PROJECT MONITOR

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TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	1
INTRODUCTION	3
PART I - HOUSEHOLD CONSERVATION IN ALLEGHENY COUNTY	12
Chapter 1 - Measuring Conservation Behavior	15
Chapter 2 - Conservation and the Potential for Conservation	26
Chapter 3 - Bias in Self-Reports of Conserving Behavior	41
PART II - EXPLAINING REPORTED CONSERVATION BEHAVIOR	61
Chapter 4 - Explaining General Conservation	72
Chapter 5 - Explaining Winterization Conservation	86
Chapter 6 - Explaining Heating Conservation	98
Chapter 7 - Explaining Cooling Conservation	108
Chapter 8 - Explaining Appliance Conservation	121
Chapter 9 - Explaining Transportation Conservation	130
Chapter 10 - Explaining Electricity Reduction	140
Chapter 11 - Conclusion to Part II	153
PART III - THE IMPACT OF CRISES AND CAMPAIGNS	168
Chapter 12 - The Impact of Project Pacesetter	169
Chapter 13 - The Impact of the Coal Strike	185
PART IV - SUMMARY AND RECOMMENDATIONS	202
APPENDIX A - SAMPLE DESIGN AND SAMPLING PROCEDURES	242
APPENDIX B - MEASURING BASIC ATTITUDES	267
APPENDIX C - PROJECT MONITOR HOUSEHOLD QUESTIONNAIRE, WINTER STUDY	
PROJECT MONITOR HOUSEHOLD QUESTIONNAIRE, SUMMER STUDY	
APPENDIX D - BIBLIOGRAPHY	
ANNEX I - MARGINAL STATISTICAL RESULTS - SEPARATE VOLUME	

EXECUTIVE SUMMARY

Drawing upon personal interviews with a representative sample of Pittsburgh area (Allegheny County, Pennsylvania) adults, and using techniques of multivariate analysis, this study uncovers factors related to energy conservation. Home owners and people who worry about the energy situation, pursue non-material life styles, and value energy conservation _per se_ were found to be among those most likely to conserve in general. The characteristics of conservers varied considerably, though, from one specific type of conservation to another. The people most likely to winterize their residences were home owners and those concerned about buying things at the lowest price. On the other hand, reductions in home heating were most likely to be made by people who had been affected personally by the energy situation and who valued general conservation _per se_. The most likely conservers in home cooling were people who lived in older dwellings and the poor. The poor were also more likely to conserve in appliance and automobile usage, as were those who valued energy conservation _per se_ and those who expressed a concern for buying at the lowest prices.

The study also identifies factors related to reductions in electricity use during the coal strike, the felt impact of the strike, and the effects of Project Pacesetter, a community campaign to encourage voluntary energy conservation. Home owners, as well as people with higher incomes and more confidence in government, were among those who reduced their electric usage the most during the coal strike period. But the more important message concerning the coal strike is that the majority of respondents felt that it had not affected them at all. Even less impact was registered by the Pacesetter campaign, although it has succeeded in attracting the attention of thousands of Pittsburghers.

The findings of this study are restricted to a particular locale and time period. Nonetheless, they have important implications for federal efforts to promote energy conservation. (These implications are detailed fully in the Summary and Recommendations section.) Knowledge of the factors related to individual acts of conservation can guide planning for energy conservation campaigns. Furthermore, recognition that energy conservation levels are not dictated by immutable characteristics of people or dwellings provides the rationale for undertaking such campaigns in the first place. An understanding of current differences between conservers and non-conservers is useful in yet another way: it can provide preliminary tests of the assumptions which underlie current and proposed energy policies. The findings indicate that for certain types of energy usage, poor people conserve less and people concerned with seeking the lowest prices do not conserve more. This raises doubts about the effectiveness of pricing strategies for achieving greater conservation.

The findings of this study and the policy implications which derive from them underscore the need for more behavioral research on the energy usage of individuals. One important basis for sound energy policy is an understanding of how energy conservation is viewed and practiced by American consumers and why.

INTRODUCTION

Energy conservation has been a central concern of public policy in the 1970's, as America has had to face increasing prices for energy and decreasing control over energy supplies. A variety of important issues has arisen in connection with public policy-making concerning energy. Some of the most conspicuous are: the rôle of the government in regulating energy prices and fostering development of new energy sources, the dependence of this country upon other nations for its energy supplies, and the distribution of the burdens of increasing energy costs among American citizens. These issues of governmental role, energy independence, and equity will be with us for a long time. It seems increasingly likely that energy will continue to be a central question of public policy throughout the remainder of this century and well into the next century.

The principal goal of American energy policy today and in the future is to make energy available to American consumers at prices they can afford. Two general paths have been suggested for attaining this goal. One is for the government to refrain from intervention. This "market solution" would give free rein to supply and demand forces in the economy, with the knowledge that a dynamic equilibrium between the two will always be achieved. A major problem with this solution is that, if fossil fuels become increasingly scarce and no suitable low-cost alternatives are available (and both of these assumptions are debatable), many consumers will be priced out of the energy market. Even if this situation never fully materializes, the increasing costs for fuels will not be borne stoically by American consumers. Rather, they will seek a public rather than private solution to the energy problem, as they have been doing for some time -- in fact, for a period which substantially predates the "energy crisis" of the 1970's. In a democratic society, then, energy supply and demand questions inevitably become matters of public policy.

The second general path involves the government directly in matters of energy supply and price. Recent federal government policy concerning energy contains several different thrusts. The signal thrust has perhaps been the creation of a Department of Energy by President Carter. This act consolidated under one roof the diverse energy-related activities of the government, symbolizing the importance of energy issues in recent years. Among its many activities, the new Department of Energy has taken at least three identifiable approaches solving energy-related problems. It has pushed hard to give freer rein to market forces -- through the deregulation of energy prices -- on the premise that fossil fuel prices have been so low in the past that they stimulated waste of energy and inhibited discoveries of new energy sources. But no democratic government can pursue a totally non-interventionist policy for solving energy problems. Thus, the Department has pursued two additonal policies. First, through governmental efforts, it has attempted to stimulate research and development on new energy sources. Second, it has endeavored to persuade individual consumers of energy to be more conservation-oriented. These thrusts -- deregulation, research and development, and conservation -- are the central pillars of federal energy policy.

For all of their extensive differences, these three pillars share a common foundation in their involvement of the individual consumer of energy. The burdens of deregulation fall directly on the consumer, and certain patterns of consumer behavior are required for these burdens to be justifiable in terms of decreased energy usage. (For one thing, higher prices must reduce the demands for energy.) The benefits of research and development activities seem at first glance less dependent upon consumers, although they do pay for them, but popular acceptance is certainly necessary for most new energy technologies to be workable. The unfortunate case of nuclear power provides undoubtedly the best example of the public's role in the adoption of new energy technologies. Where the public does not accept the technology, for one reason or another, research and development activities have essentially been wasted. Finally, the most obvious consumer role lies in voluntary conservation. Extensive government and private efforts have been devoted to persuading Americans to become more conservation conscious. But, it is a difficult chore to alter ingrained patterns of behavior by relying solely on a "carrot" approach. Thus, these efforts are coupled with the "stick" of higher prices.

The prospects for success of current and future energy policies, therefore, depend to a significant degree upon the attitudes and behavior of individual consumers of energy. It is crucial that policy-makers understand these attitudes and behavior and their sources. One way to achieve this understanding is to investigate the current attitudes and behaviors of consumers, with an eye toward identifying those characteristics which distinguish conservers from non-conservers of energy.

The Project Monitor Study. This volume reports partial results of a study of consumers' energy attitudes and behavior called Project Monitor. While the primary focus of Project Monitor has been on household consumers, the study also explores the behavior of small business consumers -- both retail and manufacturing. Only the household results are discussed here. The principal goal of the study is to understand energy-related behavior at the level where the various components of energy policy intersect. Attempts are made to attain this goal by determining the extent to which various properties of the individuals and firms are associated with various amonts of conservation. In a restricted sense, it could be said that we are attempting to isolate those factors which distinguish conservers from non-conservers.

The Project Monitor study is confined to household and small business consumers in Allegheny County, Pennsylvania (the heart of the Pittsburgh Standard Metropolitan Statistical Area) during the first seven months of 1978. Professionally trained interviewers from the Universtiy of Pittsburgh's Center for Social and Urban Research conducted interviews with about 1,000 different household consumers and about 200 small business operators. The household interviews were conducted in two waves: a representative sample of the county adult population (779 respondents) was interviewed in late February, March, and April, and then 482 people were interviewed in July and early August. The second sample was also representative of the county and included 200 new respondents as well as 282 randomly selected respondents from the study's first wave. The winter interviews averaged over one hour in length, and the summer interviews lasted about forty minutes on average. The household analysis in this report is largely focussed on the first wave sample. The second wave sample is reserved as a summer baseline for future phases of the study.[1] The small business interviews were conducted between late February and early May, concurrently with Wave I of the household study but by differently trained interviewers. They averaged slightly less than an hour in duration. In all, we completed 92 personal interviews with small manufacturers and 94 with small retailers. In neither case did we attempt to draw representative samples of the respective populations. Rather, our intention was to conduct an exploratory study -- designed to develop hypotheses more than to test them.

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[1] Our contract with the Department of Energy was to fund the first phase of a planned two-phase study. Therefore, we designed our data collection efforts in anticipation of future work with each of the samples.

The limitation of this study to a particular site and point in time, of course, constrains the generalizability of its results. This disadvantage, though, is at least partially counterbalanced by several advantages of our design. First, selection of a single site enables one to "hold constant" important situational factors in energy usage. The weather, the mass transit system, energy prices, and coal strike effects were constant factors in this study, whereas the same factors would be highly variable in a multi-site or national study. This greatly simplifies analysis and renders tne identification of other important factors in energy conservation much easier. A single-site study enables us to probe more deeply into these other factors, without needing to worry about problems of equivalence across quite different research sites.

A second advantage of a study such as ours is that we had more control over the field work than we would have had in a study with a more national scope. We were able to hold lengthy weekly meetings with the interviewers and to gain almost instant personal contact with them when special problems arose. This control undoubtedly reduced interviewer bias in the study. Finally, Allegheny County is the scene of a major private campaign to promote energy conservation. One of the initial objectives of the Project Monitor study was to monitor this campaign, called Project Pacesetter, and to attempt to assess its results. Due to unforeseen changes in the Pacesetter campaign, we were unable to realize this objective fully. Nonetheless, the existence of the Project Pacesetter campaign at the time of our study constitutes a third advantage--an excellent opportunity to include such an effort as one of the possible influences on energy conservation behavior.

Knowledge of the correlates of conservation behavior is, we believe, critical for any energy policy. Individual behavior in the energy area lies at the foundation of such policy, as we pointed out above. Extensive efforts are required to understand that behavior in terms of the individual attributes, situational factors, attitudes and perceptions associated with it. Because these forces are not independent of one another in the real world, multivariate analyses which recognize these interdependencies are necessary to isolate the important factors. We certainly can not claim to have fully explained energy conservation, even among Allegheny County household and small business consumers. Yet, we do believe that our findings, in supporting some explanations and rendering others improbable, constitute a useful first step towards understanding energy conservation behavior in Allegheny County and in America.

Organization of the Report. The report is organized into five parts and a set of appendices. Part I introduces the measures of household conservation to be used in the subsequent chapters. In Chapter 1, we develop multiple-item measures of seven types of energy usage from our respondents' self-reports on energy usage. The next two chapters turn away from these multiple-item measures to discuss the distributions and the reliability of the self-reports which underlie them. Chapter 2 discusses levels of conservation in Allegheny County and the potential for future conservation, at least in the short run. Chapter 3 uses more objective measures of conservation than the self-reports to estimate the reliability of a number of the self-reported measures.

Part II is the heart of the report. The basic analysis in the chapters of this section relates each of the types of energy conservation -- general, winterization, heating, cooling, appliance, transportation, and electricity reductions -- to twenty-four demographic, situation, attitudinal, and perceptual variables in the household sample. We present both the simple correlations between each of these "independent" variables and the "dependent" measures of conservation and the results of multivariate regression analyses which estimate the effects of the independent variables simultaneously. The objective of this analysis is to determine the characteristics which differentiate conservers from non-conservers, so that we can identify ways to promote more conservation. Chapters 4 through 10 contain the analysis for each of the types of conservation, respectively. Chapter 11 summarizes the results of the preceding seven chapters.

Our attention in Part III turns to the impact of two exogenous events on household consumers during the period of our study. The first, Project Pacesetter, was a privately financed community campaign to induce voluntary conservation in Allegheny County. The Pacesetter campaign was launched in early fall of 1978 and continued throughout the course of our study. It seems likely that it will continue for at least several more years. Chapter 12 offers a limited appraisal of the impact of Project Pacesetter on the respondents in our study. Whereas a Pacesetter-like campaign was unique to the Pittsburgh area, the other exogenous event considered in Part III was common to many other areas but unique to the particular time period of our study. We refer, of course, to the United Mine Workers' strike against the coal operators -- another in a series of energy crises to hit this nation in recent years. Chapter 13 considers the impact of the "coal strike" on household residents of Allegheny County.

Part IV summarizes our findings and then uses them in support of [illegible] of recommendations regarding energy conservation policy. While these recommendations are based on a study conducted in a single research site and at a specific point in time, we are confident that most of them would be supported by replications of our study in other settings and at other times.

Finally, the main body of the report is supplemented by four appendices. Appendix A details the methodology of our field work. Appendix B discusses the creation of the attitudinal variables used in the analysis. Appendix C contains the various questionnaires used for gathering the data of the study.

Appendix D provides full bibliographical citations of the works referred to in the main body of the report and an extensive annotated bibliography on energy policy research and related topics.

Acknowledgements. A large number of people have contributed to the Project Monitor study. We would like to take this opportunity to express our appreciation for their efforts.

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The staff at the University Center for Urban and Social Research provided valuable assistance in the field work and data preparation phases of the project. Without Philip Windell, who directed the field work and wrote the initial draft of Appendix A, this study could not have been successfully completed. We are also grateful to Pat Williams who assisted in the management of the field work, and Lyn Proehle who supervised the data processing for three of the four survey studies and helped to design the instrument and coding procedures for Wave II of the household study. Laurie Fowler, Sandy Creighton, and Steven Manners provided critical data processing assistance; and Toni Guzik provided administrative assistance. Beyond them, we are grateful to the many interviewers whose skill and perseverance enabled us to collect extensive data on conservation from well over one thousand Allegheny County citizens.

Others contributed to the study in more limited, but important, ways. Through the office of Alan Fisher, Associate Provost for Research, the University of Pittsburgh made significant financial contributions to the study. We are also grateful to Mary Ann Krempasky and her firm, Guide-Post Research, Inc., for their work on a pilot study and in preparation of the final Wave I questionnaires. Finally, gas and electric utilities in Allegheny County -- Columbia Gas, Duquesne Light, Equitable Gas, Peoples Gas -- were very helpful in fulfilling our requests for utility bill records of those respondents who had signed release forms.

Perhaps the largest debt of gratitude is owed to our respondents -- these 879 household residents and 186 businessmen and women who endured a lengthy interview process to provide us with extensive information on themselves and their energy usage. It is our hope that the results of our study will contribute to an easing of their energy problems in the future.

Finally, we must express our appreciation to Jeffrey Milstein, our contract officer at the Department of Energy. He made important contributions to the design of our study, wisely permitted us to make the necessary design corrections when it became apparent that the initial design was not appropriate, and provided useful advice all along the way. His support has been essential to this study.

PART I

HOUSEHOLD CONSERVATION IN ALLEGHENY COUNTY

The first step in a study of the differences between energy conservers and non-conservers is to measure energy usage. Energy usage is relatively easy to gauge in the aggregate. Overall consumption figures can be obtained from energy producers and utility companies. To be sure, problems must be overcome in the collection of these statistics, but all in all it is a task which has been accomplished. By contrast, it is very difficult to measure the energy consumption of a particular individual. We could gather reliable data, of course, by closely monitoring the individual's consumption over a specified time period. We could read his utility bills, monitor his gasoline purchases, and the like. But, given the different circumstances of individuals, it would be almost impossible to translate these figures into indices of conservation practice. Furthermore, the direct method of data collection violates the right to privacy of Americans, and it is rightfully restricted as a matter of public policy. Without such direct observation of individual consumption, and to take into account the diverse circumstances of Americans, we are forced to rely on less direct methods of estimating individual conservation behavior.

How to estimate energy conservation was a prime concern of the Project Monitor study. We were concerned both with what types of energy usage to measure and precisely how to measure each. We chose to engage in a broad-gauged study of conservation by focussing on many different types of energy usage activity. This choice made us even more dependent on indirect measures, for they are considerably more efficient in gathering basic data on conservation and are not restricted to only a few types of activity. The principal measurement method was to simply ask our respondents what their behavior was across a variety of activities. While this method was very efficient, its obvious disadvantage was its unreliability since respondents could be expected to exaggerate their conservation in the interview setting.

Cognizant of the unreliability problems of the self-reports, we employed more direct measures of energy conservation where we could. Among these measures were factual questions about activities, placed in those parts of the questionnaire devoid of a conservation emphasis, unobtrusive observations of activity (such as thermostat settings), and utility bills. Unfortunately, these measurements could be taken for only a minority of the specific conservation activities we wished to study. They also required much more effort to collect and, hence, were considerably less efficient than the self-reports. Even so, they serve as excellent baselines against which to gauge the reliability of the self-reports.

Part I of this report focusses on the measurement of energy conservation in Allegheny County households. Chapter 1 discusses how multiple-item measures of basic types of energy usage were derived from respondent self-reports. We opted for the multiple-item measures to heighten reliability. The results in Part II confirm that this objective was achieved: our model does far better in accounting for variance in the indices than in the individual items. This chapter is placed first in the report to emphasize the multiple-item measures as the best estimates we have of energy conservation. The remaining two chapters of Part I return our attention, for the last time in the report, to the individual items. Chapter 2 considers each self-reported activity alone in order to determine the levels of and opportunities for conservation in Allegheny County. Chapter 3 addresses directly the question of the reliability of the self-reports. The other measures of energy-related behavior are employed here to show that reliance on self-reports will not significantly alter our findings. This chapter then paves the way for the extensive analysis in Part II of the differences between conservers and non-conservers, using self-reports of energy activity and consumption.

