All summaries and component breakdowns were judged to be complete by the LM-M and East Lansing Housing Office. After all five summaries were presented, subjects were asked to rank order them.

Regulatory or mandatory programs for rental retrofit were excluded for several reasons. First, as mentioned previously, this is a sector where incentives can be extremely useful (Yergin, 1979; Skinner, 1979).

Second, landlords, like most businesses, do not prefer regulation. In fact, one of the local landlords consulted said that the mention of regulation caused a "red flag" to appear before landlord's eyes. Because of its possible reactive effect, mandatory programs were excluded. Additionally, the inclusion of regulatory program, would render several items following the summary useless. Owners have little or no choice as to whether mandatory programs are utilized. Tenant programs, such as Michigan's Low-Income Weatherization Program for Renters were excluded since the focus of the research was landlord initiated retrofit.

Procedure

The initial instrument was pilot tested with 23 landlords on January 20, 1982 at the monthly meeting of the LM-M. The investigator had approximately 30 minutes on the two hour agenda. The project was described and surveys distributed. Participants were told that the other members would receive the survey by mail at a later time and were asked to write any questions, comments, or suggestions in the margins of the survey. The surveys were returned following the meeting. Based on the responses of the pilot, the modifications mentioned previously were made.

A mass mailing of surveys to the remaining 299 members of the LM-M on March 8, 1982. This mailing included: 1) a cover letter describing the purpose of the survey, the support of the Michigan Landlord Association, and the requirements for entry in a drawing for $50 (see Appendix 4); 2) the survey itself; 3) an entry form for the cash drawing; 4) a preaddressed, postage paid envelope for the return of the survey. The design of the cover letter followed the three stages of

persuasion paradigm presented by Brown(1963), in which material is aimed at getting attention, creating arousal, and relieving tension through the acceptance of a persuasive appeal. This approach had been used successfully in the related area of environmental action (Lounsbury, 1973).

In order to increase response rates, those who returned the surveys were eligible for a cash drawing of $50 which was held in mid-April 1982. Additionally, postage paid return envelopes were included. The surveys were returned to the LM-M to increase the response rate. This initial mailing resulted in the return of 85 surveys.

Approximately 3 weeks after the mailing, the week of March 29, 1982, postcard prods were sent to all those owners who had not returned the surveys. This card is presented in Appendix 5. The prod resulted in the return of an additional 30 surveys. The final return was 140 of the 322 owners, a response rate of 44 percent.

CHAPTER 3

Results

Reliability

Overall survey reliability

An overall estimate of survey reliability was done by computing percent agreement scores on repeated items. Table 1 presents the repeated items and their agreements, as well as the agreement across the four sets of items. The agreements ranged from 79.4 to 92.7 with a mean of 86.8 percent, indicating reliable survey responses.

Scale reliabilities

Fourteen scales were derived from standardized items in a two step, rational-empirical process. Nine scales were derived by an oblique cluster structure analysis, using the BCTRY computer program (Tryon & Bailey, 1970). The clusters identified included: payback periods, audit program, voluntary program, grant program, taxcredit program, loan program, program restrictions , and planned high cost actions. Spearman-Brown reliability estimates ranged from .8842 to .6502, suggesting high to moderate internal consistency.

Table 1

Percent Agreement for Repeated Items

Item	Item	Percent Agreement
Aware of RCS? (Checklist)	Aware of RCS? (Summaries)	79.4
Aware of Voluntary Program? (Checklist)	Aware of Voluntary Program? (Summaries)	92.7
Aware of Rental Property Insulation/Weatherization Program?	Aware of Rental Property Insulation/Weatherization Program?	84.0
Requested RCS? (Demographics)	Used RCS? (Checklist)	91.2
	Average Agreement	86.8

The individual items remaining from the cluster analysis were then placed into five rational groupings. Using the SPSS subprogram reliabilities (Hull & Nie et al., 1981), the correlation matrices were examined and five scales derived. The five scales included: financial barriers to retrofit, informational barriers to retrofit, planned low-cost actions, completed high-cost actions, and completed low-cost actions. Reliability estimates ranged from .6002 to .5260, suggesting moderate, but acceptable internal consistency. Table 2 presents the rational names, composite items, directionality, and reliability estimates for all scales.

Only nine of the 46 correlations among the scales were significant at the .01 level, with the highest correlation being .4103 (number completed high cost actions with number completed low-cost actions). This finding suggested that the scales were reasonably orthoginal and therefore useful. The significant correlations among scales will be presented later in this chapter. These fourteen scales constituted the primary dependent variables.

Validity

Survey validity

A minimal measure of the validity of the survey was provided by examining the reported utilization patterns of three programs listed in the program checklist. One of which was not yet available; one for which noone had applied for prior to or during the research; and one which should be known to everyone. Table 3 presents the responses to the program items and the percent answered correctly. The percentage of valid reponses across the three items was 93.2 percent.

Table 2

Rational-Empirical Scales

Scale: Payback	alpha: .8682	direction: higher=longer paybacks
reasonable payback for $100 investment		
reasonable payback for $500 investment		
reasonable payback for $1000 investment		
Scale: Audit program	**alpha: .8804**	**direction: lower=higher preference**
favorability of list of actions provided by audit		
favorability of list of lenders provided by audit		
favorability of list of contractors provided by audit		
favorability of list of no-cost actions provided by audit		
rating of likelihood of utilization of audit program		
rank ordering of audit program		
Scale: Voluntary program	**alpha: .8842**	**direction: lower=greater preference**
favorability of certificate of compliance provided by voluntary program		
rating of likelihood of utilization of voluntary program		
favorability of voluntary program requirement of presentation of list of actions		
favorability of annual renewal of certificate		
rank ordering of voluntary program		
Scale: Grant program	**alpha: .8689**	**direction: lower=greater preference**
rating of likelihood of utilization of grant program		
rank ordering of grant program		
favorability of rent freeze component of grant program		
favorability of low-moderate household restriction for grant program		

Scale: Program restrictions	alpha: .8344	direction: lower=more favorable

favorability of $1000/year limit on tax credit program

favorability of $5000 maximum limit on tax credit program

favorability of $500/structure limit on tax credit program

favorability of 1-4 units eligibility requirement for loan program

favorability of $2000 limit on loan program

favorability of $2000/unit limit on grant program

Scale: Planned high cost actions	alpha: .7562	direction: higher=more actions

planning the addition of insulation

planning the addition of caulking/weatherstripping

planning the addition of storm or thermal windows

Scale: No program income restrictions	alpha: .7769	direction: lower=more favorable

favorability of no income restrictions on audit program

favorability of no income restrictions on grant program

favorability of no income restrictions on loan program

Scale: Loan program	alpha: .6502	direction: lower=greater preference

rank ordering of loan program

rating of likelihood of utilization of loan program

favorability of 3% interest for loan program

favorability of mandatory audit for loan program

Scale: Tax credit program	alpha: .6645	direction: lower=greater preference

rating of likelihood of utilization of tax credit program

rank ordering of tax credit program

favorability of carrying tax credits forward five years

favorability of 20% state tax credit

Scale:		alpha:	direction:
Financial barriers		.5669	higher=more barriers

lack of available loan or incentive programs

low cash flow

high cost of initial investment

long payback periods

Scale:		alpha:	direction:
Completed low-cost actions		.5334	higher=more actions

addition of low-flow showerheads

lower water heater temperature

addition of hot water heater wrap

Scale:		alpha:	direction:
Completed high-cost actions		.6677	higher=more actions

addition of insulation

addition of caulking/weatherstripping

addition of storm or thermal windows

addition of furnace modifications

addition of new furnace

Scale:		alpha:	direction:
Planned low-cost actions		.6141	higher=more actions

planned the addition of low-flow showerheads

planned the lowering of water heater temperature

planned the addition of hot water heater wrap

Scale:		alpha:	direction:
Informational barriers		.5260	higher=more barriers

lack of available information regarding what improvements to make

lack of available information regarding existing incentive programs

External validity

Measurement of external validity was done to establish the representativeness of the sample as well as to document the environment in which future program planning may take place. Attempts to measure the external validity were twofold. The first was a comparison of key demographics for the tricounty region in which the research was conducted, and the State of Michigan. The second comparison was for the same demographics for the sample participants with tricounty and national demographics.

tricounty-statewide comparisons

Key demographics identified in the conservation literature were taken from the 1980 Census of Population and Housing for comparison. The primary comparison is the percentage of renter occupied housing units. Michigan's rental housing percentage is 27.3 percent. The tricounty area's rental rate was equivalent with the national rate of 35.1 percent. Thus, approximately one third of the housing in the region under study was renter occupied.

Figure 1 presents the comparison of rental dwelling type between regions. It is clear that the largest difference is the percentage of rental units in buildings of five units or more. The tricounty area has nearly 12 percent more buildings of this type than Michigan as a whole.

Figure 2 presents the comparison of the age of the rental stock. The differeneces between the regions are minimal. The largest difference exists for buildings 40 or more years old. Michigan has approximately 8 percent more buildings of this age than does the tri-county area.

Table 3

Responses to Items Measuring Survey Validity

Item	Response		Percent Correct
	Yes	No	
Have you used the Voluntary Program?	1	113	99.0
Are you aware of Commercial Financing?	111	23	82.8
Have you used the Rental Property Insulation/ Weatherization Program?	0	110	100.0
Total			93.2

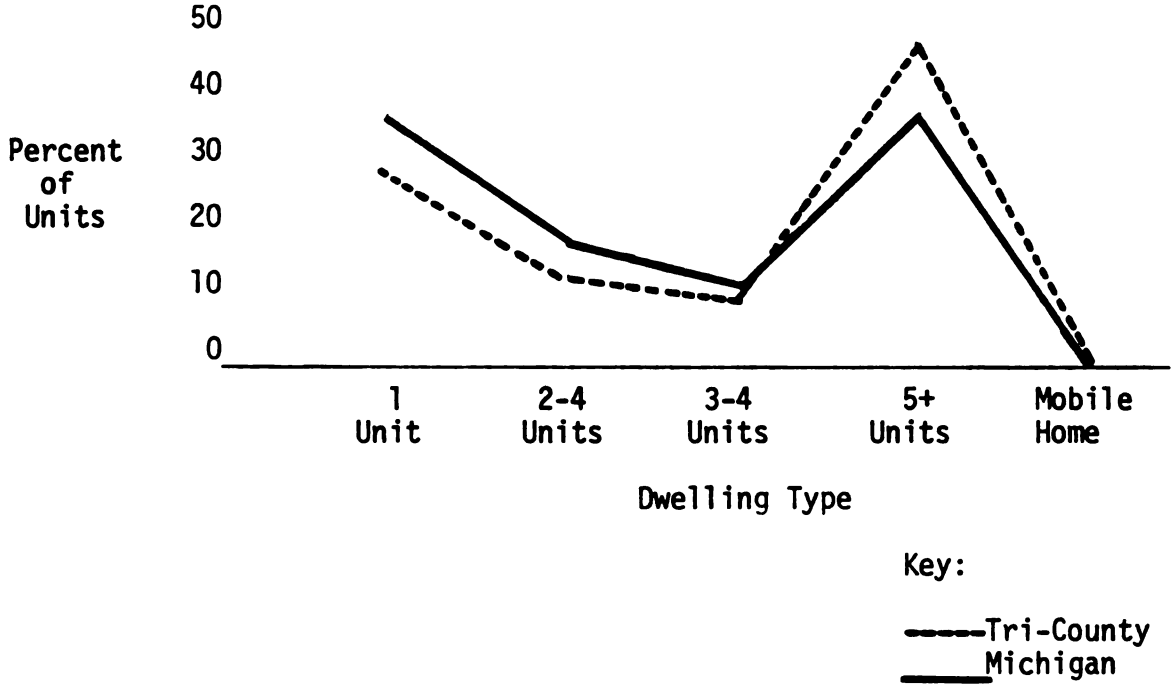

Figure 1. Dwelling Type Percentages for Michigan and Tri-County Areas

A comparison of utility payment also revealed small differences. Approximately 80 percent of the tenants in Michigan and 77.7 percent of the tricounty tenants reported paying for at least one utility. In both regions, some financial incentive to conserve was present for tenants. It is unclear whether a similar incentive is present for landlords.

Figure 3 presents the comparison for tenant income. The two categories with the largest differences were incomes of five thousand dollars or less and incomes between 10 and 14.9 thousand dollars. Michigan, as a whole, has 4.5 percent more tenants in the lower income group. The tricounty area had 3.1 percent more tenants in the 10 to 14.9 range.

In summary, minimal differences exist between Michigan and the tricounty area for relevant demographic variables. The tricounty area did have a higher rental rate, a higher percentage of buildings of five or more units, fewer rental buildings 40 years or older, and tenants with slightly higher incomes. Since the differences were minimal, the tricounty area does seem to be representative of Michigan as a whole.

sample-tricounty comparisons

Three comparisons were made between 1980 Census data for the tricounty area and responses to three demographic items from the survey. Before such comparisons could be made, conversion to similar scales of measurement were necessary. Census information is presented for housing units, rather than buildings. "A housing unit is a house, an apartment, a group of rooms, or a single room, occupied as a seperate living quarters" (Department of Commerce, 1982, p. 1). Therefore, a duplex would contain two units, a single building with five apartments would

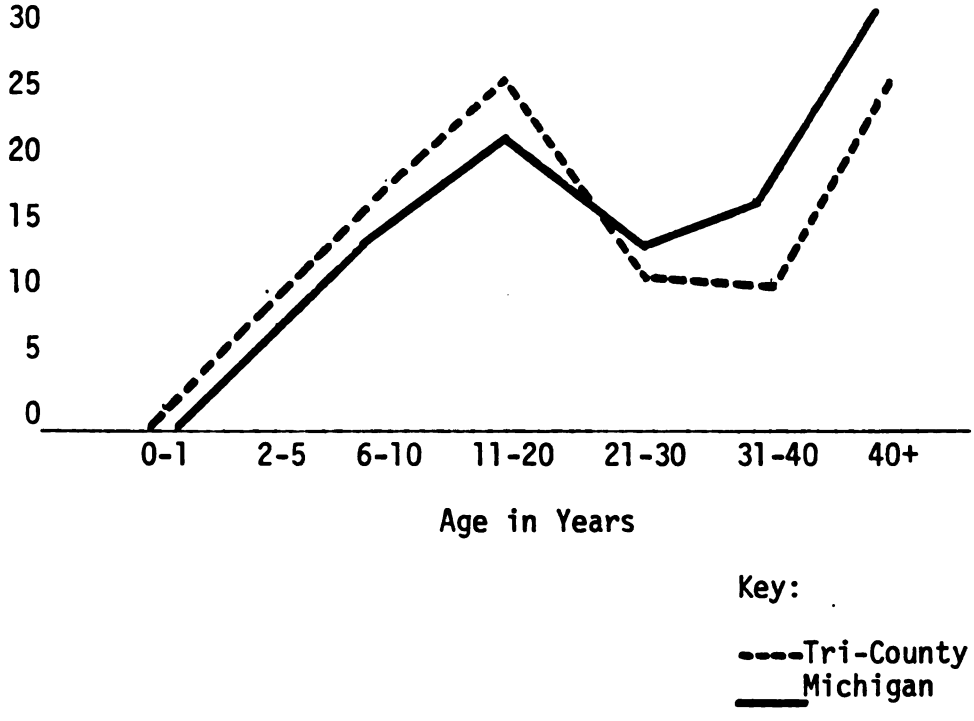

Figure 2. Age of Rental Stock for Michigan and Tri-County Area

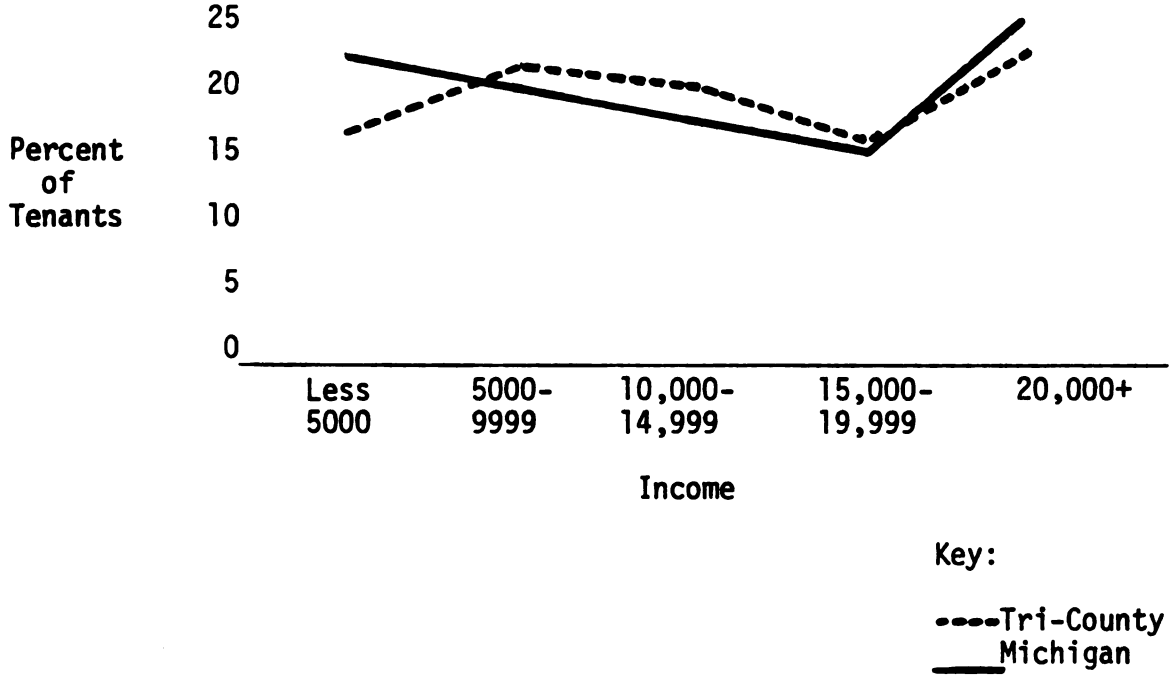

Figure 3. Tenant Income for Michigan and Tri-County Area

contain five units,etc. Since survey items were coded as buildings, conversion to units was necessary. A conservative estimate of housing units was accomplished by multiplying the number of buildings in a given category of units, by the lower limit of that category. For example, 260 buildings were reported to fall in the two-four unit range. These buildings were multiplied by two to estimate the number of units from the sample that fell in the two-four unit range. Likewise, the 50 buildings reported to contain 5-10 units were multiplied by 5. This procedure was done for all five of the unit ranges.