Chapter 1

Measuring Conservation Behavior

Energy conservation is a multi-facetted activity, involving decisions that range across a wide variety of contexts -- the kind of automobiles people drive and how they drive them; heating, cooling, and insulation of the home; use of electricity in general and appliances in particular; and a variety of other activities (e.g., recycling). This study is focussed broadly on many of the activities involved in energy conservation. It examines energy conservation as a general activity involving any of a number of different activities to reduce energy usage. It also studies different types of energy conservation, differentiated by the object of conservation -- automobile, home, heating, cooling, appliances, electricity. By examining conservation as both a generic activity and a series of possibly unrelated activities, we should be able to understand better what conservation means to householders, and perhaps of even greater importance for a rational energy conservation policy, what factors are conducive to conservation, both generally and specifically.

examined in this study. Our principal measures of conservation are multiple-item indices derived from self-reports of energy usage. This chapter discusses how these indices were developed. We also gathered evidence on energy usage in a fashion which relied less on self-reports. Chapter 3 uses this evidence to gauge the reliability of the self-reports.

The Conservation Indices. Our principal measures of energy usage are derived from responses to specific questions about twenty different energy-related activities. In both waves of the study, respondents were asked whether they were doing or had done a particular activity (such as keeping their thermostat at 68° F. or below). Wave I respondents who replied affirmatively, further, were asked if they would continue doing this activity or do it again. Respondents who were not doing or had not done a particular activity were asked to estimate the likelihood that they might perform the activity in the future. Questions about fourteen of the activities were asked, in essentially the same form, in both waves of the study. The other six questions were generally devoted to winter activities in Wave I and to summer activities in Wave II.

These self-reported activity measures are analyzed extensively in subsequent chapters of this report. Chapter 2 examines them individually, focussing on both the percentages who already conserve and the likelihood that non-conservers will conserve, to determine the levels of conservation in the Pittsburgh area and the potential for conservation there. Because of the substantial response error which is likely to appear in any single report of activity, though, the more effective analytic strategy is to consider these individual activities as multiple measures of various types of conservation. Thus, we have created six different indices of conservation: general conservation, winterization, heating, cooling, transportation, and appliances. Part II of the report examines the demographic, situational, attitudinal, and perceptual correlates of these measures of conservation.

The distributions for each conservation index are reported in subsequent chapters. Based on these data, the greatest conservation can be shown to occur the heating and cooling areas. For heating, conservation lies in what our respondents say they have done with their thermostats to keep the heat down. Conservation in cooling, on the other hand, lies in what people have not done -- more precisely, the fact that only a minority of Pittsburghers own and operate air conditioners.

Conservation is least evident in the areas of transportation and winterization of homes. Many people in our sample were quite reluctant to reduce the use of their automobiles for the commute to work or to purchase economy cars. Similarly, there was a reluctance to undertake the usually expensive winterization of homes through insulation. Apparently, a great deal more conservation could be achieved in these areas, if only ways could be discovered to alter patterns of behavior.

The six indices of conservation described above were created rather arbitrarily by grouping activities which involved the same general type of conservation. The theoretical similarity of the activities is sufficient cause for treating them together. For some of the indices, furthermore, there is empirical justification for combining the various measures. The heating, cooling, and winterization indices contain individual activities which go together behaviorally. Practice of one activity tends to lead to practice of another, as is evidenced by the positive intercorrelations among all the activities contained in each index. These intercorrelations are all significantly different from zero and range in magnitude from .11 (between wall insulation and storm windows) to .46 (between running the air conditioner always and setting it at 72° or below). For these three indices, it can be assumed that the activities tapped in our questionnaire represent an underlying continuum of conservation. We shall use the three indices without any reservations about what they measure.

The empirical justification for the transportation and appliance conservation summary indices, unfortunately, is not so solid. In each case, some activities were included which bore little or even a negative relationship to others in the index. For appliances, it was ownership of a frost-free refrigerator which did not appear to fit well with the other two activities involving use of particular appliances. For transportation, on the other hand, the problem was the low intercorrelations among most of the activities rather than negative relationships, although some of them appeared as well. Only 3 of 15 intercorrelations between pairs of activities exceeded .10, though they were all positive. Indeed, all 4 significant correlations were positive, which is a good sign of similarity of items. Unlike the case for the appliance index, then, transportation does not combine unlike activities, thus undermining the notion of a single specific dimension or continuum of conservation. Rather, the transportation index combines activities which are quite independent of one another. Substantively, this provides evidence that our respondents do not see the transportation-related activities as of a piece when it comes to conservation. They tend to see the use of trains and buses similarly, carpooling and buying an economy car are practiced together, and driving the car within the speed limit and not for short trips go together. Transportation conservation is simply a more complex phenomenon than the other types of conservation. Embedded in it, apparently, are at least three different types of decisions -- to use mass transit, to economize on the use of the car, and to purchase economy cars. Oddly, participation in a carpool goes together with purchasing an economy car and not the more theoretically similar activities of driving within the speed limit and not driving on short trips. Perhaps these latter two activities are not really seen as conservation-related by our respondents. The one is simple obedience to the law, the other may be an established practice which predates recent concerns with conservation of fossil fuels.

The final measure we shall employ in our analysis is a count of the number of conservation activities the respondent performs. Combining the individual items in this fashion rests upon our subjective judgment that each activity involves conservation. However, our respondents do not always see things this way -- or, at least, there does not appear to be a single underlying continuum of conservation along which they are positioned. Rather, it is apparent from the preceding analysis that our respondents are quite inconsistent in their activities, conserving in some ways while not conserving in others, often equally easy or easier, ways. From this evidence alone, it may be concluded that the first step toward a conservation ethic in America -- judging performance of activities by the extent to which they conserve -- has not been taken.

Even though a single neat continuum of conservation activities does not emerge in our analysis, there is good reason for combining most of the activities into a single index of conservation. Of the 190 pairwise intercorrelations between the 20 conservation activities, almost 30 per cent (52) are significant at the .05 level. Only 5 of these intercorrelations are both significant and negative. Finally, there is no activity which does not possess a significant and positive intercorrelation with at least one other activity in the set. Vacationing by bus and train is least like the others: it is significantly correlated with four other items, but only one of these correlations is positive. No other activity is characterized by more negative than positive significant relationships with the remainder of the set.

No activity emerges as a criterion activity for conservation, possessing significant and positive intercorrelations with every other item in the set. Shutting off heat in unused rooms, perhaps because it is purely an act of conservation comes closest, enjoying significant positive relationships with 9 of the other 19 activities and no significant negative relationships average correlation with the other activities is a significant, though not large, .09. Lowering the heat before bedtime and not running an air conditioner all of the time are a bit less characteristic of the set of activities. They pass the threshold used above in 7 cases and enjoy .05 and .10 intercorrelation averages with the other items, respectively.

The inferences drawn above about the existence of underlying continua of energy conservation are supported in a more systematic examination of the activity intercorrelations, using the powerful technique of factor analysis. The results of a principal factor analysis (Nie et. al., 1975, pp. 479-480) and a varimax orthogonal rotation of the factors which emerged, are presented in Table 1.1. For purposes of presentation, only those loadings which attain the magnitude of a significant (at the .05 level) correlation coefficient are retained. The loadings may be interpreted as expressing the correlation of each activity with the underlying factor listed at the top of the column.

The principal factors analysis was performed to determine how well a single factor or continuum could summarize all of the activities. As would be expected from the preceding discussion, a clear first factor does emerge. It explains 11 per cent of the total variance in the items, more than twice the variance (5 per cent) that could be explained by chance alone. All items but one (purchase of frost-free refrigerators) enjoy a loading on this principal component which passed the .05 significance threshold we have used for correlation coefficients. But, two items (vacationing by bus or train and commuting to work by public transit) had loadings which were negative. Thus, these two activities do not warrant inclusion on a single dimension of conservation. We shall later see that the reason for this is that they are modes of travel selected by the poorer members of American society because of their lower cost, not their conservation of energy. Indeed, these members of our society are not conspicuously oriented toward conservation, being among the least conserving respondents where other matters are concerned. This result leads us to utilize a measure of overall conservation which excludes the three activities -- use of public transit, vacations by bus or train, and ownership of a frost-free refrigerator -- which were not positively or significantly

TABLE 1.1

Factor Analysis of Activity Variables

Items	PRINCIPAL FACTOR	VARIMAX SOLUTION 1	2	3	4	5	6	7	8
Use storm windows	36		10	60				-9	9
Weatherstrip	33		16	45	13	-10			
Install wall insulation	26		54	10	12				
Install roof insulation	43		72	17			9		19
Lower thermostat at night	25				46				-9
Set thermostat at 68 or less	28				55				15
Shut off heat in unused rooms	35		21		41		20	10	
Run air conditioning	52	79				10			
Set air conditioning	42	54				27	28		
Use fans	17	29				-12			16
Hot water setting	28	9					48		
Wash/dry with full loads	31	22	9		14	-34	29	-16	
Frost free refrigerator	5					51		- 4	
Drive at 60 or less	29	20				22	33		-9
Walk short trips	9	12				26	9	9	
Buy economy car	13			14			15		28
Use public transit	7					9		56	
Carpool	13		11			-13	-9	15	33
Take bus/train vacation	-12			-31				38	
Recycling	14								39
% of Total Variance Explained	11								
% of Common Variance Explained		27	22	11	10	10	8	6	5

related to the underlying conservation continuum. We call this measure general conservation, since it reflects the number of conserving activities performed.

We next rotated the axes in the principal factors solution to achieve greater differentiation among the factors, using a varimax procedure. Given what we already know about the activity intercorrelations, there is no reason to expect the varimax solution to produce clear and theoretically distinct factors -- and it does not. Rather, only two factors pass the common criterion (an eigenvalue of 1.0 or better) for retention of a factor. The first of these has the three cooling activities as its highest loading constituent items, thus justifying the theoretically-derived grouping of these items. The index formed from them is called cooling. The second factor contains the two insulation activities, plus some other activities generally involved in conserving on heat in the home.

Of the remaining factors, only one other produces a factor structure which closely resembles one of our indices. The three activities involving home heating all enjoy loadings above .40 on this factor, and no other activity has a loading above .14. Thus, empirical justification is provided for an index based on these three items. We call it heating. The four activities used to measure winterization produce an interesting pattern in the factor analysis. They each enjoy significant loadings.on two factors (2 and 3), although some other activities also load on each of these. This result is due to the restrictions employed in the varimax rotation to keep the reference axes at right angles to one another. When these two factors are plotted against one another, and the items located in terms of their loadings on each, it is very clear that a 45° axis running between them (which might be produced by an oblique solution) would contain the four with high loadings and all other activities would have low loadings. In other words, the results of factor analysis can support an index which combines winterization activities as well. We call this index winterization.

As would have been expected, there is little empirical justification for grouping the appliance usage activities or the transportation activities to create indices of conservation. The absence of consistently positive and substantial correlations among these two sets of items and their failure to cluster in a factor analysis means that the respondents in this study do not consider them similarly, and certainly do not behave consistently with respect to them. Nonetheless, the conceptual similarity of the activities in each grouping provides a substantive, if not an empirical basis, for considering them together. Thus, the number of appliance conservation activities performed is used to index appliance conservation, while the number of transportation activities constitutes the index of transportation conservation. As will be seen later in this report, appliance and transportation are not particularly well accounted for by the independent variables we have selected. Surely one reason for this is that they are not particularly strong measures initially If respondents were more inclined to regard the activities in these two indices, respectively, as "of a piece," we would probably be more successful in explaining why some people perform them and some do not.

One additional measure of self-reported conservation is used in the analysis reported in subsequent chapters. This is the index of electricity reduction. Wave I of our study was conducted during a lengthy coal strike which had serious implications for the supply of electricity in Allegheny County. About half of our respondents were interviewed during the strike period, and the remainder were interviewed so soon after the strike had ended that they could easily remember their behavior during the strike. To determine how residents of the Pittsburgh area had responded to pleas to conserve energy during the coal strike, we asked them four questions about cutbacks in electric usage since the beginning of January (1978). We asked if they had recently reduced the lighting in their homes, outdoor lighting, television viewing or stereo/hi-fi listening, and usage of electric home appliances. To construct the electricity reduction index, we simply counted the number of areas in which the respondent made some reduction in electric usage. An additive index of this sort is fully justified, for the four electricity reduction items are significantly and positively correlated with one another. Of the six inter-item correlations, five exceeded .25 and the sixth was .18. All six were easily significant at the .001 level.

Table 1.2 summarizes the seven indices of conservation activity constructed from respondent self-reports of their energy usage. Each of the items contained in the index is listed below the index name. Beside the item is listed the correlation of that item with the composite index score. These additive indices will be the dependent variables for our analysis of the factors which differentiate conservers from non-conservers in Part II of the report.

Conclusion. This chapter has developed measures of energy conservation for six different types of energy usage. Self-reports of conservation achieved on a number of specific activities of each type were combined for each measure. We also developed a composite measure of conservation. These measures are the central focus of Part II of the report. Before launching this analysis, though, we shall return to an examination of each individual energy usage activity. The next chapter estimates the immediate potential for conservation in each. Chapter 3 then compares selected self-reported activities with more objective measures of the same activities so that the reliability of the self-reports can be assessed.

TABLE 1.2

Construction of Multivariate Conservation Indices

Items	General Conservation	Winterization	Heating	Cooling	Appliances	Transportation	Reduced Electricity
Use storm windows	.41[a]	.64					
Weatherstrip	.42	.60					
Install wall	.31	.57					
Install roof insulation	.43	.70					
Lower thermostat at night	.33		.68				
Set thermostat at 68 or less	.38		.70				
Shut off heat in unused rooms	.38		.70				
Run air conditioning	.30			.66			
Set air conditioning	.23			.73			
Use fans	.22			.72			
Hot water setting	.15				.48		
Wash/dry with full loads	.29				.44		
Frost free refrigerator					.66		
Drive at 60 or less	.27					.35	
Walk short trips	.19					.49	
Buy economy car	.31					.45	
Use public transit						.49	
Carpool	.25					.45	
Take bus/train vacation						.40	
Recycle	.26						
Reduce indoor lighting							.68
Reduce outdoor lighting							.66
Reduce TV/stereo use							.64
Reduce appliance use							.71

[a]Entries are the correlations of the row item or variable with the index designated by the column heading. Empty cells indicate that the particular item was not included in the index designated by the column heading.

Chapter 2

Conservation and the Potential for Conservation

The decade of the 1970's has witnessed a rising interest in the importance of energy conservation in America. In the early part of the decade, political leaders began to emphasize the importance of conservation for the public. Conservation has been encouraged in order to prevent the United States from running out of fossil fuels at some future time, to hold down price increases for fossil fuels and their substitutes, and to restrict American dependence upon foreign nations for critical raw materials such as oil or natural gas. In more recent times, conservation has been encouraged for yet another reason: to help to reduce the American trade deficit and restore the dollar as a sound currency in world markets. Thus, there is ample reason for individual Americans to conserve in their energy usage. If the pleadings of American leaders are to be believed, the practice of conservation implies the twin virtues of patriotism and foresight. As energy prices have increased, and continue to increase, conservation also has the advantage of being a money saving activity.

While Americans seem to have made some moves in the direction of greater conservation in the last decade, and the increasing energy appetites of the 1960's have been restrained, the extent of energy conservation among the American public has been disappointing. The major task of this study is to determine what the differences are between those who have conserved and those who have not so that we can begin to understand why conservation has not been more widespread. This task will be the focus of Part II of the study, and the indices of energy conservation constructed in the previous chapter will be the data to be explained. Before launching into that analysis, though, it is worthwhile to examine the individual energy usage activities to determine how much conservation has taken place in the Pittsburgh area and what the potential may be to conserve in the immediate future. It is that examination which will serve as the subject of this chapter.

Conservation in Allegheny County. The respondents in our study were asked to report their activity for twenty different types of energy usage in both the winter and summer parts of the study. For nine activities, reports were elicited at both time points, although the response alternatives were changed slightly. The other eleven activities differed between the two time points. Winter activities received more emphasis in the winter study, whereas summer activities were emphasized more in the summer. Additionally, we used the summer study as an opportunity to sharpen our measurement of conservation. Thus, where our measures had not proven to be entirely satisfactory in the winter survey, we constructed alternatives in the summer.

The levels of conservation reported for each activity serve as indicators of the amount of conservation which has been undertaken by Pittsburghers. As we shall see in Chapter 3, though, these self-reports tend to be exaggerated -- especially where transportation is concerned. For this analysis, the activities have been grouped into six categories by type of activity -- transportation, winterization, heating, cooling, appliance usage, and other. The first five categories have been measured in Part II by additive indices based on the winter activities within each category. The percentage of our respondents who have conserved on each separate activity is presented (for both the winter and summer studies) in Table 2.1.[1]

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[1]Where the same activity has been measured at the two time points, we have an opportunity to check on the sampling reliability of our estimates. The winter study, of course, produced a representative sample of Allegheny County residents. The summer study, in spite of the partial panel design, may also be treated as a representative sample of that population. Thus, in essence, we are comparing two samples drawn from the same population. Of the nine activities for which direct comparisons can be made, only two produce substantially different estimates at the two time points. Twelve per cent fewer report driving

TABLE 2.1

Self-Reported Energy Conservation[a]

TRANSPORTATION	WAVE I	WAVE II
Drive at 60 MPH or less on the highways	81.0[b]	69.0[b]
Automobile not air conditioned	X	71.4
Do not usually drive on trips of less than 1/2 mile	57.3	62.4
Purchased economy car	37.1	34.5
Regularly take public transit to work	25.9	X
Regularly take public transit	X	27.4
Regularly carpool to work	23.9	X
Regularly carpool	X	17.0
Take vacations largely by bus or train	18.3	X
Take vacations by bus	X	18.1
Take vacations by train	X	8.7
Take vacations without driving own car	X	38.5
Changed vacation plans to save gasoline	X	8.5
WINTERIZATION		
Use storm windows or thermopane on most windows	61.3	66.6
Repair weatherstripping before each winter	54.9	X
Increased attic/roof insulation to recommended levels	29.0	38.8
Had insulation blown into walls of home	13.5	22.6

[a]Unless otherwise noted, the base for the percentage is all respondents in the sample.

[b]Those who do not drive are eliminated.