The first comparison is presented in table 4. This table indicates that the percentage of units in buildings of five or more are similar for the two groups. However, the percentage of units for single unit and 2-4 unit buildings are transposed for the two groups. Respondents to the survey tended to own more 2-4 unit buildings and fewer single unit buildings than the tricounty area in general.

The second comparison focused on ownership type. No Michigan specific information was available. Because of this deficiency, comparisons were made with national data presented by Booz, Allen and Hamilton (1979) concerning the ownership types of multifamily housing of 5 units or more. Table 5 presents the percentage of units across ownership types nationally and for the sample. It is clear that the primary ownership form for both groups was single proprietorship. The current research did not draw landlords with buildings of 5 units or more from the corporate or other ownership types. This is not unexpected since these ownership forms account for only 17 percent of the national ownerships. Therefore, the sample appears to be representative for proprietorship and partnership ownership forms, and

Table 4

Percentage of Units by Dwelling Type

Units	Tri-county	Sample
Single unit	29.8	14.8
2 - 4 units	18.8	30.6
5 + units	49.6	54.5

Table 5

A Comparison of Ownership Type
by Building of Five or More Units

Ownership Form	Nationally	Sample
Proprietorship	70	78
Partnership	13	22
Corporation	11	0
Other	6	0

generalizations should be restricted to these groups.

The final comparison to be made concerned utility payment. Utilities refer to space heating/cooling, lighting, cooking, and refrigeration. Unfortunately, direct comparison was impossible since identical items were not available. Indirect measures were therefore employed. Tricounty area Census data revealed that 77.7 percent of the tenants pay for one or more utilities. Survey participants reported that tenants in 64.1 percent of their buildings paid for space heating and 4.13 percent shared costs. It could be expected that this percentage would be higher when considering all utilities, since tenants may pay for lighting or cooking but not heating. It is evident from these estimates that a direct financial incentive to conserve does exist for a substantial percentage of tenants for groups of both regions. In 32 percent of the buildings owned, the landlords paid space heating costs. Therefore, a financial incentive to conserve did exist for a relatively small number of landlords.

In summary, generalizations from the sample to the tricounty area and statewide should be made with caution when generalizing across dwelling types of varying sizes and corporate ownerships. However, the sample was representative of the tricounty area in terms of direct financial incentive to conserve for tenants, proprietorship owners, and buildings of 5 units or more. The remainder of this chapter will attempt to answer the research questions posed above.

Extent of existing retrofit actions

It was important to document the extent of retrofit actions taken by the tri-county landlords to establish the potential for further savings in energy consumption. The mean number of conservation actions

Table 6

Retrofit Actions Taken in the Last Five Years (1977-1982)

Action	Percentage of Owners	Percentage of Buildings
Caulking/Weatherstripping	65.47	55.56
Insulation	56.83	46.19
Storm Windows	51.80	52.70
Lower Water Temperature	38.13	46.98
Furnace Replacement	37.41	28.89
Furnace Modifications	30.94	28.89
Low-flow Showerheads	23.02	23.17
Individual Meters	17.39	13.97
Water Heater Wrap	15.11	15.56
Other	6.52	2.22
Solar/Wind Device	1.40	0.32

taken in the past 5 years (1977-1982) was 3.4 of a possible 10, while the mean number of actions planned was less than one (.8). Eighty six percent of the landlords reported taking at least one action in the last five years. Table 6 presents the list of possible actions with the percentage of landlords who took that action and the percentage of buildings effected. The addition of caulking/weatherstripping and insulation were the two most frequently reported actions by owners. The addition of a solar/wind device was the least frequently reported action. The addition of caulking/weatherstripping and storm windows were the actions with the greatest housing market penetration. The percentage of buildings effected was 55.6 and 52.7 respectively.

Table 7 presents similar information for actions planned for the 1982-83 heating season. The addition of caulking/weatherstripping and insulation were planned most often. Noone reported planning the installation of a solar/wind device.

It is interesting to note that the planned actions with the greatest reported market penetration were hot water heater wraps and low-flow showerheads, with percentages of 24.1 and 19.7 respectively.

Thus, this sample of rental owners report to have taken some conservation actions already. However, the actons taken, with the exception of insulation, were primarily low-cost actions with limited potential for savings.

Interrelationships among actions

As mentioned previously, the completed high cost action scale was significantly related with completed low-cost actions, $r = .41$, $p < .001$. Likewise, planned high-cost and low-cost actions were positively correlated, $r = .37$, $p < .001$. This suggested that landlords were likely

Table 7

Retrofit Actions Planned for the 1982-83 Winter Season

Action	Percentage of Owners	Percentage of Buildings
Insulation	21.58	17.46
Caulking/Weatherstripping	15.11	14.29
Water Heater Wrap	12.41	24.13
Storm/Thermal Windows	11.51	3.65
Lower Water Temperature	6.57	16.83
Low-flow Showerheads	5.84	19.68
Individual Meters	2.16	0.68
Furnace Modifications	2.16	0.63
Furnace Replacement	2.16	0.56
Other	2.16	0.79
Solar/Wind Device	0.00	0.00

to take or plan both types of actions or none at all. The distinction between high and low cost actions for these landlords may have been of little utility.

Factors in the landlord's decision to retrofit

Based on the literature and conversations with several local landlords, seven factors relating to the retrofit decision were identified. Landlords were asked to rank order these factors in terms of importance in their decision to retrofit. Table 8 presents the ordering.

This ordering suggested several interesting possibilities. This ordering did not confirm the primary importance of payback periods found by Booz, Allen and Hamilton (1979) and Levine and Raab (1981). This may have been attributable to the focus on owners of five or more unit buildings by the other researchers. The current sample consisted of primarily smaller owners with a fewer number of buildings owned. Smaller owners may have been more concerned with intital costs and cash flow since they don't have large enough holdings to await paybacks of any length.

This lack of confirmation did not eliminate paybacks from the decision process. Paybacks were ranked as more important than the other decision factors of tenant behaviors and external financing. The current research was interested in examining the mediating influence of investment levels on payback periods, while earlier research had treated payback as a unitary concept regardless of the initial investment. The current study found that the mean acceptable payback period for an one hundred dollar investment was 1.8 years; for a $500 investment, 3.4

Table 8

Rank Ordering of Factors in the Retrofit Decision

Factor	Rank
Initial Investment Required	1 (most important)
Existing Cash Flow	2
Rising Energy Costs	3
Payback Periods	4
Tenant Behaviors (rent paying, energy use)	5
Available Financing Programs	6
Need for the Nation to Save Energy	7 (least important)

years; and 5.6 years for a $1000 investment. Paired t-tests between each of these investment levels showed significant differences in the number of years a landlord would wait. Therefore, as the investment level increased, significantly longer paybacks were acceptable. Table 9 presents the t-test matrix of each pair of investment levels.

Although significant differences existed between the levels, they were all highly correlated. The mean correlation among the items was .54. Thus a landlord who will wait longer for a return on investment at a small investment will also wait longer at moderate and high investment levels. Because of this high degree of interrelatedness, these items were scaled. All subsequent analysis of payback periods will use the summed scale score.

The finding that Landlords retrofit to save money, not energy (Levine et al., 1982) was supported by the ranking of national need. Also of interest was the ranking of the availability of financing programs. Factors reflecting the landlords current internal fiscal solvency (ie. cash flow, paybacks) were more important than external financing. This may have been a reflection of the high interest rates at the time of the study or the landlords' unwillingness to utilize outside financing for his business.

Barriers to retrofit

Based on the conservation literature and conversations with several landlords, ten common barriers to retrofit were identified. The mean number of barriers encountered was 3.1. Table 10 presents the barriers and the percentage of owners encountering each barrier. The two most frequently identified barriers mirrored the important decision factors.

Table 9

T-Test Matrix of Payback with Three Investment Levels

		$100	$500	$1000
Investment Levels	$100	----		
	$500	$\underline{t}(104) = -12.29$*	----	
	$1000	$\underline{t}(103) = -13.31$*	$\underline{t}(102) = -10.97$*	

* $p < .0001$

Table 10

Percentage of Owners Experiencing Barriers

Barrier	Percent of Landlords
High Cost of Initial Investment	68.7
Existing Cash Flow	63.6
Energy Wasting Behaviors of Tenants	48.7
Long Payback Periods	36.5
Lack of Available Financing Programs	32.8
Lack of Information Concerning Existing Programs	30.4
High Vacancy Rates	20.0
Lack of Information Concerning Appropriate Actions	16.5
Other Barriers	7.8

They were the high cost of initial investments and the owners existing cash flow.

Also of interest was the finding that only 16.5 percent of the owners identified a lack of information concerning appropriate actions as a barrier. Booz, Allen and Hamilton (1979) found that to be the primary barrier for owners of buildings of five or more units. In fact, more owners identified high vacancy rate as a barrier than information about actions. This is surprising since the statewide rental vacancy rate at the time of the study was a modest 7.3 percent.

Existing program awareness and utilization

Ninety-five percent of the landlords were aware of at least one program, while 65 percent were aware of at least two. These percentages confirm the low percentage of owners who identified the lack of information concerning existing programs as a barrier. Table 11 presents the available programs and the percentage of owners who reportedly were aware of them. The residential conservation service (RCS) program was clearly the most well known program. This was probably due to the extensive publicity this program received in the form of billstuffers, newspaper ads and radio and television spots.