TABLE 2.1

(continued)

HEATING	WAVE I	WAVE II
Regularly lower thermostat at night in winter	61.9	58.3
Regularly set thermostat at 68° F or below in winter	57.8	62.7
Shut off heat in unused rooms in winter	53.1	X
COOLING		
Do not run air conditioners constantly in hot weather	90.1	X
Do not air condition home to 72° or less	80.0	X
Use fans to cool the home in summer	64.2	X
Turn air conditioning off when leaving house for 2+ hours or don't use air conditioning	X	69.2
Use air conditioning only on hottest summer days/ nights or not at all	X	71.4
Do not air condition home to less than 78°	X	69.9
APPLIANCES		
Do not set hot water heater at maximum temperature	89.3	X
Wash and dry with full loads only	81.1	X
Do not own a frost-free refrigerator	39.4	40.5
Set hot water heater at lowest temperature setting	X	29.5
OTHER		
Take newspapers or cans to recycling center	21.7	X

These data show enormous variation in conservation across the various activities. Over 80 per cent of our respondents report driving at 60 MPH or less on the highways, not running air conditioners constantly in hot weather, setting hot water heaters below the maximum temperature, and washing and drying only with full loads. By contrast, there are six activities in which over 50 per cent of our respondents do not conserve. Significantly, five of the six involve transportation and reflect strong attachments to the automobile as the primary means of transportation. The sixth is having insulation blown into the walls of the home -- a conservation activity for which there is some doubt that the benefits outweigh the costs in the Pittsburgh climate.

The variation in activity is the greatest in the transportation area. Most Pittsburghers drive at the lower speeds, which does save energy. However, this can not be construed as strictly a conservation activity. After all, it is now illegal to drive over 55 MPH on the highways, although most states allow a 5 MPH grace zone. If the speed limit were to be raised, we do not doubt that the high degree of conservation achieved here would vanish. A majority of our sample appears to conserve on only two other automobile-related activities. Most people do not own air conditioners in their automobiles, and thereby conserve their usage of fuel. However, this does not indicate purposive conservation of fuel: rather, the choice of not owning an automobile air

at less than 60 miles per hour on the highways in the summer. We attribute this difference to a subtle change in question wording -- from asking, in effect, how many break the law to asking how many comply with it. It is little wonder that fewer people will directly admit to breaking the law than will admit to it indirectly. Almost 10 per cent more people report increasing attic or roof insulation during the summer. In this case, the question was exactly the same at the two time points, although the response alternatives were a bit different. It seems unlikely that so many more people would have undertaken to insulate their roofs or attics in the short space of four or five months, and before insulation tax credits had been approved by the Congress, but the possibility that some did can not be dismissed. After all, conservation on this activity can not decrease and should grow steadily since a fixed investment is involved.

conditioner indicates a desire simply to decrease the expense of fuel. Finally, most of our respondents walk on short trips.

For the other ten activities, the preponderate percentage of our respondents do not conserve. Only a third have purchased economy cars, and fewer than three in ten take public transportation to work and on vacations or carpool to work. It is clear from these results that there is considerable room for additional conserving behavior in the use of the automobile. Indeed, as we shall show in Chapter 3, even these modest levels of conservation are inflated. It should be equally clear, given the strong emphasis on transportation conservation in recent years, that it is very hard for Americans to achieve. We remain firmly wedded to the habit of driving, and it is unreasonable to expect major changes to take place without considerable disruption of an established life style.

The picture is much better for the other types of conservation. A majority of our respondents use storm windows or thermopane and weatherstrip on a regular basis. By contrast, a much smaller number has insulated the home (either in the roof or the walls), most likely reflecting the considerable financial investment which is required to do so. Where heating and cooling activities are concerned, majorities report that they perform every activity. While more could conserve here, it is clear that one threshold in conservation (the majority threshold) has already been passed. This is an important threshold, for it might produce pressures on the minority to conform to majority behavior. Pittsburghers are virtually the model of conservationists in cooling their homes during hot weather, principally because most do not own or operate air conditioners. Appliance usage conservation falls somewhere in between heating/cooling and winterization. A decisive majority conserve in using the hot water heater (though not as much as they could, as is indicated by the bottom row in the Appliances set) and the washer and dryer. On the other hand, the attractiveness of frost-free refrigerators has made non-conservers out of another majority.

Recycling activities warrant special attention here because we shall not discuss them in subsequent analysis. About one in five Pittsburghers report that they have taken newspapers or cans to some center for recycling. This is an impressive amount of conservation activity because of the time and effort which is involved and the absence of tangible rewards for the behavior. If these reports are to be believed, it means that the recent closing of some major recycling centers in the Pittsburgh area will have a significantly negative effect on conservation.

Based on these reports of energy conservation activity, it is fair to say that individual conservation is concentrated at the margins of energy usage. When behavioral change of more than modest proportions is involved, Pittsburghers have held back. Most people will not alter established patterns of behavior for the purpose of conserving energy. Conservation would involve the restriction of automobile usage, a sizable investment in insulation, or the foregoing of the convenience of a frost-free refrigerator. This is hardly a new story: the push to conserve competes with an American life style which was built around the virtually unrestricted usage of energy. It is little wonder that so much resistance has arisen when people are asked to alter their energy consumption behavior.

The data presented in Table 2.1 apply only to the Pittsburgh area. A question immediately arises as to how representative Pittsburghers are of all Americans. While no strictly comparable data exist against which to judge the results from our sample, rough comparisons can be made using data reported by Milstein (1975, 1976) on national samples of Americans at earlier points in time.

Where transportation usage is concerned, it is clear that Pittsburghers are much more conserving. Whereas about 26 per cent of them take public transit to work and about 24 per cent carpool, the national figures are 8 and 10 per cent, respectively. These differences surely reflect the metropolitan concentration of our sample. Pittsburgh's particular types of traffic flows make carpooling possible, and there is an efficient mass transit system. Other metropolitan areas with similar transit systems should look very much like Pittsburgh.

The mesh between the Pittsburgh figures and Milstein's data is far closer in the winterization and heating areas, the only two other types of conservation for which comparable data exist. About half of the respondents in the national study use storm windows and weatherstrip each year. Our figures show that use of storm windows is higher in the Pittsburgh area, while yearly weatherstripping is practiced about equally. One suspects that if respondents in warm weather areas were pulled out of the national sample, the results would be even more equivalent for storm window usage. Finally, 48 per cent of the respondents in the national study who have thermostat controls report that they set their thermostats at 68° or less. When this number is adjusted to reflect all respondents, the percentage is 58 -- a percentage which is markedly similar to both our winter and summer reports. Pittsburghers appear to be quite like all Americans in their reported setting of the thermostat.

If we depend upon self-reports of conservation alone, however, we are apt to overestimate the amount of conservation that takes place. It is well known that Americans, inclined to want to place their own behavior in the best possible light, exaggerate their conserving activity. Milstein (1977) has called for measures of energy usage which are less dependent upon self-reports in order to arrive at more accurate estimates of conservation. Following his suggestion, we have incorporated a number of alternative measures of conservation into our study -- ranging from interviewer readings of thermostats to alternative ways of gathering self-reports. Chapter 3 will focus on how these more objective measures compare with the self-reports and what the likely sources of bias are in reporting conservation behavior.

The Potential for Conservation in Allegheny County. Before discussing the bias in reporting, though, we shall make use of some of our materials on reported energy usage in a slightly different way. In the first part of this chapter, respondents were divided into those who reported conserving versus those who reported that they did not. In the remaining part of the chapter, we shall deal with the likelihood of conservation among those who report that they do not now conserve. These data were produced by a follow-up to our initial question about energy usage. Respondents who did not engage in a particular conserving activity were asked how likely it was (on a scale of very likely, likely, unlikely, very unlikely, and would not consider) that they might perform the activity within the next year. Omitted are those activities in which the question was reversed: respondents being asked if they performed a nonconserving activity. Also omitted are summer survey results, where the change in question format changed the nature of this part of the question.

Table 2.2 reports the percentage of respondents in our sample who said that they were either very likely or likely to conserve out of those who do not already conserve. The people in these two likelihood categories are already considering the activity. That they are already considering an activity suggests that one of the barriers to conservation (dispositional forces) has already been overcome. Public and private encouragement for conservation is most likely to be effective with them. Moving these people into the category of conservers is the most immediate challenge of energy conservation efforts.

TABLE 2.2

The Potential for Conservation

	Reported likely or highly likely to conserve of ...		
	Present non-conservers	All respondents	Index of conservation potential[a]
Increase attic/roof insulation	42.2%	24.4%	10.3
Repair weatherstripping each year	49.7[b]	19.6	9.7
Recycle newspapers and cans	35.1[b]	27.0	9.5
Use storm windows/thermopane	52.8[b]	15.9	8.4
Purchase an economy car	36.9	21.1	7.8
Increase wall insulation	27.0	20.0	5.5
Regularly carpool to work	27.2[b]	16.8	4.6
Shut off heat in unused rooms	26.6[b]	10.7	2.8
Vacation largely by bus/train	13.5[b]	10.9	1.5
Lower thermostat at night	21.3[b]	7.1	1.5
Regularly take mass transit to work	14.6[b]	8.3	1.2
Set thermostat at 68° or less during day	17.8[b]	6.4	1.1

[a]The index was formed in following fashion:

$$\frac{(\text{Column 1 \%}) \times (\text{Column 2 \%})}{100} = \text{Index Score}$$

[b]The base on which this percentage was calculated includes those respondents who reported that they had done but would not do again the activity in question.

The second and third columns of Table 2.2 contain additional useful indicators of the potential to conserve. Column two shows those likely to conserve as a percentage of all respondents. This figure reflects the overall potential of an effective campaign to persuade people to conserve, since it takes into account those who are already conserving. The third column contains probably the most useful figures of all. By forming the product of columns one and two, we arrive at a crude index of conservation potential which reflects both the willingness of non-conservers to conserve and the absolute size of the non-conserver group. Both of these factors must be taken into account in judging the potentials of conservation campaigns.

The message of Table 2.2 is unambiguous. The greatest potential for energy conservation in the short run lies in the winterization area. All four winterization activities were included in the table, and they ranked among the top six activities on the index of conservation potential. Additionally, the top two activities both involve winterization, as do three of the top four. Thus, there is no doubt that considerable immediate conservation could be realized by persuading those many Pittsburghers on the verge of winterization to carry out their intentions. Passage of the energy bill, containing tax credits for winterization investments of almost any sort, may have had a substantial impact on the activity of these potential conservers since we interviewed them. One surmises that cost is a substantial hurdle for them, and the energy bill reduces the cost of the activities. Beyond the bill, better information on the benefits of winterization and what is required for adequate winterization might pay handsome dividends since so many are already favorably disposed to the activities. Some of our respondents who wanted to insulate, for example, reported being perplexed because of the variety of estimates of what they needed and what it would cost. Federal efforts to clarify these matters would be helpful.

Relatively high potential for conservation lies in two other areas -- purchases of economy automobiles and recycling. While recycling is not particularly widespread now, there are many Pittsburghers who seem favorably disposed toward it. This is a reflection of attitudes toward general conservation, for recycling does not directly involve conservation of energy -- certainly not conservation which is of direct benefit to the individual. Nonetheless, to the extent to which recycling has socially useful benefits, more efforts should be undertaken by governments (national, state, and local) to encourage it.

Many Pittsburghers also appear to be favorably disposed toward economy cars and substantial conservation can be realized by persuading people to purchase them. Indeed, the potential (at least over the short run) for conservation in the use of the automobile seems restricted to changes in the types of cars that people drive. There is little to be gained in calling for alterations in the habits which have been developed in use of cars. Carpooling, vacationing by bus or train, and using mass transit fall well below buying economy cars on the index of conservation potential.

That carpooling outranks the other two activities suggests, in turn, that people are more willing to give up driving their own car to work in exchange for riding in some other car than they are to give up the usage of a car altogether. The message from these results also seems clear: the greatest immediate gains are to be realized in substituting economy for non-economy cars and in encouraging car sharing. The potential for further conservation here, though, is not as great as in the case of winterization activities.

Finally, it is of considerable interest that so little potential for conservation appears in the home heating area -- aside, of course, from the savings that can be realized through better insulation of the home. Lowering thermostats and closing off unused rooms show very little potential for conservation.

People seem to feel that they are already doing enough in this area. Even among those who clearly do not satisfy the well-advertised standards for conservation here, there is little inclination to use less energy. This suggests that governmental leaders' exhortations to conserve through reducing thermostat settings may be falling on deaf ears or, possibly, that those who would respond to them have already done so. There is simply not much reason to expect substantial changes in the home heating area.

Conclusion. The preceding analysis has examined the level of conservation and the potential for further conservation among residents of Allegheny County. While there are admittedly problems in generalizing from a single site and a single time, there is good reason to believe that the findings uncovered here are not unique to the Pittsburgh area. At the very least, they should apply to other northern metropolitan areas.

What are the implications of these findings for federal energy policy? We see two different ways to answer this question. The first part of the chapter dealt with how much conservation (self-reported) has already taken place and leads to inferences about what policies have already achieved success. The second part of the chapter examined the potential to conserve for a sub-set of the activities and supports suggestions about what policies are likely to be successful in the immediate future. Of course, we have omitted any considerations of long-range strategies for enhancing energy conservation. Too many factors are indeterminable over the long run for us to be able to gain a good appreciation of how Americans or Pittsburghers are likely to react to particular policies. In this sense, then, our study is surely time bound.

Where conservation accomplishments to date are concerned, the picture is a relatively clear one. Substantial conservation has been achieved at the margins of energy usage -- in heating the home, in the restricted use of air conditioning, and in appliance usage. But where conservation has required significant alterations in life style, it is conspicuously absent. The best example of this comes in the usage of the automobile. Pittsburghers remain very attached to their cars in spite of the considerable energy drains that are associated with it. In this respect, they are probably little different from most Americans. Some gains have been made by convincing people to buy economy cars and to drive at lower speeds on the highways in compliance with the new speed limit laws. But, we have a long way to go to persuade people to give up the comforts of the automobile in the trip to work or the convenience of driving vacations. In this area of energy usage where tremendous savings could be achieved, little headway has been made.

Another example of savings achieved only at the margins of energy usage is in the home heating areas. There is substantial evidence that people are attempting to conserve in their use of the thermostat for home heating and in cooling. But, the benefits to be derived from better insulation of the home are not realized by many, although a clear majority do report that they use storm windows. The major constraint here would appear to be investment cost. Not only may many Pittsburghers refrain from insulating because of the lack of financial means to make the investment, but they may also conserve in the cooling area (perhaps against their wishes) because they can not afford air conditioning. Federal policies which lower the effective cost of insulation and heighten that of air conditioning should accentuate these patterns and lead to greater conservation than has been obtained up to now.

The picture is also quite clear where the potential to conserve becomes the object of study. Automobile usage, except to some extent for purchase of economy cars, exhibits very low potential. This is in line with the limited amount of conservation already practiced in this area. Winterization activities, on the other hand, have relatively high potential for immediate conservation. This finding supports even more subsidies for winterization investments (now a fact at the federal level and also in some states). Indeed, we surmise that if we were to interview our respondents again, many of them would have moved out of the potential conserver category where winterization was concerned after the passage of the federal energy bill.

Chapter 3

Bias in Self-Reports of Conserving Behavior

This study of energy conservation among Pittsburghers relies upon respondents' reports of their energy conservation activities. Self reports are the only reasonable way to gather information on a wide variety of energy-related activities in the survey setting without invading the privacy of people to an unacceptable degree. Nonetheless, there is considerable doubt about the reliability of self reports of energy conservation (Milstein, 1977). Many Americans, wanting to cast the best possible light on their own behavior, may tend to inflate the extent of their conservation. For many, conservation is a valuable social activity. It should not be at all surprising that these people will want to appear conservation-oriented in the eyes of the interviewers. Anecdotal information provided by our interviewers provides a most compelling illustration of this: a few respondents, when told by the interviewer what the study was all about, immediately turned down their thermostats or made excuses for high settings on that particular day.

Biased self-reports of conservation have the potential to cause two different kinds of difficulties for an analysis of energy conservation. First, inflated estimates of individual conservation make it difficult to gauge how much conservation is currently being practiced -- and, more critically, of what types. Because aggregated usage figures are available from other sources, however, this is not so critical a problem as it might seem at first glance. For estimates of actual usage, these aggregate figures should be relied on instead of sample estimates. The more serious difficulty lies in the possibility of a systematic bias in over-reporting of conservation among certain demographic, situational, and attitudinal groupings within the population but not others. Such a pattern to the bias in reporting makes it very difficult to determine the differences between conservers and non-conservers. Greater reported conservation among the more highly educated, for example, may be the result of greater actual conservation <u>or</u> a greater tendency to inflate conservation.

The problems of bias were recognized from the outset of our study. We were very conscious of them in designing the questionnaire and in instructing the interviewers. In both cases, we tried to minimize our own endorsement of conservation. At various points in the questionnaire, non-conserving behavior was legitimized. At the beginning of the interview, we asked our respondents to sign an agreement that they would be truthful in their responses. Also, we varied the directions of our questions, so as to reduce agreement response set. Finally, our interviewers were instructed to be as supportive of non-conserving responses as they might be of conserving responses. Due to these extensive efforts to reduce bias, we feel that we minimized bias in self-reports about conservation. In rating respondents' honesty at the termination of the interview, indeed, the interviewers felt that only <u>17 respondents</u> had been less than forthcoming in their answers to questions.

Beyond these efforts to insure honest replies to our questions, we took special measures to check the veracity of some of the reports of energy usage. As we shall see, these efforts paid handsome dividends, for they allowed us to estimate the degree of bias in the self-reports and its impact on our findings.

The interviewers made direct observations of home temperatures and the use of storm windows. The temperature observations were of several varieties: the temperature was determined on the interviewer's own thermometer and from the thermostat the interviewer read the temperature at the time, the daytime and

and (if applicable) the nighttime settings. We use the interviewer's report of the thermostat setting here. The interviewer was also asked to determine, by examining the residence from both outside and inside, what percentage of the windows in view were covered by storm windows or thermopane. These objective measures provide the data for a first test of the reliability of the self-reports.

It is important to realize that while these "objective" measures may lack the bias present in self-reports, they are not necessarily free of error themselves. Our interviewers' thermometers proved very sensitive to temperatures -- changing their readings in different parts of the residence and even in different spots in a single room. They could also be influenced by the interviewer's body heat. Great care was taken to standardize use of these thermometers, but the human factor was always a possible source of problem in gauging home temperatures in this way. Even more difficulties arose in the estimates of window coverings. Some homes had curtains drawn from the inside, making it impossible for our interviewers to see the windows unobtrusively. Many interviews, further, were conducted at night, when it was not possible to see the windows clearly from the outside. For all of these problems, however, we are confident that we have obtained reasonably accurate objective estimates of indoor temperature and use of storm windows.

The verification of self-reports of energy usage was approached in another, less objective, fashion. For two types of energy usage, we asked respondents to report their activities at more than one spot within the questionnaire. Questions about the kind of refrigerator(s) in the home and the cars owned (economy or not) by residents were asked in the section on conservation activities, where the conservation referrent was probably apparent, and then earlier in the interview in a quite different context. The tendency to inflate conseration is undoubtedly far less pronounced where the response is elicited by a matter-of-fact question without any conservation overtones. Thus, we can use these questions on refrigerators and cars as a second test of reliability.

Finally, for four other energy-usage activities, an indirect estimate of reliability can be fashioned. Before the series of questions eliciting self-reports of conservation began, we asked our respondents to estimate the quality of their wall and attic insulation. When they estimated it to be less than adequate, it seems reasonable to assume that they had not insulated, although a few of them may have been in the process of doing so. Thus, most of those respondents who later reported insulation activities after having said that their current insulation was inadequate can be suspected of having inflated their conservation. We also asked our respondents to cite the number of people in their family, including themselves, who shared a ride or used mass transit to go to work. When they responded by saying "no one," it seems reasonable to infer that a later report that they carpooled or took mass transit themselves was untruthful. Thus, by identifying the logically impossible response combinations, we can fashion a third test of reliability for the self-reports.

Reliability in Self-reported Energy Usage. This section focusses on the results from our reliability checks for the eight activities cited above. To summarize the preceding discussion, it can be said that our checks are of three types -- comparing the self-reports, in turn, with objective and direct and indirect reports under a different set of conditions. In each case, we take the self-report provided in response to the activity series of questions as the response to be judged against a more objective standard. The difference between the two is the measure of reliability. For reasons which will be obvious as we discuss each measure, a reliability coefficient in correlation terms is not generally calculable. Rather, the percentage of respondents who appear to have inflated, or over-reported, their conservation in energy usage will be our measure of unreliability in self-reported conservation. While we have not been able to test the reliability of all twenty reports on activities, eight reports we can test represent all of the types of conservation but one (cooling of homes) and will provide us with a good sense of the extent to which response inflation can disturb our basic findings.

Table 3.1 displays the over-report percentages for the eight activities. In every case, there is evidence of inflation in reported energy conservation. Our respondents, on the whole, appear more conserving in response to the series of questions explicitly tied to energy usage and conservation than in response to questions asked earlier in a different context or by our objective measures. This result is hardly surprising. What is surprising is that the magnitude of the inflation is not particularly high. In no case does the percentage of those who seem to be inflating their conservation exceed 23 per cent of the entire sample. And there is reason to believe that even this figure may conceal as much confusion as deception. Most people appear to be telling the truth.

The first entry in the table compares the respondent's report on daytime temperature setting for the thermostat with the interviewer's reading of the daytime setting. (Other "objective" measures of temperature setting are discussed later in this chapter.) In about 23 per cent of the cases, the respondent's report did not coincide with the actual setting on the thermostat. For about 9 per cent of the respondents, the setting was at 68° or below even though they said that they set it above that figure. This leaves only 14.2 per cent of the respondents who actually inflated or exaggerated their compliance with

TABLE 3.1

Estimated Over-reporting of Conservation

Self reports compared with interviewer reports	% of respondents inflating conservation
Thermostat Settings	14.2%
Use of Storm Windows/Thermopane	8.4
Self reports compared with earlier reports on the same activity in non-conservation context	
Own Frost-Free Refrigerator	7.5
Own Economy Car	22.5
Self reports compared with indirect indicators of conservation activity or the need to conserve	
Insulated Roof/Attic	3.7
Insulated Walls	1.9
Share a Ride to Work	18.6
Take Mass Transit to Work	20.9

the President's encouragement of settings at 68° or below. If this figure is discounted by those who under-exaggerated, assuming a random error component to the responses, we obtain about 5 per cent of the sample who can actually be said to have exaggerted their conservation. Random response error aside, then, the bias in reporting appears small.

The next entry in the table compares the respondent's report on use of storm windows/thermopane with the interviewer's observation. Here the evidence points to even less over-reporting than was the case for thermostat settings. The total of over 8 per cent who can be said to have over-reported is almost matched, furthermore, by an almost equal number of respondents (7.8 per cent) who under-reported their usage of storm windows. For this activity, the most plausible inference is that virtually all of our respondents were truthful, perhaps because this is something which can be easily checked. What appears to be unreliability seems more attributable to interviewer error, since it is distributed evenly between over-reports and under-reports. Respondent self-reports seem highly reliable here.

Once we move beyond these first two entries in the table, we enter a domain in which the reliability checks are less dependable, since they are based upon a comparison of respondent reports at two different places in the interview. Even so, there continues to be less over-reporting of conservation behavior than might be expected. Respondents were asked twice if they owned frost-free refrigerators: once in a series of questions about appliances, the other time in the conservation series. The responses of about 12 per cent of the respondents did not agree across these two measurements: 7.5 per cent did not admit they owned frost-free refrigerators when to have answered "yes" would have made them appear less conserving. Discounting this figure by errors in the other direction, which could be due to the lack of strict equivalence between the two questions, we arrive at a very modest estimate of real over-reporting: 3.3 per cent of the sample.

To estimate over-reports in the use of economy cars proved more difficult. At one point in the interview, respondents were asked to give the make, model, year, and mileage (in town and on the highway) of each car they owned. Using average highway miles per gallon, we arbitrarily designated as economy cars, those which attained at least 20 MPG -- a generously low figure. Owners of economy cars by this measure were then compared with those who claimed to own an economy car in the conservation section of the questionnaire. The highest level of exaggeration in all of our measures is achieved here: over one-fifth of our respondents reported owning (or were currently purchasing) an economy car even though they had no car that attained better than 20 MPG on the highway. Of course, a few of these respondents may have been in the process of buying such a car. Furthermore, slightly below 6 per cent of the respondents denied owning an economy car when they really did by our measure, thus yielding a pattern of response error which (when applied equally to the other responses) lowers the over-reporters by 6 per cent. Even when these "corrections" are employed, however, there still remains a substantial number of people who have over-reported their conservation in the transportation area. That over-reporting peaks here may signify the importance of the car in American life and may explain why we are least successful in accounting for conservation behavior in Part II of the report.

The final four entries in Table 3.1 are based on indirect estimates of over-reporting. In the two insulation cases, respondents were asked to judge the quality of the insulation in their homes. Those who replied that it was less than adequate but who then claimed to have insulated (or to be insulating) were coded as over-reporters. A fraction of them may really have been in the process of upgrading their insulation, but other data in the survey lead us to believe this fraction is very small. Even without this assumption, there is almost negligible over-reporting where insulation is concerned. About 4 per cent of the sample said that they had insulated their roof even though their earlier report was that their roof insulation was inadequate; about 2 per cent were in a similar situation where wall insulation was concerned. We feel secure in attributing almost all of the over-reporting to insulation in the process of being installed. There is no significant inflation here.

The amount of over-reporting seems higher, by contrast, when sharing a ride or taking mass transit to work is involved. Early in the questionnaire, respondents were asked to enumerate the number of people in their family who made use of each mode of travel to get to work. They were instructed to include themselves in this enumeration. Those who said "no one" and then reported later that they shared a ride or used mass transit were coded as "inflaters." Unless they misunderstood the question and forgot to include themselves in the count (and this is a possibility), their two responses are inconsistent -- an inconsistency which emerges, we think, because they wish to appear more conserving than they really are in response to the conservation series of questions. Around one-fifth of the respondents are classified as over-reporters in each case. We suspect that some so classified had really forgotten to include themselves in the count for the earlier question. For one thing, such a high level of over-reporting is completely out of character with our estimates of reliability for the other activities. Yet, for these activities we can not write off the inflation to this factor entirely. This is yet another sign that there is more unreliability in reporting on use of the automobile than elsewhere.

The findings for auto usage are discrepant enough from those for the other activities to require further comment. Several reasons may be offered to explain why so much exaggeration appears when reporting the usage of an automobile is concerned. First, carpooling and use of mass transit are not the "either/or" activities that the others are. Some of the respondents have shared a ride or have taken the bus at times during the year. Leaving it up to them to define what is meant by "regular" usage of these modes of travel to work leaves substantial room for the discretion of the respondent. It seems hardly surprising that this discretion is exercised to make the respondent appear more conserving. Second, the cars designated as in the "economy" class change with each model year, and it is possible that some respondents bought a car as an economy car even though its MPG rating is low by current standards. Yet there is still room for exaggeration. The automobile lies at the center of the American way of life. While most Americans know that considerable energy can be saved in their automobile usage, they are very reluctant to change their behavioral patterns. One can imagine that many feel some guilt about this -- a guilt that is translated into inflated estimates of how much they do conserve.

Except in the transportation area, there is little evidence in our data of significant over-reporting of conservation activity. Over-reporting occurs in virtually every case to be sure. But the number of respondents exaggerating their conservation is, for most activities, quite small, making the estimates of conservation to be derived from our data reasonably reliable. This is not the case, however, where auto usage is concerned -- a fact which may help to explain the weak explanatory power of our model of transportation conservation. It is clear that further work to develop reliable measures of transportation conservation is necessary.

Systematic Bias in Over-reporting. That there is a tendency to over-report energy conservation across all eight of the activities for which we can gauge reliability should hardly be surprising. Conservation has become an important norm in American society. More and more Americans pay attention to it, although in many cases this attention is little more than mere "lip service." This over-reporting means that estimates of conservation based on survey reports are likely to be inflated. The ones in our sample certainly are. But it is quite another question whether this inflation is patterned by the characteristics of the respondents. If the over-reporting is randomly distributed by respondent characteristics, attempts to explain conservation behavior using these characteristics will yield meaningful results. The only effect of response unreliability, since it is random, will be to deflate the magnitudes of the coefficients of relationship. On the other hand, if the over-reporting is patterned according to certain respondent characteristics, attempts to explain conservation become more problematic. Relationships can emerge due to real sources or error sources, and it will be difficult to distinguish the one from the other in this case. Thus, it is important to determine the correlates of the over-reports of conservation behavior. This is the topic for this section of the chapter.

Our method for determining whether a pattern exists to the over-reports of energy conservation anticipates the analysis of Part II of the report. The relationships between over-reports and twenty-four predictor variables are examined. These predictor variables are of four types: 6 reflect the demographic characteristics of our respondents, 3 measure home situation, 4 tap perceptions of the energy situation, and 11 represent various attitudes which seem relevant to energy conservation. The dependent variable for this analysis, though, is different from what it will be later. Here we have dichotomized all responses for the eight self-reports on which we have reliability tests into those that are over-reports and those that are not. To determine the patterning of the over-reports, we have simply performed multiple regression analysis of these dichotomized variables on the 24 predictors. The results of this analysis are reported in Table 3.2.

The message of Table 3.2 is very clear. There is very little systematic patterning to the over-reports of energy conservation. For only two of the eight variables is the regression equation itself significant at the .05 level, and one of these (the one for mass transit usage) is barely significant at that level. Beyond that overall result, very few of the predictor variables achieve individual significance. Five of these lie in the two significant equations, while the other five are scattered across three equations. Furthermore, in no case does a predictor variable turn up as significant on more than one occasion.

Over-reporting is patterned the most systematically for mass transit conservation. Two variables, income and age of residence, achieve significance in the equation. People with higher incomes seem more apt to say that they have used mass transit regularly when it appears, from a more objective measure, that they have not. People who live in older residences are likewise more guilty of over-reporting. The latter relationship is very difficult to account for because type of residence should have no bearing on transportation usage except that it is related to residence within the city -- a variable not included in our equation.

On the other hand, the relationship for income is more interpretable. People with higher incomes are more likely to perceive energy-related problems and to have attitudes supporting energy conservation. But, at least where transportation is concerned, we later find them to be less conserving (see Chapter

TABLE 3.2

Explaining Over-reports of Conservation[a]

Demographic Variables	Frost Free	Economy Car	Share Ride	Mass Transit	Insulate Roof	Insulate Walls	Storm Window	Thermostat
Sex								-.12
Education							.17*	
Income				.11				
Age							.13	
Race								
Income Decline								
Situational Variables								
Age of residence				.17				
Size of residence								
Ownership of residence	-.11							
Attitudinal Variables								
Political Confidence	-.09							
Political Trust								
Sophistication								
Energy Conservation					-.13			
General Conservation								
Cost Consciousness								
Non-Materialism								
Energy Concern								
Innovativeness								
Companies Not Cause	-.11							
Perceptual Variables								
Energy Impact								
Coal Strike Impact							-.10	
Pacesetter Recognition								
Group Encouragement								
OVERALL R^2	.05 (NS)	.04 (NS)	.08 (NS)	.10 (.05)	.06 (NS)	.06 (NS)	.09 (.05)	.07 (NS)

[a]Table entries are standardized or Beta regression coefficients. They are presented only when significant at the .05 level and are starred when significant at the .01 level. The significance level for each equation is provided at the end of the column, below the R^2 figure. NS refers to not significant.

9). Given their attitudes and perceptions, the behavior of the higher income respondents may well indicate some feelings of guilt. This guilt may be translated, in turn, into exaggerated reports of usage of mass transit. That a similar pattern of bias does not appear for the other two transportation variables, however, reduces the problem that this finding poses for our analysis in Chapter 9. It appears that the bias due to income is restricted to the mass transit component of the transportation index.

There is also some systematic patterning to the bias where use of storm windows is concerned. More educated and older respondents are apt to inflate their conservation in this area. So too are those who perceived no impact of the coal strike which was taking place during the period of our interviewing. We are hard pressed to explain the latter relationship; fortunately, it is the smallest of the three. But, one explanation for the findings with education and age makes sense: older and more educated respondents are more aware of the energy situation and more supportive of conservation in general. While they are not non-conservers on the average, the non-conservers among them may feel more guilt about their behavior and be more prone to exaggerate to our interviewers. That these patterns do not appear for either of the insulation variables, however, is reassuring. The patterns identified here appear to be restricted to storm window usage and, thus, will have only modest effects on the winterization index to be analyzed later.

The five other significant coefficients require little attention. They are not particularly large and are scattered across three types of energy usage. Also, they are all negative, signifying that those whom we would expect to be conservers are less likely to exaggerate their conservation. Thus, the probable effects of over-reporting for these variables is to reduce the relationships between the predictors and conservation behavior. Systematic patterns of bias pose no particular problems here.

The results of this analysis are highly gratifying, for they lay to rest our concern that exaggerations of energy conservation might be responsible for the substantive findings we report in Part II of this report. About the only effect of exaggeration of conservation is to lower the magnitude of the coefficients. There is no persistent or substantial pattern to the over-reporters. Thus, in spite of the uniform tendency towards over-reporting of energy conservation, we can safely use self-reports as the dependent variables in analyses of the determinants of conservation behavior, without corrections for unreliability.

<u>A Note on Home Temperatures</u>. In the winter study four different measures of home temperature during waking hours were utilized, in addition to asking the respondents if they set their thermostat at 68° or below. During the early part of the interview, we asked the respondents to specify the temperature at which they normally set their thermostat during the winter. After the interview had been completed, the interviewer read the thermostat in the residence (where there was a thermostat) and recorded the daytime setting and the current temperature. Finally, interviewers carried their own thermometers and took readings of home temperature during the course of the interview. This section considers the differences in the temperatures recorded by these measures.

These four pieces of information provide us with a rather complete picture of conservation in home temperature setting. Achieving a conserving temperature in the home is more difficult than it might appear on the surface. Several steps are involved in the process, and error may appear at any step. Below is a schematic diagram of the steps involved:

Reported Thermostat Setting $\xrightarrow{\text{(Reporting Error)}}$ Actual Thermostat Setting $\xrightarrow{\text{(Setting Error)}}$ Thermostat Temperature $\xrightarrow{\text{(Temperature Error)}}$ Actual Temperature

Errors can occur at each set of the process. Reported temperature may diverge from thermostat settings. This seems best explained as a reporting error, since the question asked explicitly for the temperature at which the themostat was set. Given the way in which a thermostat normally operates, not to mention mechanical malfunctions of the thermostat, setting error can occur as the recorded temperature at the time of observation diverges from the set temperature. Finally, for a variety of reasons, the temperature recorded on the thermostat can differ from the temperature in the particular part of the home where our interviewer obtained a thermometer reading. We call this temperature error. Its source may be thermostat malfunction, or, more likely, simply the variations in temperature that can occur in any home.

A request to Americans to conserve in energy usage will achieve different results depending upon exactly which step of this process is targeted and the amount of error at each of the steps. For example, if Americans are asked to set their thermostats at 68° F., actual home temperatures may be higher or lower depending upon the nature of setting and temperature error. If thermostats consistently underheat the house, people will have to put up with normal temperatures below 68° F. If, on the other hand, thermostat settings consistently overheat a home, less conservation will be achieved by targeting on the thermostat setting than on actual temperature if people are complying with the requests. Thus, it is important to estimate the degree of error in each of these temperatures.

Table 3.3 reports the differences between each contiguous temperature measure so that we can estimate the amount of each of the error types. These differences have been coded into four categories for ease of interpretation: same,

TABLE 3.3

Errors in Estimating Home Temperatures

	Reporting Error[a]	Setting Error[b]	Temperature Error[c]
No Error	44.1%	28.6%	29.3%
1-2° Error	26.9	29.1	33.8
3-5° Error	16.0	25.4	23.2
More than 5° Error	13.0	16.9	13.6

[a]The difference between self-reported thermostat setting and actual setting.

[b]The difference between thermostat setting and the temperature recorded on the thermostat thermometer.

[c]The difference between the temperature recorded on the thermostat thermometer and the temperature recorded on the interviewer's thermometer.

1-2^{o} different, 3-5^{o} different, and more than 5^{o} different. It is immediately apparent from the data that reporting error is the smallest of the three types of error -- a rather surprising result. Most people have set their thermostats at the temperature they tell us or within 1 or 2 degrees of it. Significantly, about equal numbers report setting it 1-2 degrees above as below the actual setting. While certainly some respondents have given deceiving responses to our question, more than two-thirds have not. In fact, the pattern of differences of even greater magnitude is so well balanced between the two sides that it seems safe to conclude that random response error rather than conscious under-reporting (or over-reporting) is the culprit.

Rather more error appears in the setting-reading and reading-interviewer-temperature comparisons. For reasons that are not immediately apparent to us, the bulk of the error lies on one side of the differences in each case: settings are apt to be considerably lower than thermostat readings and thermostat readings to be lower than interviewer-recorded temperatures. While these results are difficult to explain, one implication of them is clear: there is substantial error in thermostats in Pittsburgh homes. This error appears in both the synchronization between thermostat setting and thermostat temperature and between thermostat temperature and the temperature recorded on an independent thermometer. The existence of this error must be taken into account in "objective" studies of temperature in the home. Also, reductions of this error might be a useful policy objective, since existence of error of this type surely confounds individual attempts to comply with conservation appeals.