While a high percentage of owners were aware of at least one existing program, 73 percent reported that they hadn't used any of the available incentive programs. Table 12 presents the existing programs and the percentage of owners who used them. The RCS program was utilized more often than other incentive programs. However, the use of commercial financing was utilized even more than the RCS program. This is another example of rental owners using thier own resources or common financing rather than external programs. This lack of utilization may

Table 11

Existing Conservation Financing Methods and the Percentage of Landlords Aware of Them

Program	Percent Aware
Residential Conservation Service	89.8
Commercial Financing or Bank Loans	82.8
Michigan Solar Tax Credit Program	60.6
Michigan Solar Tax Exemptions	52.2
MSHDA Loan Program	29.9
Rental Property Insulation/Weatherization Program (East Lansing Owners Only)	35.0

Table 12

Existing Financing Methods and the Percentage of Landlords Utilizing Them

Program	Percent Used
Commercial Financing or Bank Loans	27.6
Residential Conservation Service	19.3
MSHDA Loan Program	5.1
Michigan Solar Tax Credit Program	1.6
Michigan Solar Tax Exemption Program	0.8

have been explained by the fact that the existing programs have only existed for 2 years or less, while owners reported taking actions over the last 5 years. Future research must explore this awareness-utilization disparity.

Incentive program preferences

The current study attempted to identify which of 5 incentive alternatives the landlords most preferred. This would aid in future program alternatives. Landlords were asked to rank order five sample incentive programs. The loan program was the most preferred, followed by the tax credit, audit, grant and voluntary programs. The landlords also rated the likelihood that they would use each program, if available. The resulting ordering based on mean rating responses was: tax credit, audit, loan, grant, and voluntary. It was interesting that the orderings revealed slightly different compositions. One plausible explanation was that ratings allowed a preference for several programs. An examination of the rating means suggested that landlords preferred the tax credit, audit and/or the loan program. The differences between the rating means for these three programs was neglible, while the difference between them and the grant and voluntary programs were significant at the .001 level. Thus, owners may prefer anyone of the three programs, but when asked to prioritize, the loan program was most preferred.

One possible confounding factor in the program rankings and ratings was the fact that the RCS audit program was available and utilized by 23 owners. Reactions to this and other programs could have been influenced by experiences with it. However, an analysis of those who had and hadn't used the program revealed no differences in either the rating or

rank orderings. Utilization of the audit program did not appear therefore as a confound.

Relationships with key demographics

It was noted earlier that relationships between energy usage and selected demographics have been found (Olson, 1976). Based on the literature, three key demographic variables were hypothesized to have a relationship with rental retrofit decisions and were selected for further analysis. They were: number of buildings owned, dwelling type, and utility payment method. A fourth demographic, ownership type, was dropped from the analysis due to a lack of variance and the problems noted with external validity above.

Number of buildings

The number of buildings owned ranged from 1 to 41, with a mean of 4.5. This mean supports the current and future efforts to target landlords for energy conservation because of the potential market penetration. Targeting a single tenant reaches one apartment, while targeting one lanlord may reach many apartments or buildings.

The number of buildings owned was significantly related to the number of completed conservation actions, $r = .259$, $p < .001$. Those owners with larger holdings have taken more actions. This may have been due to the increased opprtunity for more actions on more buildings. Number of buildings owned was also positively related to planning the installation of low-flow shower heads ($r = .530$, $p < .001$) and hot water heater wraps ($r = .530$, $p < .001$). Therefore, larger owners have taken more actions in the previous 5 years and plan more low-cost actions in the ensuing year.

Number of buildings was moderately related to the total number of barriers experienced, r =.169, p <.036. This finding may have been due to the increased oppritunity to take actions noted above and during this process of action, barriers were encountered. Confirmation of this suggestion comes from the finding that number of barriers was related to number of actions taken (r = .22, p <.01) and actions planned (r =.29, p <.001). Thus, only those who had attempted numerous retrofit actions experienced large numbers of barriers.

Similarly, program awareness was significantly related to the number of buildings owned, r =.23, p <.005. The more buildings owned, the greater the percentage of existing programs the owner was aware of. Number of buildings was not significantly related to program preferences.

Dwelling type

Of the buildings represented, 42 percent were single unit buildings, 44 percent were 2-4 unit buildings, and 14 percent were buildings of five or more units. It was interesting to note that 37 percent of the landlords didn't fall within a single category of dwelling type ownership, but rather owned some combination of the three types. Because these owners were distributed across the three combinations, a clear interpretation of multiple dwelling type owners was not possible. In order to preserve conceptual clarity, these multiple owners were excluded from further analysis.

The current study employed a 3x2 factoral ANOVA with inndependent variables of dwelling type (1 unit, 2-4 units, 5+ units) and space heating payment (owner pays, tenant pays). The number of financial barriers encountered, differed significantly by dwelling type, F

(2,59)=4.18, p <.008. Landlords who own buildings of 5 or more units exclusively, experience fewer financial barriers. Owners of single unit buildings reported longer acceptable payback periods than owners of the larger unit buildings, F (2,47)=7.20, p <.002.

The preference for both the voluntary and loan programs differed by dwelling type ownership. Owners of buildings with 5 or more units preferred the voluntary program least, F (2,47)=3.407, p <.042. Owners of 5 plus unit buildings also preferred the loan program least, F (2,46)=6.069, p <.005. This differential preference for the loan program was not suprising since this group of owners experienced fewer financial barriers. These owners may not have been in crucial need of up-front financing.

The payment of space heating costs

Just as a single owner may have owned buildings of different dwelling types, some landlords had more than one method of paying space heating costs. In fact, 30 percent fell in the category of some combination of owner, tenant , or shared space heating payment. Additionally, less than 4 percent of the owners had buildings where the costs were shared exclusively. As before, clear interpretation of these multiple payment owners was not possible. Both these groups were excluded from further analysis.

As noted above, a 3x2 factoral design was used to assess space heating payment effects. The number of planned actions differed significantly by who paid space heating costs, F (1,70)=4.178, p <.05. When an owner paid, he reported planning more actions. Specifically, those differences were for planned ,low-cost actions, F (1,70)=4.39, p <.04. This difference was particularly true when owners paid space

heating costs in single unit buildings. Figure 4 presents the significant interaction of payment and dwelling type for planned low-cost actions, F (2,70)=6.642, p <.002.

Preference for the loan program also differed by space heating payment, F (1,46)=5.105, p <.029. Owners who paid space heating costs preferred the loan more. Since the payment of space heating costs reduces the owners existing cash flow, it is not surprising that those who pay for energy costs would prefer programs providing up-front financing.

Interrelationships among actions, barriers, program awareness and preferences

It was hoped that an examination of the interrelationships of actions and barriers with program preferences would aid in the identification of incentives that would aid different types of owners. The finding that the number of actions taken or planned was positively related to the number of barriers experienced was presented earlier. More specifically, financial barriers were positively related to both completed actions (r =.24, p < .006) and planned actions (r =.27, p <.005). Those who plan or complete actions experience more financial barriers.

Informational barriers were correlated with planned actions (r = .27, p <.002), and in particular, planned low-cost actions (r =.29, p <.001). As these owners reported encountering more informational barriers, they also reported planning more low cost actions. This might suggest that owners were unwilling to plan high-cost actions when they were unsure of what actions to take or where to obtain financing. Low-cost actions allow the owner to take some step toward saving energy

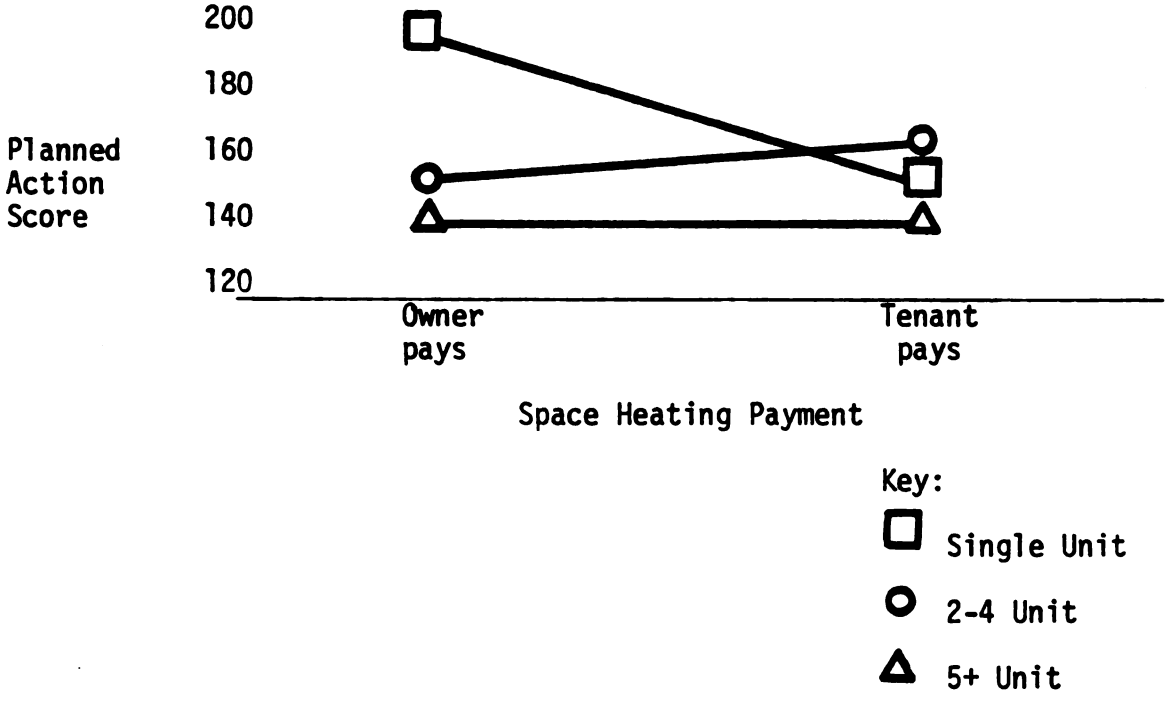

Figure 4. Significant Interaction of Space Heating Payment and Dwelling Type for Planned Low-Cost Actions

without incurring a potentially large and unwise investment.

Program awareness was related with the number of completed actions (r =.29, p <.001), but negatively related to planned actions (r =-.23, p <.004). Program awareness was also related with completed high cost actions, r =.30, p <.001. One plausible explanation for these seemingly contradictory results was that owners who completed actions, and particularly high-cost actions, became aware of external financing programs. Greater awareness was not related to future actions since high potential conservation actions had already been taken.

Program awareness was positvely related to the length of acceptable payback periods, r =.23, p <.015. Payback periods were negatively related with the number of barriers encountered, r =.25, p <.01. Those who experienced more barriers demanded shorter returns on investment.

Of particular interest were the relationship of actions and barriers with program preferences. Not surprisingly, those owners who reported having taken more conservation actions showed a greater preference for the voluntary program, r =-.2098, p <.019. The voluntary program rewarded those who completed conservation measures with a certificate of compliance.

Those who encountered more barriers had a greater preference for the loan program, r =-.26, p <.007. Financial barriers were correlated with preference for the loan program, r =-.23, p <.016. This finding supports the suggestion that up-front financing was preferred by those experiencing financial barriers in the form of high initial costs or low cash flow.

A related finding was that those who preferred tax credits would accept longer payback periods, $r = -.26$, $p < .012$. Tax credit programs require the owner to incur the initial costs, aquire a tax liability and await reimbursement. It was not unexpected that those who would prefer such a program would also wait longer for a return on investment.

Finally, greater program awareness was associated with a lower likelihood of utilization for the audit program, $r = .21$, $p < .024$. Since the available programs consisted of two tax programs and two loan programs (each providing financing) and the identical audit program, owners who were aware of programs providing financial assisitance might prefer audit programs less.

CHAPTER 4

Discussion

Program planning environment

The argument that energy policy should be developed on the local level was presented earlier (Danke & Lagassa, 1980; Levine et al., 1982). It was therefore necessary to document the local environment in which future planning may take place. The examination of existing housing information revealed that the tri-county area had a substantial percentage of rental housing units (35.1). These rental units appeared to have substantial potential for energy savings since 44% were 20 or more years old. Twenty-two percent were 40 or more years old.

While potential savings existed, it was unlikely that tenants were willing or able to take high potential, high-cost efficiency improvements. Sixty-one percent of the tri-county tenants had a 1980 annual income of less than $15,000. Fourty percent had annual incomes of less than $10,000. Levine et al. (1982) found that a commitment to retaining a building was related to the number of actions taken. Tenants do not have this commitment to the units since few stay more

than a couple of years in a rental unit.

Further support for targeting conservation incentives to landlords came from the finding that these tri-county landlords owned a mean of 4.5 buildings. Therefore, greater potential market penetration may have been achieved with landlord efforts. Not only should policy be developed at a local level, but that policy should involve landlords.

The rental units in the tri-county area covered the range of dwelling types, from one unit to five or more unit buildings. Since the applicability and cost-effectiveness of any conservation action is dependent upon the building's construction, a variety of actions were required for rental housing.

Most researchers and policy makers have defined rental housing as dwellings of 5 units or more. However, 50% of the tri-county units and 84% of the buildings represented in the current research were 4 unit or less buildings. Such a restrictive definition would exclude half of the tri-county rental market.

In addition to the difference in size and construction, space heating payment differed across dwelling types. Tenant payment was related to single unit buildings, $r = .40$, $p < .001$. Owner payment was related to 2-4 unit dwellings ($r = .21$, $p < .008$) and 5 or more unit dwellings ($r = .16$, $p < .05$). These correlations most likely reflect the metering of the buildings. Larger buildings were master metered at a single location, and owners pay this bill. Thus the direct financial incentive to conserve provided by these bills varies by dwelling type. This fact, in conjunction with significant differences in financial barriers and some program preferences suggested the need for a variety of incentives for different dwelling types.

Conservation actions

The finding that 86% of the landlords in the current study had completed at least one action suggested that rental owners did have an interest in energy conservation. This high percentage confirmed the Levine et al. (1982) finding that 97% of that sample of landlords had completed one action. The actions completed most often by the current sample (insulation and weatherstripping) were identical to those of the Booz et al. (1979) study. Weatherstripping is a low-cost, low-potential conservation mearsure. Not surprisingly, owners in that study perceived weatherstripping to be the least effective measure that they had completed. The owners in the present research were not asked to evaluate the effectiveness of actions taken. However, it is possible that the current owners had similar perceptions.

Owners appeared to have an interest in taking measures to save energy. The owners experienced financial barriers and therefore installed low-cost actions with limited effectiveness. This process may have had the effect of disillusioning owners from taking further actions. In addition to possible disillusionment, the prevalence of low-cost actions taken by the tri-county owners suggested that the potential for efficiency improvements still existed.

Owners in the Levine et al. (1982) study reported that most had financed those actions from their own operating funds. Some had borrowed financing, but were reluctant to do so again. A greater percentage of the current sample reported using standard commercial financing (27.6%) than all existing programs combined (16.8%). Since 86% of the landlords in the present study reported taking some conservation measure, a substantial proportion must have financed the

improvements from their own funds. A conservative estimate would be approximately 50%.

Since the current owners reported encountering financial barriers, and were likely to have financed any actions taken from their own funds, it was not surprising that the mean number of planned actions was less than one. While the potential for efficiency improvements existed in the tri-county rental market, it is unlikely that these measures will be taken unless some form of external financing becomes available.

Levine et al. (1982) found that owners of master metered buildings had taken more conservation actions. This was probably due to the fact that owners typically pay utility costs in these buildings. Thus, these owners had a direct financial incentive. Although completed actions did not significantly differ by space heating payment in the current sample, the number of planned actions did. Those owners who paid space heating costs planned more actions, specifically low-cost actions. This also suggested the need for external financial incentives for high-cost efficiency improvements.

The retrofit decision process

Landlords in the Levine et al. (1982) study reported that the primary motivating factor in the decision to take retrofit actions, in all cases, was financial. Although a motive for taking action was not examined directly in the present study, support did exist for the financial motive. The need for the nation to save energy was ranked as least important. The four most important factors in the current research were financed related. It appears that landlords take action to save money, not energy.

This financial motive had direct implications for those who don't pay for heating costs. In those cases, there are few dollar savings to be achieved by conservtaion for landlords. Potential policy should target these owners.

The current study focused on one particular factor in the decision process, payback periods. It was found that the length of an acceptable payback varied with the amount of the initial investment. The mean acceptable payback ranged from 1.8 years to 3.4 years to 5.6 years. Booz et al. (1979) found that 62% of those owners required a payback of 3 years or less. However, since no investment level was specified, it was unclear what that percentage means. Future research should explore the relationships of paybacks with investment levels.

Once the decision to retrofit occurred, a greater percentage of owners in the current study reported experiencing financial barriers. This finding differed from the Levine et al. (1982) and Booz et al. (1979) findings that a lack of available information regarding actions to take was reported to be the most frequent barrier. This may have been due to sample differences. The current sample had a substantial percentage of single and 2-4 unit buildings. These buildings are similar in structure to single family homes where landlords may reside. Therefore, actions appropriate at home would also be appropriate on their rental units. Secondly, 20% of the current owners reported utilizing the RCS audit program. This program's specific purpose is to tell the owner what actions are appropriate and cost effective. Thus, these owners may have been more aware of actions than those in the earlier research.

Levine et al. (1982) reported that 49% of their landlords thought that conservation actions are too expensive and 37% encountered a limited cash flow as a barrier. The greater emphasis on financial barriers for the current sample may have been explained by the Levine et al. statement, "access to capital was more often cited as a problem for owners with relatively few holdings." (p.18). The current sample was dominated by owners with relatively few holdings of limited size.

A final barrier which received confirmation was the energy wasting behaviors of tenants. Fourty-nine percent of the current owners and 34% of the Levine et al.(1982) sample reported experiencing this barrier. Landlords are unlikely to take measures to save energy if they feel that tenants are not concerned with energy usage. They are also unlikely to install measures that require tenant monitoring, such as storm windows or clock thermostats, if tenants won't use them. This suggested a need for collaboration of both tenants and landlords in a comprehensive rental conservation program.

The Program awareness-utilization disparity

One plausible explanation for the large awareness- utilization disparity in the current research was that the existing programs did not meet owner needs. The landlords' preferred a loan program. However, the MSHDA loan program had owner income restrictions as well as other eligibility requirements. These restrictions may have excluded some owners and discouraged others from applying. The second loan program, the Rental Property Insulation/Weatherization program was available to East Lansing owners only. Only 21 landlords in the current sample owned property in East Lansing. Even with such a small sample, it was

surprising that noone had used this program.