Conclusion. We began this chapter with a concern over the possibility of systematic bias in our self-reports of energy usage. These self-reports will be the basic measures of individual energy conservation in our sample. What if they are erroneous or, even worse, self serving in the sense that they exaggerate actual conservation?

It is clear from our analysis that error does creep into the self-reports of energy conservation and that this error typically lies in the direction of exaggerating conservation behavior. This tendency is pronounced where usage of the automobile is concerned but almost negligible elsewhere. The existence of this error means that our estimates of conservation in Allegheny County are consistently inflated, with the degree of inflation reaching probably serious proportions in the area of transportation conservation. We have undoubtedly uncovered a common tendency in studies of energy conservation which rely upon self-reports of behavior, and considerable caution is urged in extrapolating levels of conservation from their results.

The more central concern of this study, however, is with the correlates of conservation behavior. Error in reporting (even error that is systematically in a pro-conservation direction), does not necessarily confound the correlational analysis. If the error is randomly distributed across the independent variables we use, then its effect is to attenuate the correlation coefficients. The existence of such attenuation means that the real relationships are apt to be stronger than they appear from our analysis, thus rendering our analysis conservative in the reporting of findings. But, random attenuation does not alter the relative magnitudes of the explanatory variables. Only patterned over-reporting has this effect. Thus, it is critical to determine the extent to which over-reports vary with independent variables in the study.

The findings of this chapter show that it is safe to assume that the patterns of exaggeration are essentially random. There is no particular group in the sample that is consistently more prone to over-report their conservation behavior. Nor are the relationships which do emerge for any particular type of activity very strong. Thus, our evidence undermines a charge that the findings in Part II are artifactual or that relationships which would otherwise have been important are obscured by systematic bias.

Having discounted the possibility that our analysis of the differences between conservers and non-conservers would be marred by systematic over-reporting that is correlated with our predictors, we may now proceed with the analysis. For this report, we eschew the measurement strategy of correcting our measures for attenuation. That more complicated procedure should be left for later analyses of these data, since it can not be adopted across all of the variables we have utilized.

PART II

EXPLAINING REPORTED CONSERVATION BEHAVIOR

Using the measures of reported conservation behavior developed in Part I of this report, we shall now turn to the core concern of Project Monitor: What are the factors which can explain energy conservation, or the lack of energy conservation? A complete answer to this question requires a research design which focusses on behavioral change from non-conservation to conservation and isolates the factors which covary with that change. Of course, this complete answer can only be achieved under full experimental conditions so that the explanatory factors can be isolated. Such a design is impossible for reasons too obvious to elaborate here.

The single best alternative to this is a quasi-experimental design which monitors behavioral change in a more natural setting. Such a design, however, requires data gathered at two meaningfully distant points in time. While Project Monitor has collected data in two waves from the same 300 individuals, the elapsed time between waves (as little as three months in some cases) is not sufficient for behavioral change in energy usage. We must await the results of the second phase of the Monitor study in which summer-to-summer and winter-to-winter comparisons at least a year apart will be made. Of course, even this design will have limitations. For example, focussing only on change during a particular period of time ignores the factors that have led people to achieve a certain level of conservation before the study starting point. These factors may be quite different than those which induce them to change subsequent to the study.

The approach taken in the current study is to determine the characteristics which distinguish self-reported conservers from non-conservers at a single point in time --winter, 1978 -- and in a single location -- Allegheny County, Pennsylvania. The drawbacks to this approach ought to be obvious. For one thing, for our findings to be meaningful to policy-makers, the time period selected must not be anomalous, particularly in comparison to later time periods. Even though the nation was in the midst of a coal strike during the first part of our interviewing period, we do not believe that winter, 1978, is any less typical than any other point in time we might have selected. A more serious drawback, we believe, is the site of the study. Allegheny County is in many ways typical of a northern metropolitan setting, but nonetheless, one must be cautious in generalizing our findings even to other similar locales. The problems in generalizing to different kinds of locales (e.g., rural areas, the South, etc.) are much more serious. Even so, while the levels of conservation are heavily affected by where one might choose to do the study, there is less reason to believe that the factors related to conservation are so variable. Thus, it is likely that our findings will hold across locales, although this remains a testable assumption for future studies.

For all of the drawbacks to a cross-sectional study of the factors distinguishing conservers from non-conservers, such a focus has the considerable advantage of identifying those factors which have already had a possible effect on conservation behavior. Knowledge of these factors can aid policy-makers in several ways. First, where more people can be moved in the conservation-prone direction on the factor in question, greater conservation can be achieved if only the original functional relationship between the factor and conservation holds. Second, and of more general significance, policy-makers can better choose their "tools" for promoting energy conservation with the knowledge of what things have led to conservation in the past and what things have not.

This part of the report contains eight chapters -- one for each of the seven types of energy conservation identified in Chapter 1 above and a final chapter which discusses the implications of our findings. The format is essentially the same for each of the analysis chapters. Various variables are related to each measure of conservation using linear correlation and multiple regression analysis. (More complex functional relationships are left for future study.) The simple correlation coefficients are presented in order to show the bivariate relationships between each "independent" variable and each conservation measure. The heart of the analysis, though, lies with the next two steps -- in which the independent variables are considered simultaneously in order to control as well as possible for each other factor. Our objectives in this analysis are twofold. First, we want to determine how much variance in each conservation measure can be accounted for by each type of variable. This objective is accomplished in Equation 1 by estimating the variance explained by the variables in each of four predictor sets. Second, we want to isolate the impacts of the significant variables, no matter from which set they come. This is accomplished in a second regression equation (Equation 2) in which only those variables which achieved the magnitude of .06 in the first equation are retained.[1] Our task here is not to explain as much variation in conservation as possible. If it were, we would have retained all of the variables in this final equation. Rather, it is to gauge the relative importance of the variables. This concern with relative performance leads us to present the standardized regression coefficients.

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[1]This value is considerably below the .05 significance level threshold normally used as a cut-off point. We have used it to lower the probability that potentially significant variables will be omitted from Equation 2.

Four different types of factors are measured as "independent" variables for this analysis. Six of them can be organized under the heading of demographic variables, since they are relatively fixed ascriptive characteristics of the individual. They are respondent sex, education, age, and race; family income; and the individual's expectation about his or her real family income in the future. The latter is, strictly speaking, an attitudinal or perceptual variable rather than a demographic characteristic. Nevertheless, since it too relates to the family's economic position in the society, we shall consider it in this section.

It is difficult to formulate precise expectations concerning how these variables should be related to the various forms of energy conservation when the effects of "third" variables are controlled. However, it is useful to at least articulate our "hunches" and the rationale behind them -- if only to provide benchmarks against which our results may be judged. We would expect education to be positively related to conservation. Educated people should understand the need to conserve better and should be more exposed to communications which carry conservation messages. On the other hand, income should predispose people in the opposite direction. Thinking in terms of strict economic rationality, the marginal dollar savings from energy conservation should be more important to those with less income than to those with more income. Likewise, expectations of declines in real income in the future should lead the rational respondent to cut back where possible in anticipation, as well as to make investments which are likely to pay off in the long run, such as in insulation and an economy car. In both cases, people may be expected to behave as rational consumers. Finally, we would expect conservation to increase with age, primarily because older respondents in our sample grew up in far less prosperous times than the post-World War II period and learned frugality in their formative years. This is clearly a generational explanation for our hypothesis, using age as a surrogate for one's generation.

Where race and sex are concerned, we are not quite sure what to expect. Our focus group sessions conducted prior to the winter survey have left us with the sense that women are more conservation-oriented than men and with a variety of explanations for that phenomenon. But these explanations are much too tentative for us to impose here. Similarly we can think of no good reasons why the races should differ in their conservation behavior, except for those which can be accounted for by the differential composition of the two races on the other demographic variables. Perhaps blacks are less willing to conserve than whites, feeling less of a stake in American society and (as a distinct sub-culture) being more isolated from the mainstream of American life.

Three variables were included as independent variables to reflect the respondent's residential situation. They are expected to have little impact on energy usage outside of the home, where transportation is concerned in particular. But in the home, especially where heating, cooling, and winterization are concerned, they might be particularly important. Our expectations are quite straightforward when it comes to the relationships between these situational variables and energy conservation. Other things being equal, we would expect people in older residences and in larger residences to be more conservation-oriented. In both cases, we might expect fuel bills to be larger, thus increasing concern for conservation at the margins. The age of residences for the people in our sample ranged from brand new to well over one hundred years of age. One-half of our respondents, in fact, occupied residences that were at least forty years old -- a reflection of the concentration of aged housing stock in the Pittsburgh area. Finally, whether the respondent owns or rents the residence should be an important consideration in energy conservation. Too few of our respondents did not pay at least one of the utility bills (only 6 per cent) for this to be a major factor leading renters to be less conserving, although those who do not pay their bills certainly do conserve less. More convincing reasons, because they apply more globally, are that the absence of equity in a property and the short-term orientation of renters reduce the incentive for them to make any winterization investments. Where the other forms of conservation are concerned, we are really not certain what to expect. Renters, though, are less likely to pay their gas bills than their electric bills, so we might expect them to show less of an inclination to conserve where gas is used (mostly in heating) than where electricity is used.

Eleven different variables are included which tap basic attitudes. Three of them are simply the answers to individual questions posed in the interview situation. The other eight are additive indices formed from responses to several questions. The construction of these variables is discussed at length in APPENDIX B and will not be covered here. We expect that each of these variables will be positively related to energy conservation -- that, if you will, each predisposes the individual to conserve. Confidence in the performance capabilities of governmental officials (political confidence) is expected to have this effect because it seems likely to orient one favorably to the messages coming from the government to conserve more. Confidence and trust in the governmental authorities seems a necessary condition for accepting these exhortations and acting in accordance with them. Likewise, a more general sense of political trust should predispose people to conserve more. This seems simply another dimension of basic respect for the authorities, and both of these dimensions should be conducive to greater compliance with what the authorities are asking people to do. Of course, the national government has not been entirely consistent in urging energy conservation -- although passage of an energy bill, even if emasculated considerably from its original version, puts Congress more clearly on the record in favor of conservation. This act, though, came well after our survey was completed. Nonetheless, when asked if the government encouraged conservation for a number of individual behaviors, our respondents answered almost uniformly "yes." Thus, they seem to feel that conservation is being requested by government. It is but a simple logical extension to hypothesize that their attitudes towards the government will affect their compliance with this message.[1]

The energy situation in America today is very complicated, involving projections of future supplies and demands for energy, understanding of the complexities of the market for energy resources, among other important factors. Not all Americans have the cognitive capacity to understand the situation, to achieve what we call energy sophistication. Given the nature of the energy situation, it seems likely to us that those who do understand it will be more likely to conserve. This tendency may also be traced to their greater attention to energy matters. Thus, we expect a positive relationship between our measure of energy sophistication and conservation.

We have measured the predisposition to conserve in two different ways. First, we focussed on the satisfactions derived from conservation of energy <u>per se</u>. Then, we developed a measure of satisfaction with conservation more generally -- what might otherwise be called frugality. In both cases, we would expect that an expression of personal satisfaction with conservation would lead to greater conservation in actuality. People generally do things that are personally gratifying to them, other things being equal. Of course, other things are not always equal, and that is why we have employed a variety of other measures of attitudes and other factors.

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[1] One previous study found little relationship between attitudes towards government and compliance with governmental requests to conserve. This study was conducted by Sears, <u>et. al</u>. (1977) in Los Angeles, California, in the aftermath of the Arab oil boycott.

Energy pessimism taps feelings about whether the energy situation will be taken care of essentially through the development of new energy sources and without individual conservation. Pessimists simply do not believe that this will happen and seem prepared to face the need to conserve. Because of this, it seems very reasonable to expect that pessimists will be more likely to conserve. They have come to expect that there will not be other, far easier solutions to the energy problems the country faces. Whether they translate their pessimism into individual behavior of a conserving nature is, of course, an empirical question, but it is one which we expect will be answered in the affirmative.

One of the fundamental premises of governmental energy policy -- and an article of faith for most businessmen and economists -- is that Americans will react to the higher costs of energy in the future by using energy less. This is a premise, by the way, which is not shared by the respondents in our summer sample. When asked if higher prices lead to less energy consumption, a full 58 per cent replied "no" -- a sharp contrast to what most economists and policy-makers believe. The critical linkage between higher prices and lower usage may well be an individual concern with the price of commodities. For those to whom price makes a difference, higher prices should induce more conservation. For those to whom price makes little difference, higher prices may not lead to any changes in behavior. In other words, demand can be seen as elastic for some people but as inelastic for others. We can test this critical assumption by relating our measure of cost consciousness to energy conservation activities, expecting that the cost conscious use less energy (ceteris paribus) than the non-cost-conscious. While we can not claim to have tested the economist's aggregated relationship between cost and demand, it does seem that testing this hypothesis constitutes a first examination of the crucial individual behavior component of theories of elasticity.

From another perspective, energy conservation may be seen to be linked to people's life styles. Those who are materially oriented, who value possessions and the trappings of conspicuous consumption, should be less willing to conserve in their energy usage than those who are non-material in orientation. Perhaps the most prominent expectation given this hypothesis is that non-materialists should be much more willing to purchase and drive economy cars, while the materialists will prefer the higher-status less economical versions. Thus, we should expect a positive relationship between non-materialism and energy conservation.

Finally, are the three attitudinal variables measured simply in terms of answers to a single question in the questionnaire. We asked respondents how worried they were about the energy situation, with the expectation that those who expressed more concern would be more likely to do something about it by conserving themselves. We asked people how willing they were to be among the first to change, to be innovators, with the hypothesis in mind that innovators would be more likely to engage in some of the newer forms of conservation. Clearly we are assuming, with this, that conservation is perceived as an innovation. We also asked our sample of Pittsburghers if they blamed oil and gas companies' drives for profits for the energy situation in America today. Our hypothesis here was that those who were not willing to project blame to the companies, a common target of accusation in recent years, would be more likely to assume self responsibility for conservation. Displacement of responsibility for the situation from the individual's own realm of action, conversely, should make him less likely to conserve.

Four variables are included in our analysis to reflect respondents' perceptions of the impact of events and energy conservation campaigns. Our interview opened with two open-ended questions about the felt impact of, first, the coal strike, and then the energy situation in general. We expect that those who are conscious of an impact of one or both of these on their own lives will be more likely to conserve. It seems likely that they will see a greater need to conserve than those who perceive no effect of either the short-term coal strike or the long-term energy situation. Similarly, we would expect those Pittsburghers to be more likely to conserve who report an awareness of the Project Pacesetter campaign to promote energy conservation and recognize efforts to encourage conservation by groups to which they belong. In each case, of course, there is always the danger that the causal direction of the relationship is opposite to what we have hypothesized: in other words, that conservation leads to perceptions about the impact of the energy situation and about encouragement by others to conserve. Our cross-sectional data can not help us to discount this possibility. Panel materials, though, can be used to isolate the causal direction. With the four-month panel we currently have at our disposal, however, it seems unreasonable to expect to learn very much at all about whether perceptions or behavior comes first. That is another reason why a longer-term panel study is necessary.

In short, there are reasons to believe that a variety of variables will be related to energy conservation. Our study presents 24 different variables, of four different general types, for consideration. It ignores many other potential contributors to conservation decisions and behavior. For example, actual knowledge of what can be done to conserve or what the general nature of the energy situation is may be important cognitive constraints on behavior. Our sophistication measure only touches this factor tangentially. But in our summer study, we have added a measure of energy-related knowledge which bears more directly on the questions posed above. Another important factor in energy usage is surely the weather. While we have recorded weather information during the period of our study, we have not entered it in our analysis because it is a constant for all members of the sample and can explain no variation in the energy usage of Pittsburghers in 1978. If we were to conduct a national study, on the other hand, weather would be an important factor in accounting for different levels of energy conservation. Readers will surely think of other factors of possible importance which might be included in analysis of conservation behavior, but for now we shall rest our case on those explicitly included in our study.

The following chapters report the results of our analysis of the impact of the 24 factors discussed above on energy conservation. Reported first are the results for our measure of general conservation. Reported next are the findings for each of the five components of general conservation -- winterization, heating, cooling, appliance usage, and transportation. Finally, we examine the relationships between the independent variables and a special measure of energy usage -- the extent to which electricity was conserved more than usual in the first few months of 1978, during the coal strike. In each chapter, the presentation of results follows the same form. We begin with the simple correlations between each independent variable and the particular type of conservation. Then, we introduce through multiple regression analysis the *ceteris paribus* condition. We control for other independent variables of the same type in Equation 1 and for all **sizable independent variables** in Equation 2. The most important results of our analysis, and the ones which we shall dwell on in our conclusions, are those portrayed in the last column under the Equation 2 heading.

Chapter 4

Explaining General Conservation

Conservation is a multi-faceted activity. It can involve actions taken to reduce gasoline usage by purchasing economy cars, driving at lower speeds, keeping the car in better operating condition, as well as simply using the car less in trips to work and other travel. It can involve lowering the heat in the home, shutting off heat in unused rooms, adding storm windows and weatherstripping, insulating attics and walls, and even adjusting the use of air conditioning to cut down on energy consumption. Conservation in the energy areas can also embrace the more efficient use of home appliances and a host of other activities, such as recycling, designed to cut down on the amount of energy consumed. All of these activities and more merit inclusion when we speak of energy conservation as a general set of activities.

General energy conservation is a meaningful concept, but it is not immediately apparent that it is meaningful operationally for the individual. Use of the car, home heating and insulation, appliance usage, and the like may or may not be seen by Americans as activities sharing a common denominator Furthermore, these activities may or may not be practiced with this notion of a common denominator in mind. Considerable effort has been expended by government agencies and other parties, such as Project Pacesetter in Allegheny County, to liken these activities to one another by emphasizing the relationship of each one of them to the saving of energy. But, it is an empirical question whether people practice them as if they are linked to one another.

The results presented in Table 1.1 above show that, behaviorally speaking, it is meaningful to discuss energy conservation in generic terms. Conservation-oriented behavior on one activity generally goes with conservation on other activities. Only the use of mass transit to go to work or to go on vacation and the purchase of frost-free refrigerators, among the items we have measured, are not related in a meaningful way to others in the set. In a more rigorous fashion, the factor analysis provided clear confirmation, at least for the activities we sampled, that to speak of energy conservation in generic terms is meaningful at the individual level. Based on their reported behaviors, at least, Pittsburghers seem to share this conception -- though there are a few activities which it does not embrace.

This section of the report focusses directly on general conservation. We measure conservation by simply counting the number of conserving acts performed of those on the principal factor in Table 1.1.