Tax credit or exemption programs require the owner to finance the initial investment, accumulate a tax liability, and await reimbursement through tax breaks. The two available tax programs for rental owners limited what actions could be completed. This limitation did not provide an incentive to any owner not wishing to take solar retrofit. The landlords rated the tax program in the current study as most favorable. The key difference was that it allowed a 20% tax credit on conservation measures of the owner's choice. If tax credit programs are hoped to induce substantial market penetration of conservation, this choice of actions should be included.

The RCS audit program was the most frequently utilized program, despite the fact that it did not include a financing component. This may have been due to the low cost for the service ($10) and the substantial publicity associated with it. The evaluation of homeowner use of the RCS program in Michigan found that those receiving the audit took more low-cost actions (Kushler & Saul, 1982). It is unclear whether landlords took action following the audit. Since these owners reported financial barriers, it is unlikely that audit programs alone can facilitate efficiency improvements.

One reason that programs may not meet owner needs is that owners are generally not included in program development. An example is the East Lansing Voluntary Conservation Program which was least preferred of the program alternatives. This program was developed without landlord input and was keyed to the city's vacancy rate. The program provided a certificate of compliance to be used as a market incentive for prospective tenants. However, few landlords perceived vacancy rates as

a problem.

The positive relationship of program awareness with completed high-cost actions and its negative relationship with planned actions may have several interpretations. One might be that as owners became aware of rising energy costs, they considered taking conservation action. They examined the existing financing alternatives and found that they did not meet owner needs. Therefore , they did not utilize conservation programs but rather standard commercial lending or their own funds. They didn't plan further actions since high-cost actions had been taken and further monetary savings from conservation may not have justified further investment. Future investment may also have been inhibited by the awareness that interest rates are high and that external financing programs did not meet their needs.

preferred incentive programs

Since the key factors in the decision to retrofit, as well as the most frequent barriers, are associated with initial investment costs, it might be hypothesized that these owners would have preferred up-front financing. Several findings confirmed this hypothesis. First, the loan program was ranked as the most preferred program. Second, owners who paid space heating costs preferred the loan program more than those who did not. Owners who pay utility cqsts have a reduced cash flow and fewer operating funds. Finally, those who experienced more financial barriers preferred the loan program.

The ranking and rating of the grant program, another up-front financing alternative, ran counter to this hypothesis. This may have been due to the required rent freeze component of this program. The 2 year rent freeze component was rated as the second least favorable

component out of a possible 20. (Program eligibility requirements for the audit program was the least preferred.) Therefore, these owners preferred programs that did not provide initial financing to a program that did, but also contained restrictions on the owners.

Landlords in both the Levin et al.(1982) and Booz et al. (1979) studies reported tax incentives as the most preferred incentives, followed by low interest loans. The facts that the current landlords rated the tax credit program as most favorable and probably preferred any one of three programs (loan, tax credit, audit) suggested that the differences between samples may have been minimal.

The results concerning the voluntary program suggested that this program would not induce owners to take conservation action. In fact, this program rewarded those who had already taken action. Not surprisingly, those owners who had taken more actions preferred the voluntary program. Owners of 5 or more unit buildings preferred the voluntary program least of all. This may have been due to the greater number of actions that must be taken to receive the certificate for larger buildings. A program developed as a marketing incentive for prospective tenants may have been little incentive when the current vacancy rate is low and not perceived to be a problem by owners. This may have been particularly true for owners of buildings with many units.

The current research did not examine landlord perceptions concerning regulatory programs or standards for reasons stated earlier. In general, landlords dislike governmentally set standards. One example in the tri-county area was the attempt of the East Lansing Housing Commission to develop conservation standards for rental housing. This attempt was defeated by strong opposition by landlords from both inside

and outside the East Lansing area. The low preference for the grant program alternative in the present study may have been due to a regulatory component.

Regulatory standards may have been necessary in areas where owners have no incentive to conserve or existing incentives fail to induce action (Levine et al., 1982). However, since financing was central in the decision to retrofit, a requirement that landlords take action without simultaneously providing financial assistance may reduce availabe rental units due to abandonment or condominium conversion. This could have adverse effects on low-income tenants who occupy much of the tri-county rental housing market.

Revision of existing rental income tax laws may have been useful in facilitating retrofit. Landlords who pay for energy costs usually have a direct financial incentive. However, this incentive can be lost since these owners can deduct energy costs on their federal taxes as operating expenses. In some cases, this deduction can result in close to total subsidation of energy costs (Bleviss, 1980). Thus, the development of conservations standards may have been useful if they include a financing component. Revision of existing tax laws and regulations may also be useful.

Summary

Substantial potential for savings exists in the tri-county rental housing market. The current research supported the targeting landlords for greater market penetration of efficiency improvements. Since the research was voluntary, the response rate demonstrated that rental owners are willing to participate in the development conservation policy.

As Levine et al. (1982) pointed out, "Landlord perceptions alone cannot shape policy or be used to design programs" (p. 27). However, results of the current study suggested that existing programs may not meet owner needs. Landlord perceptions are useful in that they may make programs more compatable with owner needs and thus increase the likelihood of utilization.

It is unlikely that a single incentive program will aid the entire rental market. Barriers, actions, and incentive preferences differed by dwelling type ownership and space heating payment. Complicating the rental market further was the fact that some landlords owned a combination of dwelling types with differing space heating payment methods. These multiple owners should be included in further research.

Just as no single program is likely to be sufficient, focus on landlords alone may not be effective. Landlords perceived tenant behavior as important in their decision process. Thus, a comprehensive rental program would include efforts with both tenants and owners.

Although the landlords perceived financial barriers, conservation action was taken by many owners. These actions are taken to save money, not energy. Thus, attention to the direct financial incentive of utility payment will be useful in policy development.

The key factors in the decision to retrofit, as well as the common barriers, were financial in nature. The primary factors concerned the initial costs. These findings, in conjunction with the program alternative responses, suggested that up-front financing would be effective. Specifically, low-interst loans or tax programs allowing the owner a choice of actions are most preferred. The addition or revision of regulatory standards may also be of use, but should include financial

assistance. A truly comprehensive rental housing conservation program would involve both tenants and landlords and include a combination of standards and incentives.

APPENDICES

APPENDIX A

ADMINISTRATIVE AGREEMENTS

ADMINISTRATIVE AGREEMENT

The following agreement pertains to the Energy Conservation and Rental Housing Project to be done through Michigan State University and in cooperation with the Landlords of Mid-Michigan. This project is an effort to determine what barriers rental owners encounter when considering energy conservation improvements and what specific incentive programs will aid landlords in making these improvements. In order that the project may be completed and that the responsibilities of all individuals involved in the project are not misunderstood, the following responsibilities of each party are hereby agreed to:

On The Part Of The Landlords of Mid-Michigan (LM-M):

1. LM-M will allow access to its membership in order to solicit voluntary participation.
2. LM-M will place an article in their regional newsletter announcing the upcoming project.
3. LM-M will invite the project director to its January meeting in order to describe the project and pilot test the proposed survey.
4. LM-M will allow the surveys to be returned to their office for collection by the project director.

On The Part Of The Research Project Director:

1. Director will assume complete responsibility for the operation of of the research project.
2. Director will maintain the confidentiality of all data concerning project participants.
3. Director will make available requested information concerning the progress of the research project.
4. Director will provide a final report of the project to the LM-M.

These agreements shall be in effect during the six months the project is expected to run, January 4 to July 4, 1982.

Landlords of Mid-Michigan:

_____ / /

Research Project Director:

_____ / /

APPENDIX B

INITIAL PILOT SURVEY

Mid-Michigan Rental Property Owner Survey

Policy makers tend to treat all rental owners as if they all have the same needs. However, characteristics such as ownership type may reflect different needs. Please complete the following background questions so that owner characteristics may be matched with appropriate programs.

1. How many rental buildings do you own? ______________

2. Of those buildings in #1, how many fall into the following categories of units per building?

   1 unit_____ 2-4 Units_____ 5-10 units_____ 11-20 units_____ 21+ units_____

3. Of those buildings in #1, how many fall into the following ownership types?

   Private_____ General partnership_____ Limited partnership_____

   Corporation_____ Management firm_____ Other(specify)_________________ _____

4. Of those buildings in #1, in how many does the:
   Owner pay the utilities for space heating? _________

   Tenant pay the utilities for space heating? _________

   Owner and Tenant share the utilities for space heating? _____________

5. Have you requested a Residential Conservation Service (utility supplied) energy audit?

   Yes_______ No_______

6. Do you own any buildings in East Lansing? Yes_______ No_______

- -

In order to establish what actions landlords are already taking, complete the following table which lists a number of conservation improvements. Indicate the number of buildings that you have done the action on in the last 5 years, or that you have specific plans to do this winter. Estimate if exact numbers are not available.

Improvement	Number of bldgs. done in the last 5 years	Number of bldgs. with specific plans
Added insulation		
Added caulking or weatherstripping		
Added storm or thermal windows		
Made furnace modifications		
Installed a new furnace		
Converted to individual metering		
Added a solar or wind device		

(continued)

Improvement	Number of bldgs. done in last 5 years	Number of bldgs. with specific plans
Installed low-flow showerheads		
Lowered water heater temp.		
Installed a water heater wrap		
Other(specify)		

To help us identify the specific problems that rental owners face when attempting to make energy improvements, please answer the following questions.

1. What are some of the specific financial barriers you have encountered?_____

_____

2. What are some of the other barriers you have encountered?_____

_____

3. A payback period is refered to as the amount of time it takes to recover the original investment from the dollars associated with the energy savings. What do you consider a reasonable payback period for your energy investment when the original investment is:

   less than$100 _____ years

   $500 _____ years

   $1,000 _____ years

4. Listed below are several factors that landlords frequently identify as important when making decisions regarding energy improvements. Rate each of these factors in terms of their importance for <u>your</u> decisions by placing a number of 1 to 5 to the right of each factor. 1=most important 2=somewhat important 3=neither important nor unimportant 4=somewhat unimportant 5=unimportant

   Intial investment_____ Available financing_____ Vacancy rates_____

   Building depreciation_____ Property assessments_____ Need for saving energy_____

   Payback periods_____ Future availability of energy supplies_____

   Other(specify)_____ _____

Valuable information can be obtained by discovering what programs have been utilized in the past. For each of the following programs available for <u>building improvements</u>, indicate whether or not you are aware of the program; and whether or not you have used it by circling the appropriate answer.

Programs	Are you aware of?		Have you used?	
Residential Conservation Service (utility supplied energy audits)	Y	N	Y	N
Michigan Solar Tax Credit Program	Y	N	Y	N
Michigan Solar Tax Exemptions	Y	N	Y	N
MSHDA Loan Program (1 to 8% loans based on income)	Y	N	Y	N
Commercial financing (usual loans at the going interest rates)	Y	N	Y	N

Program	Are you aware of? Y	N	Have you used? Y	N
Rental property insulation/weatherization (3% loans for East Lansing owners)				
Voluntary Conservation Program (certificate for voluntary compliance with a set of energy improvements)	Y	N	Y	N

Some programs provide weatherization of rental property if the tenant requests it with owner approval. Are you aware of and have the tenants of any of you buildings utilized any of the following programs?

Renter Self Help Program (cost reimbursement for improvements)	Y	N	Y	N
Weatherization and Energy Conservation Outreach (no cost improvements)	Y	N	Y	N
Low-income Home Weatherization for Renters (free energy improvements)	Y	N	Y	N

Policy makers often develop incentive programs without the input of landlords as to which programs are likely to be used. The following section will present 4 summaries of existing or proposed programs to aid landlords in making energy conservation improvements. Indicate your reactions to each by answering the questions that follow them.

Program 1: Rental Property Insulation/Weatherization Program

Owners of one to four rental units who do not own more than four properties in the city may borrow up to $2,000 per unit at 3% interest from the city to complete energy conservation improvements. Properties proposed for improvements must be shown to be rented to low-to-moderate households and must allow an energy audit to be done. Under this program, the property owner doesn't have to satisfy income restrictions.

1. What is the likelihood that you would use this program if it were available? (circle)

Definitely would use	Likely would use	Neither likely nor unlikely	Not likely would use	Definitely would not use

2. Have you been aware of this program? Yes_____ No_____

3. What do you consider to be the most favorable component of this program?

_____

4. What do you consider to be the least favorable component of this program?

_____

Program 2: Voluntary Conservation Program

Owners of residential rental property may be eligible for qualification for an Energy Conservation Certificate through the city housing commision. Buildings will qualify for the certificate after a number of verifiable improvements have been made. Each conserving action will have a corresponding number of points associated with it and the certificate will be awarded when a minumum number of points have been achieved. The certificate will be in the form of a sticker and may be renewed annualy. Upon request, an owner must present to prospective tenants or buyers a list of the improvements (supplied by the city) which qualified the property for the certificate.

1. What is the likel ihood that you would use this program if it were available? (circle)

Definitely would use	Likely would use	Neither likely nor unlikely	Not likely would use	Definitely would not use

2. Have you been aware of this program? Yes_____ No_____

3. What do you consider to be the <u>most</u> favorable component of this program?

____

4. What do you consider to be the <u>least</u> favorable component of this program?

____

<u>Program 3: Rhode Island State Income Tax Program</u>

Owners of residential rental property may take personal state income tax credit of 20% of any expenses they incur when purchasing and installing energy conservation items. The maximum allowable credit is $500 per structure, up to a total maximum of $5000. No more than $1000 may be taken in one year, although credits may be carried forward for 5 years.

1. What is the likelihood that you would use this program if it were available? (circle)

Definitely would use	Likely would use	Neither likely nor unlikely	Not likely would use	Definitely would not use

2. Are you aware of this program or others like it? Yes_______ No_______

3. What do you consider to be the <u>most</u> favorable component of this program?

____

4. What do you consider to be the <u>least</u> favorable component of this program?

____

<u>Program 4: Pittsburgh Rent Brake Program</u>

Owners of residential rental property housing low to moderate-income tenants may apply to the city for up to $2,000 per unit to make repairs that will reduce energy use. In return, owners must agree to freeze rents on these units. Owners who receive $1,000 or less must freeze rents for 1 year. Owners who receive a $2,000 grant must agree to a 2 year feeze. Under this program, owners do not have to satisfy income restrictions.

1. What is the likelihood that you would use this program if it were available? (<u>circle one</u>)

Definitely would use	Likely would use	Neither likely nor unlikely	Not likely would use	Definitely would not use

2. Are you aware of this program or others like it? Yes_______ No_______

3. What do you consider to be the <u>most</u> favorable component of this program?

____

4. What do you consider to be the <u>least</u> favorable component of this program?

____

- -

Now that you have read and considered all 4 summaries, please rank order them in terms of which would be most likely to lead you to make energy conservation improvements by placing a 1 to the left of the program that would be most likely. Then place a 4 to the left of the program that would be least likely to induce you to make energy improvements. Thenplace a 2 to the left of the program that would be the second most likely and a 3 by the program that would be the third most likely to induce you to make conservation improvements.

_______Program 1(Rental Property Insulation/Weatherization Program)

_______Program 2(Voluntary Conservation Program)

_______Program 3(Rhode Island State income tax Program)

_______Program 4(Pittsburgh Rent Brake Program)

Finally, what follows is a list of existing and suggested incentives offered to aid landlords to make energy conservation investments. Please rate each of the incentives in terms of how likely they would be to influence you to make energy improvements to <u>your</u> properties, by placing a number of 1 to 5 to the left of each incentive.

<u>1</u>=Definitely would influence <u>2</u>=Likely would influence <u>3</u>=Neither likely nor unlikely to influence <u>4</u>=Not likely to influence <u>5</u>=Definitely would not influence

_____Low cost energy audits for your buildings

_____Tax credits

_____Tax deductions

_____Property tax exemptions

_____Low interest loans

_____Conservation certificate for compliance with energy standards

_____Accelerated depreciation

_____No interest loans

_____Grants in exchange for rent freezes

_____Energy conservation improvement clauses in leases

Please make any additional comments you may have regarding energy conservation and the rental housing market and/or this survey.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

<u>THANK YOU for your time and cooperation in this effort.</u>

APPENDIX C

FINAL LANDLORD SURVEY

Mid-Michigan Rental Property Owner Survey

Policymakers tend to treat all rental owners as if they all have the same needs. However, characteristics such as ownership type may reflect different needs. Please complete the following background questions so that owner characteristics may be matched with appropriate programs.

1. How many rental buildings do you own? _____

2. Of those buildings in #1, how many fall into the following categories of units per building?

   1 unit _____ 2-4 units _____ 5-10 units _____ 11-20 units _____ 21+ units _____

3. Of those buildings in #1, how many fall into the following ownership types?

   Private _____ General Partnership _____ Limited Partnership _____
   Corporation _____ Management Firm _____ Other (specify)_____

4. Of those buildings in #1, in how many do the following persons pay the utilities for space heating?

   Owner_____ Tenant_____ Shared_____

5. Have you requested a Residential Conservation Service (utility supplied) energy audit?

   Yes_____ No_____

6. Do you own any buildings in East Lansing? Yes_____ No_____

In order to establish what actions landlords are already taking, complete the following table which lists a number of conservation improvements. Indicate the number of buildings that you have done the action on in the last 5 years, or that you have specific plans to do this winter. Estimate if exact numbers are not available.

Improvement	Number of bldgs. done in the last 5 years	Number of bldgs. with specific plans
Added insulation		
Added caulking or weatherstripping		
Added storm or thermal windows		
Made furnace modifications		
Installed a new furnace		
Converted to individual metering		
Added a solar or wind device		
Installed low-flow showerheads		
Lowered water heater temperature		
Installed a water heater wrap		
Other (specify)		

To enable us to identify those factors that are crucial to your decisions concerning energy conservation improvements, please answer the following questions.

1. A payback period is referred to as the amount of time it takes to recover the initial investment from the dollars associated with energy savings. What do you consider a reasonable payback period for your energy investment when the initial investment is:

   less than $100 _____ years
   $500 _____ years
   $1000 _____ years

2. Listed below are several factors that landlords frequently identify as important when making decisions regarding energy improvements. Please rank order these by placing a "1" by the one factor that is the most important to your decisions. Then place a "7" to the left of the one factor that is least important to your decision making. Then place a "2" by the factor that is the second most important and a "6" by the second least important. Continue until each factor has a unique rank.

_____	Initial investment required	_____	Rising energy costs
_____	Payback period	_____	Tenant behaviors (i.e. rent paying, energy use)
_____	Existing cash flow	_____	Need for the nation to save energy
_____	Available financing programs		

3. Given below is a list of barriers that landlords frequently encounter when attempting to make energy conservation improvements. Place an "X" to the left of only those that you have encountered when attempting to make energy improvements.