Table 4.1 presents the distribution of respondents on this measure of generic conservation. Unlike the situations for the specific conservation indices, we have included all respondents in this general index even if they had missing data on some activities.[1] Most Pittsburghers fall into the middle of this distribution, neither failing to conserve on a number of activities nor conserving on almost all activities. Clearly, some progress has been made toward conservation in the county, while there is considerable room for additional conservation. For the purpose of statistical analysis, furthermore, this distribution assumes a very nice form -- it is virtually unimodal, with most of the cases grouped near the mean and the median of the distribution, and resembles the normal curve.

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[1]Eliminating respondents with missing data cuts the effective N for this index almost in half, while yielding only minor changes in the regression results and explaining the same amount of variance.

TABLE 4.1

Distributions of the General Conservation Index

Number of Conserving Activities		
0	0.4%	
1	0.3	
2	0.3	
3	2.3	
4	3.3	
5	4.0	
6	6.7	
7	10.5	
8	14.2	Mean = 9.06
9	11.0	Median = 9.23
10	15.1	Standard Deviation = 2.79
11	11.9	
12	9.5	
13	6.3	
14	3.0	
15	0.9	
16	0.3	
17	0.0	
	100.0% (N = 779)	

What attributes, situations, attitudes, and perceptions are related to conservation as measured by this general index? To answer this question, we have examined the linear relationships between each of four sets of variables and general conservation. The first set of variables includes the most common demographic attributes of people. The second set focusses on our respondents' home and their ownership status -- what we refer to as situational factors. The third set of variables is clearly attitudinal in nature. The fourth set of variables is perceptual -- two of them measure the perceived impact of energy problems on the respondent, while the other two measure respondents' perceptions of energy-conservation campaigns. Table 4.2 reports the results of this analysis: first, in terms of simple correlations between each independent variable and conservation alone; then taking into account simultaneous effects in a multivariate sense -- both for variables within the four sets only (Equation 1) and then for all important variables (Equation 2). The analysis in each case is designed to pick up linear relationships between variables.

Simple Correlations. A number of the simple correlations between the independent variables and conservation are substantial. The correlation for ownership is the highest of all, attaining a level seen only rarely in studies of mass attitudes and behavior. Home owners are much more likely than renters to conserve, even where a general measure involving much more than conservation around the home is utilized. Income also enjoys a noticeable relationship to conservation, although it falls far below that recorded for home ownership and the correlation of these two independent variables leads one to expect the relationship to vanish when home ownership is controlled (as it does in Equation 2). In the other relationships which are significant, there is very little that is surprising.

TABLE 4.2

Explaining General Conservation[a]

	Simple Correlations	Equation 1	Equation 2
Demographic Variables			
Sex	-.01		
Education	.07		
Income	.18	.18**	.02
Age	.03		
Race	.24	.23**	.19**
Income expectations	.00		
DEMOGRAPHIC R^2		(.08)	
Situational Variables			
Age of residence	-.13	-.06	.04
Size of residence	.07		
Ownership of residence	.39	.38**	.33**
SITUATIONAL R^2		(.16)	
Attitudinal Variables			
Political confidence	.02	.07	.07
Political trust	.04		
Sophistication	.16	.19**	.11**
Energy conservation	.16	.11**	.10**
General conservation	.07	.06	.01
Energy pessimism	.11	.07	.09*
Cost consciousness	.08	.14**	.11**
Non-materialism	.12	.10**	.10**
Energy concern	.10	.11**	.10**
Innovativeness	-.03		
Not cause companies	.08		
ATTITUDINAL R^2		(.10)	
Perceptual Variables			
Energy impact	.11	.09*	.04
Coal strike impact	.13	.12*	.07*
Pacesetter recognition	.10	.08*	.07*
Group encouragement	.03		
PERCEPTUAL R^2		(.03)	
OVERALL R^2			(.29)

[a]The regression coefficients are standardized or Beta coefficients. They are single starred when significant at the .05 level and double starred when significant at the .01 level.

People with sophisticated views of the energy situation, who are already predisposed to conserve in energy usage, who are non-material in orientation, and who are pessimistic and worried about the energy situation are inclined to be more conserving. Furthermore, those who have felt an impact of either the general energy situation or the coal strike and who are aware of Project Pacesetter are also more likely to conserve. Only the strong relationship between race and general conservation does not lend itself to easy explanation.

There is good reason to believe that these simple relationships may not endure under controls for the other important variables. Thus, we turn our attention to the multivariate analyses presented in columns 2 and 3 of the table. Considered first are the regressions of conservation on the variables in each of the four sets separately -- column 2 of the table. Then, we examine the regressions of conservation on those variables which were important in each set, now considered simultaneously.

<u>Equation 1</u>. The demographic variables account for about 8 per cent of the variance in conservation. Two of them -- income and race -- are significantly related to general conservation and account for the bulk of this explanatory power. As income increases, so also do the number of conserving acts taken by Pittsburghers. This relationship is highly significant and fairly robust. It suggests that the more affluent residents of the county, while they might be the ones least hurt by the rising costs of energy and related problems, are nonetheless more likely to conserve in a general sense -- a result that is somewhat unexpected. General conservation is even more strongly related to the race of the respondent: whites are more likely to conserve than blacks. This is so even when the effects of income, education, and the other demographic variables in our model have been taken into account,

as they are in a multiple regression analysis. It is obvious that, beyond the well-known lower status position of blacks in the county and the country, there are other factors (perhaps attitudinal or cultural) that predispose blacks to be less involved in conservation. Our study does not enable us to determine what these are. No other demographic variables achieve a significant relationship with general conservation in Equation 1. Among them, only education had a non-zero individual relationship with conservation, but that relationship vanished when the effects of income were also taken into account.

The situational variables account for a substantial 16 per cent of the variance in conservation. Two of the three are related to general conservation. This is a bit surprising, on the surface, because these variables reflect residential situation and can be expected to have little direct bearing upon use of the automobile or even of appliances. Nevertheless, the age of the residence and ownership of the residence are both related to overall conservation. The older the residence, the less likely the resident is to conserve -- although this relationship falls short of significance.

Much more significant is the finding that owners are much more likely to conserve than renters -- a fact of considerable consequence for conservation campaigns. Indeed, this relationship is one of the highest we have found in the study. About one-third of the citizens of the county rent their residences. Even though most of them pay their own utility bills, they are much less conservation prone than owners. As we shall see later, renters, not surprisingly, fall behind owners in conservation around the home, especially in the willingness to make investments to winterize the home. It should not be surprising that the lack of equity in a property curtails willingness to upgrade it.

Ten per cent of the variance in general conservation is explained by the attitudinal variables, and five of them are significantly related to conservation, even when the effect of other attitudes is under simultaneous consideration. The most important attitudinal variable is our measure of sophisticated thinking about the energy situation. As sophistication increases, conservation increases -- in support of the hypothesis that it takes a rather sophisticated conception of the current energy situation to see the wisdom in individual conservation and act accordingly. The second most important attitude is cost consciousness: the more an individual tends to take cost into account in other consumer decisions, the more likely he will be to conserve on energy usage. This finding supports the expected impact of cost increases on energy consumption, as the rational man assumption from economic theory operates. That the relationship is no stronger than it is and that other attitudes are more or equally important, though, suggests that economic rationality is typically clouded by other considerations when it comes to the conservation of energy. This finding contains an important message for those who would tie our energy policy to pricing of energy: pricing policies will have some effect, but the effect may not be sizable. Energy conservation is not typically seen in cost-saving terms.

A predisposition toward energy conservation, non-materialism, and concern about the energy situation have an impact on conservation which approaches that of cost consciousness. In each case, those who hold these attitudes are more likely to conserve, as we would expect. Several other attitudes have lower and insignificant relationships with conservation. Respondents who rate the performance capability of government in the energy area as high are more likely to be conservers. Perhaps some degree of confidence is required for people to accept the view propounded by governmental leaders that one should conserve generally in energy usage. Energy pessimists are also slightly more likely to conserve, as are those respondents who are conservation-oriented in non-energy-related activities. Though their impacts are insignificant, these variables will be retained for Equation 2.

The perceptual variables account for a modest 3 per cent of the variance in conservation. Three of them are significant. Those who felt that the energy situation in general and the coal strike in particular had made an impact on their lives were more likely to conserve. This result squares with our earlier finding that worry about energy problems was more common among conservers. In addition, those respondents who recognized Project Pacesetter as a community effort to enhance energy conservation were also more likely themselves to conserve. In each case, of course, the direction of causality in the relationship is ambiguous: those who see more impact and those who recognize Project Pacesetter may conserve as a consequence of these attitudes and perceptions, or they may have these orientations as a result of their conservation behavior. With data from a single point in time, it is impossible to distinguish empirically between these two interpretations.

Equation 2. The relative contributions of the various factors discussed above can be seen even more clearly when we bring all of them together in a final regression equation. The variables used in Equation 2 together can explain 29 per cent of the variance in conservation activity. This is surely a substantial amount of variation to be accounted for by such a small set of predictors. Of further significance is the fact that most of this variance is accounted for by ownership of residence and the various attitudinal variables. The demographic variables relied upon so often to differentiate conservers from non-conservers do not explain much once other potential explanatory variables are taken into account.

The largest coefficient is attained by the variable measuring ownership of the residence. Almost 11 per cent of the variation in conservation activity can be accounted for by this variable alone. Owners are simply much more likely to conserve than non-owners. This is a fact which must be taken into account in preparing conservation campaigns. We can be sure that it is the home ownership per se rather than its representation of demographic characteristics such as higher income, that accounts for the relationship, because Equation 2 "controls for" the effect of the other variables in our model.

Collectively, the attitudinal variables come close to matching the impact of home ownership. Five of them have regression coefficients which exceed .10 -- easily significant at the .01 level. The most important are sophistication about energy matter and cost consciousness. The more sophisticated the view of the energy situation, the greater the likelihood of conservation. Also, the more concerned people are with cost in their purchasing, the more they conserve. Thus, an energy-related attitude and a consumer behavior orientation emerge as the most potent attitudinal correlates of general conservation.

The other variables which are significantly related to energy conservation behavior are energy pessimism, energy conservation proneness, non-materialism, and worry about the energy situation. The more pessimistic respondents are, the more likely they are to conserve. The more our respondents value energy conservation, hardly surprisingly, the more conservation they report. The less materialistic they are, the more conservation-oriented they are. Finally, the more worried they are about the current energy situation, the more likely they are to conserve. These relationships are all in the directions we would expect. That is to say, the relationships make theoretical sense. What is even more important is that attitudes can be shown to have such substantial impact on reported behavior.

There are three other variables for which the regression coefficients attain the levels required for significance. Of special note among these is the coefficient for recognition of Project Pacesetter. Even when the effects of other variables upon recognition are controlled for, a significant relationship remains between recognition of this community campaign and general energy conservation. At least the minimum condition for a Pacesetter impact has been achieved: those who recognize the program do tend to conserve more. While the impact is modest by absolute standards, it represents a substantial amount for a community campaign to attempt to effect behavioral change.

Also, perceptions that the coal strike had an impact on them are related to general conservation. In one respect, this is a puzzling relationship. The major effects of the coal strike were on the supplies of electricity, not other fuels, and conserving responses to the strike should be limited to electricity usage only, something that is not a very important component of our general conservation index. We interpret this relationship in a broader sense. The impact of the coal strike was ascertained first in our interviews, and the question probably captures more general perceptions of energy situation impact. Looked at from this perspective, then, the relationship between the coal strike impact and conservation simply reflects a greater propensity to conserve among those who feel that they have been affected by the higher prices and shortages which have characterized the energy situation in America.

The final significant relationship in Table 4.2 involves one of the demographic variables -- race. Whites are substantially more likely to conserve, other things being equal, than are blacks. This relationship is puzzling to us. A racial difference in conservation behavior would normally be explained by citing the other demographic attributes which are correlated with race. This explanation will not suffice here because we have controlled for these variables and race continues to exhibit a substantial relationship. Of course, it is always possible that the functional relationships between these other demographic variables and conservation are not linear, and that using non-linear forms would remove the impact of race. It is also worth considering, though, that there is something about being black that, beyond the status characteristics normally associated with that attribute, makes people less inclined to conform to either the requests of political leaders or the forces of the price system in attaining greater conservation. Only by further research can we determine just what these other factors are.

Conclusion. In summary, then, it is clear that the regression model we have employed can "explain" a substantial portion of conservation activity in general. Home ownership is especially important, leading Pittsburghers to be much more concerned about conserving than if they merely rented their residence. Also noticeably important is a set of attitudinal orientations towards conservation and life in general. It is likely that the present distributions of attitude impede further conservation in Allegheny County. If residents were more cost conscious, more sophisticated in their energy situation views, valued conservation *per se* more, worried more about the energy situation, and were less materialistic, energy conservation activity would increase.

Most of these attitudes, especially pessimism, sophistication, and concern, but also perhaps cost consciousness **and conservation values, can be** affected by educational campaigns. Campaigns designed to heighten public understanding of the energy situation in America can certainly increase sophistication in thinking about energy. In this regard, though, it is important to realize that educational campaigns do not exist in a vacuum: the public receives other information about the energy situation through reporting about the myriad activities of utilities, energy suppliers, and the like by way of the media, and is in contact with energy utilities at the local level. Taken together, the messages from these diverse sources present a very mixed picture of the energy situation, and it is little wonder that many of our respondents were confused about its nature. These mixed messages have a profound impact also on energy pessimism, concern, and perhaps even cost consciousness. Pessimism and concern may vary depending upon what people believe among a variety of disparate messages regarding our energy future, although most of those messages probably support pessimism and concern more than their opposites. Messages about the higher costs of energy, on the other hand, will be weighed by people in the context of their own energy expenses. In a period of high inflation, it is difficult for most people to disentangle energy cost increases and their causes from other increases and their causes. Thus, it is probably not surprising that more "cost conscious" respondents do not make special efforts to cut their costs in energy usage. Much more effort must be devoted to showing how energy cost rises are related to inflationary increases in other costs in our economy and how these rises compare with the general level of inflation. Only in this way will Americans be persuaded that they should treat their energy usage differently from other forms of consumption and conserve in it more.

Even taking for granted the current distributions of attitudes, though, there is potential for further conservation in attitudinal campaigns. Many Pittsburghers hold attitudes which are dissonant with their reported behavior. For example, some value energy conservation per se but do not practice it to a significant degree. Campaigns which have as their objective the raising of salience of energy matters and which try to call attention to the dissonance between attitudes and behavior also may have some impact on overall conservation.

Among the attitudes which are important associates of general conservation, only confidence in government seems to lie beyond the reach of educational campaigns. Since the mid-1960's. Americans have become much more cynical about their government. This decline in trust (the opposite of cynicism) predated the Watergate period, even though Watergage surely accelerated it. If more Pittsburghers were confident in their government's ability to handle the energy situation, our results suggest that more would conserve. The lack of confidence undermines the willingness of the public to respond to requests from governmental leaders to conserve and probably undermines willingness to believe messages emanating from the government regarding energy and conservation. A restoration of confidence in government must be accomplished by means which have very little to do with energy policy, but such a restoration might pay handsome dividends in persuading the American public to do their part in making an energy policy work. After all, communications research established long ago that an important element in persuasion is the credibility of the source of the message.

Chapter 5

Explaining Winterization Conservation

To conserve on the use of energy in home heating and cooling, two different types of activity can be practiced. The householder can reduce the comfort levels of the home by turning down the heat in the winter and restricting the use of air conditioning in the summer. These acts may be carried out quite easily because they involve little planning, no capital expenditures, and virtually no physical effort. Probably all that is required is that the agent of conservation convince other members of the household to accept a bit more discomfort. Alternatively, the householder can maintain current comfort levels in the home and cut energy usage by reducing heat and cooling loss from the home. An inexpensive and easy way to do this is to simply seal joints with weatherstripping and caulking. Of course, the installation of storm windows and doors and the insulation of attics or roofs and walls require more effort, expenditure, and planning. Collectively, we refer to these latter types of activities as winterization of the home, even though the better insulation can also pay handsome dividends in energy savings during the summer. In Pittsburgh, however, it is preparation for the winter that most concerns residents. Just over one-third of Pittsburgh homes are air conditioned .

This section of the report examines winterization activities. Conservation in the winterization area is measured as a simple sum of the number of winterizing acts the respondent has performed. Table 5.1 presents the distribution of this activity for our sample. While over four in five households have carried out at least one of the winterization activities, it is unusual for them to have executed all of them or even all of them but one. Most people have simply not added wall insulation to their homes, and significant numbers have not insulated their attics or roofs and/or installed storm windows. On the average (using either the median or the mean), Pittsburghers have engaged in slightly fewer than two activities. Fortunately for the later regression analysis, however, the distribution of the winterization variable is unimodal around its measures of central tendency, bearing some resemblance to the normal curve even though the number of points is restricted to five.

It should be fairly clear what one would expect to find related to winterization activity. Since three of the four winterization acts can involve substantial expenditures of capital, it stands to reason that they would be more common among those who have the resources to make the expenditures. Since they involve investments in a residence, furthermore, it is highly unlikely that they would be undertaken by renters, for whom the improvement would only enhance their landlord's equity and not theirs. Finally, it seems quite likely that winterization efforts would be most common among those who generally look for ways to save money and who are concerned with energy conservation in general. After all, one of the best ways to save money on energy is to invest in ways to improve the efficient use of energy in the home. The payback period for insulation and storm windows varies considerably, depending at least in part on whether the work is done by the householder or by a contractor, but with rising energy prices it becomes less and less extensive. Because of this, winterization activities would appeal to those people already predisposed to conserve on their energy usage.

TABLE 5.1

Distributions of the Winterization Index

Number of Conserving Activities	0	16.7%	Mean = 1.75
	1	25.4	Median = 1.75
	2	31.3	Standard Deviation = 1.16
	3	19.1	
	4	7.5	
		100.0%	(N = 639)

What are the factors which differentiate conservers from non-conservers on this winterization index? In order to answer this question, we have replicated our analysis with the independent variables introduced in Chapter 4 for this new dependent variable. Table 5.2 presents the results for this analysis. Column 1 contains the simple correlation coefficients between each independent variable and winterization. Column 2 contains the standardized regression coefficients for the demographic, situational, attitudinal, and perceptual factors separately. Column 3 gives the results of an overall multiple regression equation in which only those variables significant in the earlier subset equations are entered. Of course, this method restricts us to only the linear relationships among the variables.

Simple Correlations. From the results of the simple correlation analysis, it is obvious that one factor dwarfs all others in importance in its relation to winterization activities. This is home ownership which enjoys a high .39 correlation with the winterization conservation index. Home owners are much more likely than renters to make the kinds of investment which reduce the heat (and cooling) loss within their homes. Another situational variable, age of residence, is next in importance, although its impact is half the magnitude of that for ownership. Contrary to our expectation, the older the residence, the less likely the occupants are to engage in winterization activities.

Among the demographic variables, only income, race and age have substantial relationships to winterization. As income rises, so too does winterization activity. As age increases, something which bears an important relationship to home owning, so too does winterization. Finally, whites are more likely to winterize than blacks, although this relationship too may vanish once the greater propensity of whites to own is controlled.

There are no substantial correlations with winterization among the attitudinal or perceptual variables, although some of them do attain acceptable levels of significance. Perhaps the requirement of financial resources in this area of conservation curtails the previously potent impact of the attitudinal dispositions in particular. Whatever the case, the correlations are so low that we shall defer discussion of the relationships until the following section.

These simple correlations are only the first chapter in the story of winterization conservation. Since many of the independent variables are themselves related to other independent variables, the simple correlations may produce relationships between two variables which emerge only because the variables are each related to some third variable. To handle this situation, we turn to the tools of multivariate analysis. Column 2 of Table 5.2 presents the standarized multiple regression coefficients within each specific set of independent variables. Column 3 presents the standarized coefficients for the independent variables which emerged as important in the first equation, this time considered simultaneously across the sets.

TABLE 5.2

Explaining Winterization Conservation[a]

	Correlation	Equation 1	Equation 2
Demographic Variables			
Sex	-.03		
Education	-.06	-.13**	-.08
Income	.16	.24**	.09
Age	.12	.09	-.04
Race	.14	.11*	.05
Income deline	.09	.09*	.06
DEMOGRAPHIC R^2		(.08)	
Situational Variables			
Age of residence	-.19	-.12**	-.07
Size of residence	.05		
Ownership of residence	.39	.36**	.38**
SITUATIONAL R^2		(.16)	
Attitudinal Varables			
Political confidence	-.01		
Political trust	-.08	-.14**	-.12**
Sophistication	.06	.11*	.06
Energy conservation	.07	.06	.08
General conservation	.02		
Energy pessimism	.03		
Cost consciousness	.09	.12**	.13**
Non-materialism	.09	.09*	.06
Energy concern	.05		
Innovativeness	-.06	-.08	-.01
Companies not cause	.05		
ATTITUDINAL R^2		(.05)	
Perceptual Variables			
Energy impact	.06		
Coal strike impact	.01		
Pacesetter recognition	.07	.07	.03
Group encouragement	.04		
PERCEPTUAL R^2		(.01)	
OVERALL R^2			(.24)

[a] The regression coefficients are standarized or Beta coefficients. They are single starred when significant at the .05 level and double starred when significant at the .01 level.

Equation 1. We discuss column 2 (Equation 1) first. The demographic variables in this equation account for 8 per cent of the variation in winterization activities and all but one of them achieve significance at the .01 level. The hypothesis that income would be strongly related to winterization efforts is strongly supported in these results. This regression coefficient is significant and fairly strong: the more income one has, the more likely one is to winterize. Financial position has an impact on winterization activities in yet another way. Those respondents whose future financial picture is expected to worsen, in that they expect inflation to outstrip their income, are significantly more likely to have winterized their homes. Since the impact of absolute income levels has already been taken into account in this equation, it is clear that expectations about future income exert an independent impact on winterization. Those in a declining financial situation presumably feel that energy-saving investments now are an important edge against inflation. Thus, in two senses income substantially influences conservation activity in this area.

Three additional demographic variables are related to winterization activities: age, race, and education. The age relationship is straightforward: the older the respondents, the more likely they are to undertake winterization activities. This relationship is a clear candidate for extinction, though, once we take into account ownership of the home, for age is strongly related to ownership with home owners more likely than renters to be older. Increases in education are related to decreases in winterization activity, precisely the opposite from what one would expect given the income impact on winterization and the high relationship between education and income. But, even at the level of the simple correlation, there is a slight negative relationship between education and this type of conservation. This relationship is strengthened once the counter-tendencies of income and perhaps age are removed in the multiple regression analysis. Thus, when other demographic factors are controlled, education clearly does not predispose people towards more winterization. Rather, it seems to have the opposite effect, although one must be very cautious about inferring causality from these results. Finally, whites are more likely to winterize than blacks, although we expect this relationship to vanish once controls for home ownership are employed.

The situational variables account for a full 16 per cent of the variance in winterization activities. The most potent of them, as we expected, is home ownership. Owners are much more likely than renters to winterize their homes. Presumably they can realize a return on this investment and have the decisional freedom to undertake it that renders do not enjoy. Also related to winterization is the age of the residence. The older the home, the <u>less likely</u> the respondent is to undertake winterization activities. This is a bit puzzling, since one can imagine the need for insulation to be greater for these structures. It is necessary to await the full multiple regression results to make certain that this relationship is not spurious.

A number of attitudes are related to winterization behavior, and the attitudinal variables together account for 5 per cent of the variation in winterization. The most impressive relationships appear for political trust and cost consciousness. Respondents with less trust in government are more likely to winterize their homes -- a puzzling relationship which we shall pass over right now until we can ascertain if it holds up under more extensive controls. More cost conscious respondents are also more likely to engage in winterization activities. This is very much as expected, for the long term returns from winterization are typically handsome. Apparently those more oriented towards money saving recognize this, while those to whom money saving is not particularly important do not. Here is another indication that the dictates of economic rationality can operate at the individual level, but only as long as the individual's attitudes predispose him to be interested in saving money relative to other things. That is to say, economic rationality is a variable and not a constant at the individual level. Non-materialists and those favorably disposed to energy conservation are also more conservation-oriented on this activity, another indication that attitudes do play some role in conservation behaviors.

The perceptual variables account for hardly any variation in winterization. Only one of them even approaches the significance threshold for entry into the equation -- recognition of Project Pacesetter. Those who recognize Pacesetter also conserve more. Whether Pacesetter induces conservation or conservers pay more attention to campaigns is a question we can not answer from our data, and both are probably occuring. It seems less reasonable, though, to expect mere recognition of Pacesetter to have an impact on behavior. This is especially so because so few of our respondents had any contact with Pacesetter beyond recognition.

Equation 2. Equation 2 sorts out the simultaneous relationships among the variables from different sets in Equation 1. The result is to eliminate all but three variables as highly significant in relation to the level of winterization activity. The most important of them, by a very wide margin, remains home ownership. Clearly, home owners are more likely to conserve through winterization than renters. Their definite edge undoubtedly reflects the fact that capital investments will add to the value of the property for the owner, something that the renter has no interest in doing, and that the owner need gain approval from no one else to install insulation, storm windows, etc. Even more significant is what this relationship suggests about the orientation of renters toward winterization activities. A good case can be made that winterization investments can be recouped in energy savings over the long run. But even though income differences between renters and owners are held constant, renters are still not disposed to make these investments. They undoubtedly hold a short run view. Many renters may not expect to live in the residence for a long time. Whatever their thinking, it seems quite clear that possession of the property is in itself a strong motivator. This is a message which is important in planning conservation campaigns. A full 30 per cent of our respondents are renters, and most of them pay their heating bills. Yet, even those who do pay their own heating bills are not very oriented toward saving energy through winterization.

Two attitudinal variables have a significant relationship to winterization. The stronger of them is cost consciousness. Those respondents who are concerned with saving money generally appear to recognize the advantages of winterization. Perhaps of even greater significance, those who are less concerned with saving relative to other considerations (and they represent a majority of our sample) are less likely to winterize. While the relationship is not strong enough to preclude some people who are not very cost conscious from winterizing, it is strong enough to suggest that the dictates of economic rationality do not operate for most of them. That is, while we can be reasonably sure that increases in the cost of energy will lead to greater winterization in the aggregate (and hence, greater conservation), cost savings will appeal most to only a minority of our respondents. The remainder must be approached on other grounds for them to be persuaded that conservation through winterization is worthwhile.

Trust in government remains related to winterization. It is a puzzling relationship, for unlike findings with the political confidence variable, the cynics tend to be more conservation-oriented. Perhaps their lack of trust in government predisposes them to pursue by themselves solutions to the energy problems they experience. This explanation, however, is only surmise. There is no obvious reason for this relationship.

The predictor variables incorporated into Equation 2 explain a full 24 per cent of the variation in winterization activities, with most of their impact explicable by the potency of home ownership. This is the greatest amount of variance, by a substantial degree, that we have been able to account for in a particular type of conservation and comes close to the amount explained in general conservation. Of all the types of conservation considered, winterization appears to require the greatest efforts, both physical and financial. Thus, it should come as no surprise that we are better able to account for it through our regression analysis. After all, the more formidable the barriers to behavior, the more discriminating should be the motivations for behavior. Foremost among these motivations are those derived from home ownership.

Conclusion. What do these results tell us about the possibilities for inducing more people to take more substantial steps to winterize their homes? First, from looking at the distribution of winterization activities, it is clear that the problem is to persuade more people to insulate. Because of the cost typically involved in insulating, the most successful measures will be those that attempt to reduce this cost. To this end, the provisions of the recently passed energy bill which provide tax incentives for insulating should be quite useful. Among those who are generally cost conscious in particular, these incentives may be sufficient to promote greater conservation. But the effects of this legislation will be restricted by the fact that many Americans are not highly conscious of the cost of things, especially when those costs are hidden in energy bills that they do not understand very well. More attention must be paid to making clear what the costs are, and these efforts may have to begin with more informational utility bills.

Another constraint on winterization activity is that a large number of Americans do not own their own homes, thus diminishing their incentive to winterize. We do not know how strongly motivated landlords are to engage in winterization activities, although we suspect that these motivations will be weak as long as the landlords do not pay utility bills or can pass rising utility costs along to their tenants. The puzzling thing to us is that, even in the large share of the cases in which tenants do pay their bills, renters appear not to see winterization as a way to reduce their costs. This may be due in part to an unwillingness to make investments in someone else's property, but we suspect that it is part of a more general orientation of renters away from feeling any responsibility for their residences. Conservation among renters remains as an important problem area and surely requires more extensive attention than it has received to date.

Finally, the results of this analysis support a view that winterization activities will be affected much more by the manipulation of monetary incentives and the like than by more generally attitude-oriented conservation campaigns. The demographic and situational variables are much more strongly related to this type of conservation than are the attitudinal and perceptual variables. Yet, they are the variables least likely to be affected by persuasive appeals or more information. We simply can not easily raise incomes or make more people home owners -- or, at least, there seems to be little willingness to accomplish these possibly desirable goals for energy conservation reasons. The most productive efforts in winterization activities will probably come in the provision of information about how to winterize to those already inclined to do so, in tax incentives to winterize, and in clear-cut information on the kinds of savings which are likely to be realized through winterization. The first may be the special responsibility of the private market system, while the second has recently been pursued by govern-

Thus, the most likely future impacts should come in the third area -- clarifying the benefit-cost tradeoff from winterization -- and there the regulatory powers of government could be used to induce utilities to sharpen at least the energy cost side of this equation.

Chapter 6

Explaining Heating Conservation

An important share of all the energy used by Americans is consumed in heating homes to comfortable temperatures. American homes, through the widespread usage of central heating systems, have achieved a standard of cold-weather comfort which is unparalleled in the world. This standard, though, is achieved through the heavy concentration of fuels, especially natural gas, in the home heating area. Government leaders have exhorted Americans to be less wasteful in home heating. President Carter urged Americans to reduce their daytime temperature settings to 68^{o} F. or below, and he asked that thermostats be set significantly lower over night. From our data, it is clear that this message has been clearly received by many Americans. Over 80 per cent of all respondents in the summer survey could identify 68^{o} as the setting recommended by the President. Furthermore, in answering our question about their own settings, there was a strong desire to comply with this announced norm. What was equally clear, of course, was that compliance with the norm has not been forthcoming in many cases.

This section of the report examines the characteristics which distinguish home heating conservers from non-conservers -- that is, the variables that are related to more or less conservation in the home heating areas. The independent variables used here are the ones utilized in earlier sections. The dependent variable is the index of home heating conservation which we have constructed by summing the conservation-oriented answers to three questions about thermostat usage and closing off rooms in the home to save heat.

The distribution of our respondents across the four values of the heating index is presented in Table 6.1. This distribution is skewed in the direction of conservation, with almost a full two-thirds of the respondents performing at least two of the three conserving activities. Only one in eight respondents reported that they did not set their thermostats at the lowered settings or close off unused rooms. Given the lack of variation in this measure, our ability to account for heating conservation should be substantially limited.

The relationships between the independent variables and heating conservation are reported in Table 6.2. The first column contains the simple correlations. The second column exhibits the standardized regression coefficients for each of four equations -- one for each set of independent variables. The third column contains the standardized regression coefficients for the equation in which each important variable in Equation 1 was entered.

Simple Correlations. None of the simple correlations achieves the magnitudes of the most important variables in previous sections. Home ownership (a highly important variable in accounting for both winterization and general conservation) and perceived energy impact are the most important correlates of heating conservation, even though the relationships are not of great magnitude. Overall, the most important variables tend to be attitudinal and perceptual in nature. Perceptions that the energy situation has had an impact relate most to conservation in home heating usage among these variables. Next in order of magnitude come generally favorable attitudes towards conservation, followed by recognition of Project Pacesetter as a local campaign for energy conservation, energy concern, and perceived impact of the coal strike. Other variables are important as well, particularly income, race, and concern about energy. All in all, there is little that is surprising in these relationships; only three of them are in directions that seem contrary to theoretical expections, as is indicated by the minus signs, and only one of these attains significance.

TABLE 6.1

Distributions of the Heat Conservation Index

Number of Conserving Activities	0	12.2%	
	1	22.4	Mean = 1.85
			Median = 1.96
	2	33.4	Standard Deviation = 1.01
	3	32.1	
		100.1%	(N = 689)

Equation 1. A clearer picture emerges once the regression analysis is employed. The results from Equation 1 show that a near majority of the variables used as predictors contribute to heating conservation. In all, 10 of the 24 variables bear significant relationships to the heat conservation index. Judged by the standard of variance explained, the attitudinal set is the most important with the demographic and situational variables the least important. But, the important result is that some variables from each set are found to be important, even though no set possesses a very strong relationship to heat conservation.

Among the demographic variables, income and race are significantly related to heat conservation. As income rises, so too does the amount of

TABLE 6.2

Explaining Heating Conservation[a]

	Simple Correlations	Equation 1	Equation 2
Demographic Variables			
Sex	.02		
Education	.05		
Income	.10	.10*	.07
Age	.06	.08	.04
Race	.13	.11**	.09*
Income decline	.00		
DEMOGRAPHIC R^2		(.03)	
Situational Variables			
Age of residence	-.07		
Size of residence	.07		
Ownership of residence	.14	.13**	.06
SITUATIONAL R^2		(.02)	
Attitudinal Variables			
Political confidence	.03		
Political trust	-.02		
Sophistication	.04	.09*	.01
Energy Conservation	.08	.06	.05
General conservation	.13	.12**	.11*
Energy pessimism	.02		
Cost consciousness	.09	.10*	.06
Non-materialism	.08	.08*	.07
Energy concern	.10*	.09*	.08
Innovativeness	.04		
Companies not cause	-.01		
ATTITUDINAL R^2		(.05)	
Perceptual Variables			
Energy impact	.15	.13**	.09*
Coal strike impact	.10	.08	.08*
Pacesetter recognition	.12	.10**	.09*
Group encouragement	.00		
PERCEPTUAL R^2		(.04)	
OVERALL R^2			(.10)

[a]The regression coefficients are standarized or Beta coefficients. They are single starred when significant at the .05 level and double starred when significant at the .01 level.

heat conservation reported by our respondents, and whites report themselves as being more conserving than blacks. Race is most strongly related to heat conservation. The implications of these results seem clear: where home heating is concerned, greater conservation is practiced among more established people (given the correlation between race and income) in Pittsburgh. Where the need to conserve is greatest, given economic hardships, conservation is the least.

Where the situational variables are concerned, ownership of residence has a significant impact on heating conservation, with residences owned by the respondent apt to be the ones in which conservation is the greater. Again, this implies, ceteris paribus, that the better off members of the Pittsburgh population are more conservation prone. Since ownership of a residence probably makes one more conscious of heating bills, though, there is a faint trace here of economic rationality operating. Only when the relative impacts of the various sets of variables are sorted out in Equation 2 can we finally clear up this matter.

Among the attitudinal variables, there are five which contribute significantly to greater energy conservation. Those respondents who see the energy situation in a more sophisticated fashion, who are unlikely to be highly confused by it or to project blame for it illogically on various parties, are more likely to conserve. It seems that greater energy knowledge does contribute to conservation at least where heating is concerned. Also contributing are supportive attitudes toward more general types of conservation. Cost consciousness, an inclination to use the relative cost of something as a decision criterion in purchasing it, bears somewhat of a relationship to heat usage, with the cost conscious people more likely to conserve. Likewise, respondents who are less materialistic in their value systems are more likely to engage in conservation activities. Finally, worry about the energy situation induces people to be more conserving, as might be expected.

There is little that is surprising in these findings. The attitudes which would be expected to be conducive to greater conservation -- sophisticated understanding of the situation (which presumably calls for conservation), conservation proneness, cost consciousness, non-materialism, and worry about the situation -- have that impact. It is perhaps surprising that their impact is not larger. While errors in measurement that are a normal part of the survey setting may well have driven down the observed relationships, it is fair surmise that heat conservation is motivated by a variety of very complex factors which vary considerably from individual to individual. We have not captured this variety well in our regression results.

The perceptual variables account for a total of 4 per cent of the variation in heating conservation. They are more important here than in any other equation considered in Part II of the report. Three perceptual factors are significantly related to heating usage. Perceptions that the energy situation and the coal strike have had a personal impact on the respondent are related to greater conservation. Heating conservation requires little effort and no expenditures, merely a willingness to endure a little discomfort. Thus, it is not surprising that those who feel that the energy situation has affected them, in one form or another, are more conserving. Of course, we must entertain the equally likely possibility that those who are more conserving in the first place are more attuned to energy problems. Recognition of Project Pacesetter is also linked to heating conservation. And, again, the causal direction of this relationship must remain problematic.

Equation 2. Greater clarity in accounting for heating usage is achieved by bringing all previously important independent variables together in the overall regression equation, Equation 2. This reduces to five the number of significant relationships. Altogether, these variables in Table 6.2 account for 10 per cent of the variation in heating conservation -- not a trivial amount, but nowhere near as large as the levels achieved in dealing with either general conservation or winterization earlier.

The most important variables continue to be attitudinal and perceptual in nature. A disposition in favor of general conservation possesses the highest standardized regression coefficient, showing that conservation-oriented people are more likely to conserve in the home heating areas. All of the other important attitudinal variables from Equation 1, though, are eliminated as statistically insignificant when controls are introduced in Equation 2 for other variables.