_____	Lack of available loan or incentive programs	_____	Energy wasting behaviors of tenants
_____	Low cash flow	_____	High vacancy rates
_____	High cost of initial investments	_____	Other (specify)_____
_____	Long payback periods		_____
_____	Lack of available information regarding what improvements to make	_____	Other (specify) _____
_____	Lack of available information regarding existing incentive programs		_____

Valuable information can be obtained by discovering what programs have been utilized in the past. For each of the following programs available for building improvements, indicate whether or not you are aware of the program, and whether or not you have used it by circling the appropriate answer.

Programs	Are you aware of?		Have you used?	
Residential Conservation Service (utility supplied energy audits)	Y	N	Y	N
Michigan Solar Tax Credit Program	Y	N	Y	N
Michigan Solar Tax Exemptions	Y	N	Y	N
MSHDA Loan Program (1 to 8% loans based on income)	Y	N	Y	N
Commercial Financing or Bank Loans (usual loans at the going interest rates)	Y	N	Y	N
Rental Property Insulation Weatherization Program (3% loans for East Lansing owners)	Y	N	Y	N
Voluntary Conservation Program (certificate for voluntary compliance with a set of energy improvements)	Y	N	Y	N

Policymakers often develop incentive programs without the input of landlords as to which programs are likely to be used. The following section will present 5 summaries of existing or proposed programs to aid landlords in making energy conservation improvements. Indicate your reactions to each by answering the questions that follow them.

Program 1: Rental Property Insulation/Weatherization Program

Owners of one to four rental units who do not own more than four properties in the city may borrow up to $2,000 per unit at 3% interest from the city to complete energy conservation improvements. Properties proposed for improvements must be shown to be rented to low-to-moderate households and must allow an energy audit to be done. Under this program, the property owner doesn't have to satisfy income restrictions.

1. What is the likelihood that you would use this program if it were available? (circle)

Definitely would use	Likely would use	Neither likely nor unlikely	Likely would not use	Definitely would not use

2. Have you been aware of this program? Yes_____ No_____

3. Indicate whether you find each component of the above program to be favorable or unfavorable by circling the appropriate answer to the right of each component.

	Favorable	Neither	Unfavorable
-1-4 units who do not own more than 4 properties	1	2	3
-Borrow up to $2,000	1	2	3
-3% interest	1	2	3
-Must allow energy audit	1	2	3
-No owner income restrictions	1	2	3

Program 2: Voluntary Conservation Program

Owners of residential rental property may be eligible for qualification for an Energy Conservation Certificate through the City Housing Commission. Buildings will qualify for the certificate after a number of verifiable improvements have been made. Each conserving action willhave a corresponding number of points associated with it and the certificate will be awarded when a minimum numberof points have been achieved. The certificate will be in the form of a sticker and may be renewed annually. Upon request, an owner must present to prospective tenants or buyers a list of the improvements (supplied by the city) which qualified the property for the certificate.

1. What is the likelihood that you would use this program if it were available? (circle)

Definitely would use	Likely would use	Neither likely nor unlikely	Likely would not use	Definitely would not use

2. Have you been aware of this program? Yes_____ No_____

3. Indicate whether you find each component of the above program to be favorable or unfavorable by circling the appropriate answer to the right of each component.

	Favorable	Neither	Unfavorable
-Certificate for compliance	1	2	3
-Annual renewal	1	2	3
-Must present list of actions	1	2	3

Program 3: Rhode Island State Income Tax Program

Owners of residential rental property may take personal state income tax credit of 20% of any expenses they incur when purchasing and installing energy conservation items. The maximum allowable credit is $500 per structure, up to a total maximum of $5,000. No more than $1,000 may be taken in one year, although credits may be carried forward for 5 years.

1. What is the likelihood that you would use this program if it were available? (circle)

Definitely would use	Likely would use	Neither likely nor unlikely	Likely would not use	Definitely would not use

2. Are you aware of this program or others like it? Yes_____ No_____

3. Indicate whether you find each component of the above program to be favorable or unfavorable by circling the appropriate answer to the right of each component.

	Favorable	Neither	Unfavorable
-20% State tax credit	1	2	3
-Maximum credit $500/structure	1	2	3
-Total maximum $5,000	1	2	3
-No more than $1,000/year	1	2	3
-Credits carry forward 5 years	1	2	3

Program 4: Pittsburgh Rent Brake Program

Owners of residential rental property housing low-to-moderate-income tenants may apply to the city for up to $2,000 per unit to make repairs that will reduce energy use. In return, owners must agree to freeze rents on these units. Owners who receive $1,000 or less must freeze units for 1 year. Owners who receive a $2,000 grant must agree to a 2-year freeze. Under this program, owners do not have to satisfy income restrictions.

1. What is the likelihood that you would use this program if it were available? (circle one)

Definitely would use	Likely would use	Neither likely nor unlikely	Likely would not use	Definitely would not use

2. Are you aware of this program or others like it? Yes_____ No_____

3. Indicate whether you find each component of the above program to be favorable or unfavorable by circling the appropriate answer to the right of each component.

	Favorable	Neither	Unfavorable
-Low-moderate households (tenants)	1	2	3
-$2,000 per unit	1	2	3
-Rent freeze	1	2	3
-No owner income restrictions	1	2	3

Program 5: Michigan RCS Program

Owners or tenants of residential rental property of 4 units or less may receive a home energy audit from their utility company. Owners or tenants of 5 or more units may request an audit, but it is up to the discretion of the utility whether or not to provide the audit. The auditor will evaluate the residence for energy efficiency, discuss low-cost/no-cost conservation practices, provide a list of possible conservation actions with their associated costs and payback periods, provide a list of lenders and contractors, and provide a packet of 5 items to aid in conserving energy. There is a $10 fee for the service and there are no income restrictions.

1. What is the likelihood that you would use this program if it were available? (circle)

Definitely would use	Likely would use	Neither likely nor unlikely	Likely would not use	Definitely would not use

2. Are you aware of this program or others like it? Yes_____ No_____

3. Indicate whether you find each component of the above program to be favorable or unfavorable by circling the appropriate answer to the right of the component.

	Favorable	Neither	Unfavorable
-Restrictions on units	1	2	3
-List of no-cost actions	1	2	3
-List of actions with associated costs and paybacks	1	2	3
-List of contractors	1	2	3
-List of lenders	1	2	3
-Packet of 5 items	1	2	3
-$10 fee	1	2	3
-No income restrictions	1	2	3

Now that you have read and considered all 5 summaries, please rank order them.

_____ Program 1 (Rental Property Insulation/Weatherization Program)
_____ Program 2 (Voluntary Conservation Program)
_____ Program 3 (Rhode Island State Income Tax Program)
_____ Program 4 (Pittsburgh Rent Brake Program)
_____ Program 5 (Michigan RCS Program)

What do you feel is needed to achieve energy conservation in the rental housing market? _____

Please make any additional comments you may have regarding energy conservation or this survey:

THANK YOU for your time and cooperation.

APPENDIX D

COVER LETTER TO LANDLORDS

February 22, 1982

Mid-Michigan Landlord Association Members
Michigan Landlord Association
520 South Washington
Lansing, MI 48910

Dear MLA Member:

As you are aware, energy prices are skyrocketing and no end is in sight. The cost of energy is steadily accounting for more of your operating expenses and/or forcing you to raise rents to nearly unmarketable levels. Energy conservation improvements can slow or alleviate these problems, but conservation improvements can also be costly. Meanwhile, policymakers continue to develop programs that are either unavailable to the rental sector or fail to meet the needs of the rental property owner.

The enclosed survey is part of a project that was discussed in the January edition of the Mid-Michigan Landlord Association's newsletter. This survey, being conducted by Michigan State University and with the support of the Michigan Landlord Association, provides you with an opportunity to express your views and concerns related to the development of energy conservation incentive programs. It is hoped that by accurately assessing and compiling your and other landlords' needs and concerns on this issue, realistic and useful programs may be developed. Not only does the Michigan Landlord Association support this effort, but it will utilize this information in its efforts to work with state and local policymakers.

You are in no way required to complete the enclosed survey. However, the alternatives to your participation are not favorable. They are to allow policymakers to continue to ignore the rental sector or to develop programs that don't meet your needs.

As a token of our appreciation for your cooperation in this effort, everyone who completes and returns the survey will be entered in a drawing for a cash prize of $50. Enclosed with the questionnaire is a sheet that provides room for your name and address. This will allow us to contact you after the drawing in early April. Your responses to the survey will be kept in strict confidence and final results will be tabulated and presented to the MLA and selected policymakers, but only in group form.

Please complete the enclosed questionnaire and return it in the preaddressed, stamped envelope. It should take you approximately 15-20 minutes to complete. If you would like to obtain a copy of the final results, enclose a note to that effect with the survey.

Thank you for your time and effort in this project. If you have any questions and/or concerns regarding this project, feel free to contact me.

Sincerely,

Glenn A. Stanton
56 Baker Hall
Michigan State University
East Lansing, MI 48824
(517) 353-5015 (MSU)
(517) 371-3481 (Home)

Mid-Michigan Rental Housing Conservation Project
Michigan Landlord Association
520 South Washington, P. O. Box 40297
Lansing, MI 48910

APPENDIX E

POST CARD PROD

APPENDIX E

POST CARD PROD

Dear LM-M Member:

During the week of March 8, you should have received an Energy Conservation Survey. If you have not yet returned this survey, please do so since each individual's response is crucial for the success of the entire project. Don't lose this oppritunity to express your views on this important topic.

Sincerely,

Glenn A. Stanton
Energy Conservation and Rental Housing Project

REFERENCES

REFERENCES

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