Three of the four perceptual variables continue to possess significant relationships with heating conservation in this final equation. Perceived impact of the energy situation in general and recognition of Project Pacesetter tie for the highest standardized relationship, with impact of the coal strike lagging only slightly behind. These relationships provide us with good reason for supposing that heating conservation is activity which can be influenced by campaigns designed to alter perceptions of the energy situation in America today -- campaigns which can be largely informational in their nature.

Among the remaining variables, only the race of the respondent is significantly related to heating conservation. Whites are, as they have been before, more likely to conserve. This relationship continues to puzzle us, since the most plausible third variable influences have been controlled for this equation. There is apparently some additional factor which differentiates among the races in Pittsburgh and is related to differential dispositions to conserve in the home heating areas. Whatever this factor is, it is exogenous to our model and will probably require careful study to uncover. The relationship for income, while insignificant, is a bit puzzling. It indicates that those who are most in need of saving money through heating conservation are slightly less likely to conserve. Again, we are confronted with a situation in which, on the surface, economic rationality does not appear to be governing the behavior of our respondents. What is unexpected about this relationship for income is that it becomes insignificant when controls are imposed for other variables. It is a puzzle which remains to be explained.

Conclusion. These findings leave us on less firm ground than before for speculating about how conservation can be increased, largely because we can not explain more variation in heating conservation. Assuming that these relationships are valid, though, several conclusions appear to be warranted given these results. One is that, again, the attitudinal and perceptual factors are of considerable importance in accounting for another aspect of conservation. Efforts designed to affect them appear to have potential for enhancing conservation behavior. Attitudes and perceptions are more amenable to change than are situational or demographic factors, and if the functional relationships remain unchanged, changes in each type of variable could bring about changes in levels of conservation.

The mismatch between reported and observed levels of conservation in the heating area suggests another factor which may be important in achieving further conservation. The indications are strong that our respondents understand the announced norms in the heating areas and value compliance with them -- otherwise, there would be little incentive to exaggerate their conservation behavior. Conservation compaigns which highlight the dissonance between accepted norms and behavior, a source of guilt to some users, might lead to reductions in dissonance by changes in behavior. Attempts to isolate those who exaggerate their conservation behavior and then to make them conscious of the dissonance between their reports and their behavior would make an interesting and useful test of the potential for conservation-oriented campaigns.

From the results of our analysis in Chapter 3, though, it is also important to realize that many people honestly believe that they are complying in their use of home heating. Providing feedback on actual behavior may be the first step in a campaign designed to expose dissonance and force cognitive consistency. This feedback can come through verification of thermostat accuracy and through more attention to providing use information to customers on utility bills.

Finally, there is great importance in the null finding that home owners are not significantly different from renters in their usage of energy for heating purposes, once other significant factors are taken into account. Rather, it is financial investment, as in the case of winterization, which differentiates renters from owners. More effort might be devoted to convincing renters that winterization investments can have the same impact, with less discomfort, perhaps, as turning down their thermostats. Alternatively and more realistically, conservation campaigns should be predicated on the assumption that there are different audiences for different messages. The audience for heating conservation does not need to be segmented according to whether or not a home is owned. The audience for winterization does require such segmentation.

Chapter 7

Explaining Cooling Conservation

The other side of conservation through control of home temperatures involves a summer activity -- cooling the home to comfortable temperatures during hot weather. Given the climate of the Pittsburgh area, of course, cooling is a less important activity to our respondents than is heating. In other parts of the country, though, home cooling is a vital activity. In the South, Southwest, and some parts of the West, summer would be virtually unbearable without air conditioning. For some parts of the nation, indeed, air conditioning costs account for the major portion of household energy-related expenses. An understanding of the factors that are related to energy use in cooling, therefore, is important in formulating a rational energy policy. Our Pittsburgh data can at least improve that understanding for northern urban areas, in which cooling is utilized only during certain periods of the summer.

Most Pittsburghers already engage in extensive conservation in the cooling area. Only 36 per cent of them use air conditioners, thus forcing most to rely upon "natural" cooling and fans, which are quite energy efficient. Table 7.1 reports the distribution of our sample on the cooling conservation index. This distribution reflects the widespread absence of air conditioners from homes in the Pittsburgh area, and the cautious use of air conditioners where they are present. Based on the scores earned on this index, there is little room for additional conservation in the Pittsburgh area. Furthermore, the index is so skewed in the direction of conservation that there is little variation to be explained by our regression models and the assumption that the dependent variable is distributed normally for regression analysis is violated. We have measured cooling conservation more extensively in the summer study but will leave that measure for later analysis. For now, with substantial reservations in mind concerning the adequacy of our cooling index, we shall proceed to isolate the factors which relate to cooling conservation as we have measured it.

TABLE 7.1

Distributions of the Cooling Conservation Index

Number of Conserving Activities	0	4.9%	
	1	10.9	Mean = 2.31
			Median = 2.54
	2	32.2	Standard Deviation = .85
	3	52.0	
		100.0	(N = 658)

Simple Correlations. A few substantial relationships emerge between the explanatory variables and the measure of cooling conservation, in spite of its restricted variation. Six of these relationships are above .10 in magnitude, but no one of them even approaches the magnitudes of a few of the relationships found for some of the other measures of conservation.

Three of the six highest correlations involve demographic variables. Income, education, and (somewhat unexpectedly) sex are all substantially related to cooling conservation. The income and education relationships reflect a phenomenon not heretofore present in our analysis. Those with higher levels of income and education are significantly less likely to conserve in the cooling area. Basically, this means that they are more likely to own and use air conditioners. As we shall see later, the impact of education is spurious, owing to its prior relationship to income. Income enjoys the highest correlation with cooling conservation. That its correlation is negative leads to the inference that ownership of air conditioning is seen as a luxury to Pittsburghers. Those who can afford air conditioning typically have it, while those who have lower incomes typically can not afford it -- though they might desire it. Here, for the first time, our expectation that the poor would conserve more is upheld.

The more extensive data on cooling from our summer study support the interpretation that identifies air conditioning as a luxury. While some respondents felt that either room or central air conditioning was undesirable, a majority found it desirable. Almost 57 per cent of the sample rated room air conditioning as desirable and virtually 50 per cent rated central air conditioning as desirable. By contrast, even more sizable majorities rated both types of air conditioning as luxuries, and as expensive. If Pittsburgh summers were hotter than they typically are, it stands to reason that air conditioning would be seen less as a luxury and that Pittsburghers, by implication, would conserve less energy in the cooling area.

The relationship between sex and cooling conservation defies easy explanation. Homes from which we drew a male respondent seem, from these data, to be less likely to have air conditioning than homes in which the respondent was female. This relationship does not vanish in subsequent analysis when we control for other factors. The reason for the greater tendency of male-respondent households to conserve, then, remains a subject for future study.

TABLE 7.2

Explaining Cooling Conservation[a]

	Simple Correlations	Equation 1	Equation 2
Demographic Variables			
Sex	-.13	-.09**	-.12**
Education	-.11		
Income	-.21	-.21**	-.14**
Age	.02		
Race	.06	.08*	.06
Income decline	.06		
DEMOGRAPHIC R^2		(.07)	
Situational Variables			
Age of residence	.17	.17**	.17**
Size of residence	-.01		
Ownership of residence	.00		
SITUATIONAL R^2		(.03)	
Attitudinal Variables			
Political confidence	.11	.14**	.11**
Political trust	-.01		
Sophistication	-.04		
Energy conservation	.00		
General conservation	.03		
Energy Pessimism	.05	.07	.09*
Cost consciousness	.13	.14**	.07
Non-materialism	.04	.07	.08*
Energy concern	.03		
Innovativeness	-.09	-.11**	-.10*
Companies not cause	.02		
ATTITUDINAL R^2		(.05)	
Perceptual Variables			
Energy impact	-.05		
Coal strike impact	.00		
Pacesetter recognition	-.01		
Group encouragement	.00		
PERCEPTUAL R^2		(.00)	
OVERALL R^2			(.12)

[a]The regression coefficients are standardized or Beta coefficients. They are single starred when significant at the .05 level and double starred when significant at the .01 level.

The third demographic variable which enjoys a noticeable relationship to cooling conservation is education. As education rises, cooling conservation is less common. In part, this may be the result of the correlation between income and education. We are hard pressed to explain this relationship in any other terms, largely because it contradicts our expectations about the effects of education. Fortunately, education vanishes as a significant factor in the regression equation, supporting the view that its impact is spurious through income and eliminating any need to furnish explanations for that impact.

The age of the residence is also correlated substantially with cooling conservation. Older structures are less likely to make use of air conditioning. Part of the reason for this is that they are less likely to come with central air conditioning units or, because of their heating systems, to allow easy adaptation to central air conditioning. They may also be roomier and have better ventilation, thus diminishing the need for air conditioning. Explanations for this relationship must focus on the structural properties of older homes, because the relationship between age of residence and cooling does not change with the imposition of controls in later analysis. Just what structural properties are important, though, must (like sex above) be the subject of further study.

The two remaining substantial correlations are found in the attitudinal set of variables. Confidence in the performance capabilities of government (political confidence) and cost consciousness both enjoy positive and significant relationships to cooling conservation. The cost consciousness relationship is easy to explain. Air conditioning units are somewhat expensive to purchase and the operating costs are high. It is entirely within the realm of expectations that people who are generally cost conscious in their consumer behavior will carry their cost consciousness over into the energy conservation area in decisions about air conditioning. The realization that they are conserving in energy usage may not even enter their minds. Even for those who own air conditioners, the possibilities for conservation by running the air conditioners selectively are high. Again, cost conscious respondents should be the ones to take advantage of these possibilities.

To explain the relationship for political confidence, a more general approach seems necessary. Confidence in the performance capabilities of government in the energy area is one of the political attitudes which might lead people to comply with governmental requests to conserve. The more credible the source, so this explanation goes, the more likely will be the compliance with messages which emanate from the source. Thus, attitudes toward government do appear to have an important impact on conservation.

The simple correlations are not sufficient to support inferences about the factors separating conservers from non-conservers. There is always the possibility that the simple relationship reflects the impact of some third variable upon both the independent and dependent variable (as is the case) for education). Thus, to ascertain more fully the factors influencing conservation in cooling, we turn to multiple regression analysis.

Equation 1. First we consider the results of the multiple regressions for each set of independent variables separately.

The demographic variables account for 7 per cent of the variation in cooling conservation. Three of them attain significance: income, sex, and race. Education, which exhibited a fairly substantial simple correlation, is not significant once the effects of other independent variables (particularly income) are considered. Furthermore, the effects of sex are depressed a bit in this multivariate analysis. Income is as strong a predictor of cooling conservation levels as before, and the negative relationship it enjoys is unchanged. Conservers in the cooling area are still more likely to come from lower income families in our sample, much as we would expect. The impact of race is increased slightly in Equation 1, appearing for the first time to be important, with whites still more likely to conserve than blacks.

The situational and perceptual variables, by contrast, do rather poorly as predictors of cooling conservation. The former account for a modest 3 per cent of the variation in conservation, while the latter can account for no variation. Only age of residence among all these variables is significantly related to cooling conservation, with more conservation being practiced in the older residences. The best explanation for this, as we suggested previously, is that older homes are designed so as to be less amenable to air conditioning and to require it less.

The attitudinal variables account for about 5 per cent of the variation in cooling conservation. Two of them -- cost consciousness and confidence -- share the highest level of magnitude. In both cases, the standardized regression coefficient in the multivariate analysis is larger than the simple correlation indicating that the effects of these two variables were suppressed somewhat in the correlational analysis. Political confidence probably makes people more inclined to respond to governmental requests to conserve, as argued previously. Cost consciousness undoubtedly makes people more sensitive to how they can save money at the margins in their usage of air conditioning. In each case, the variable relates to cooling activities, as we would expect.

Three other attitudinal variables have noticeable relationships to cooling conservation. The most important of them is innovativeness, which appears as a significant predictor for the first and only time in all of our equations. The relationship, though, is negative, suggesting a direction which is the opposite of what we would have expected. Respondents who are more likely to do things before other people do them, to be "innovative," are less likely to conserve in their cooling activity. This suggests that cooling conservation is not yet perceived as an innovative activity, and we rather suspect that use of air conditioning may be seen as more modern and more innovative than doing without it.

Pessimism about the energy situation and non-materialism also exhibit relationships to cooling conservation, and both of these relationships are in the expected direction. Pessimists seem to be more inclined to try to deal with the energy situation in their own behavior, perhaps because they do not expect it to be settled anywhere else. Non-materialists seem to be less attracted to the kinds of luxury air conditioning provides.

Equation 2. All of these variables which are related to cooling conservation are now brought together in one final regression equation -- Equation 2. The nine variables, using the linear rule, explain 12 per cent of the variation in cooling conservation. This is not as substantial an amount as we have achieved in some other areas of conservation, although it is a bit higher than is achieved in heating, transportation, or electricity reductions. Given the limitations of our cooling measure to begin with, the variance explained here is gratifyingly high.

The most important variable in Equation 2 is age of residence. The relationship it enjoys with cooling conservation has remained exactly the same through all three of our analyses. The older the home, the more likely there is to be conservation in the cooling area. As suggested previously, the principal reason for this lies in the less frequent use of air conditioners in older Pittsburgh homes. Explanations for less frequent use of air conditioning here which focus upon the demographic or attitudinal correlates of residence in older homes are simply not adequate, for the multiple regression analysis which builds in these variables leaves age of residence unscathed as a predictor. Instead, we must search for explanations in the characteristics of older residences themselves. The ones offered before seem to be the most relevant here. Older homes have heating systems that are often hard to convert to central air conditioning, requiring a substantial investment for that type of cooling. Older homes also seem to be more likely to possess the advantages of natural ventilation, thus reducing marginally the need for air conditioning. Their windows are typically larger and their ceilings are higher, thus promoting the flow of air through the dwelling. These explanations, though, are only suppositions. The reason why age of residence appears as the most significant predictor of cooling conservation remains outside the reach of this study.

Second in importance are two demographic variables -- income and sex. The explanation offered earlier for the impact of income seems unassailable. Air conditioning is an expensive luxury, both to purchase and to operate. It seems quite reasonable that those who are better able to afford it -- that is, those who have higher family income -- will be more likely to utilize it. The more luxurious and higher status activity, unfortunately, is the one which is the most wasteful of energy in this particular case. Sex also remains related to cooling conservation in this analysis, for reasons which are not easily fathomed, and we shall refrain from trying to interpret this relationship.

Four of the attitudinal variables are significantly related to cooling conservation in Equation 2. Political confidence is the most important of them, demonstrating that a manifestly political variable does have some influence on conservation behavior (in contrast to what is found in the Sears et. al., 1978, study). We favor the explanation suggested above for this relationship: that those respondents who are confident in government are more likely to heed governmental requests to conserve because of their confidence in the source of these requests. By contrast, those who do not look upon the government as offering much hope in the energy area seem to transfer their lack of confidence to the messages which emanate from the government about energy conservation.

Next in importance is innovativeness. Here the relationship remains opposite in direction to what we expected. Innovators are not more likely to conserve in cooling their homes. Rather, they are more likely to buy and use air conditioning -- acts which lead to substantially less conservation. As suggested previously, it may well be air conditioning which is itself the innovative activity. It is newer and, as a result, less familiar. Clearly, cooling conservation is not seen by innovators as innovative behavior, or they would be likely to adopt it.

The relationships of pessimism, cost consciousness, and non-materialism to cooling conservation are in the directions we had expected. Pessimists about the energy situation in America today seem more likely here, as well as in some of the other areas of conservation, to take upon themselves the responsibility for conserving -- perhaps preparing themselves for future hardships. Those respondents who pay close attention to cost in their buying practices presumably are doing so also in the conservation area, although this relationship falls just short of significance. Finally, people who place a high value on material things in life tend to conserve less in their cooling activities. This is but another indication that there may be high status connotations associated with the use of air conditioning -- in itself an important barrier to conservation.

Conclusion. What do these findings suggest about energy conservation policy in the cooling area? Perhaps the principal implication is that formidable obstacles must be overcome before Pittsburghers will conserve more in their use of air conditioning. They already conserve substantially, simply because a majority of them do not own air conditioners. As the results of our regression equation demonstrate, though, we have only limited knowledge of those factors which differentiate conservers from the few non-conservers in this area. A first step must be to increase that knowledge -- something we have, in Project Monitor, undertaken to do in designing a more extensive set of cooling measures in the summer study.

Furthermore, those factors which we have identified in the regression model are largely things about which little can be done. Age of residence can hardly be affected by energy policy. If our inferences are correct regarding why air conditioning is used less in older residences, about the only option is to consider changing building codes so that new structures are less in need of air conditioning. Given the cost of higher ceilings and more windows, as well as the advantages of new heating systems, though, building design changes seems quite unlikely. Nor can we alter sex, race, or even income on behalf of greater conservation. Demographic attributes are fixed and can not be easily manipulated even for desirable social ends.

The greatest prospect for encouraging more energy conservation in cooling homes lies with the attitudinal variables. Two different strategies can be adopted here. Educational campaigns can focus on the necessity of conservation if energy is to be available in desirable amounts in the future, thus attempting to increase energy pessimism, and on the cost savings to be realized from less cooling. With these increases, our model tells us that some additional conservation may follow. A second conceivable strategy is to design campaigns to make cooling conservation the innovative, or the new and exciting, activity. Some lessons might be learned here from cigarette companies, which have devoted considerable effort to making smoking a "status" activity -- and with considerable success. Infusing conservation in the cooling area, and elsewhere, with innovative symbolism might reverse the negative relationship we have found here and lead to positive relationships for the other areas of energy usage.

A third possible strategy would be to attempt to improve the relationships between the attitudinal variables and conservation. This could perhaps be accomplished by highlighting the contradiction between energy pessimism, cost consciousness, or non-materialism and the non-conserving use of air conditioning. To eliminate the contradiction between their attitudes and behavior, some people might be induced to make marginal changes in their behavior. After all, significant gains in energy conservation could be made by turning up the thermostat a degree or two in the setting of air conditioning. The challenge is to motivate people to do that.

There is a faint hint in our data of another obstacle to greater conservation in the cooling area. Conservation generally cuts against the grain of American society. Our affluence has led us to value the comforts of air conditioning, of our own car, and of other energy intensive products. It is these higher levels of affluence which lead certain activities to move, almost imperceptibly, from being regarded as luxurious to being demanded as necessary. Driving one's own car may be the prime example of an activity which has traversed that path. And certainly in areas of the country with hot, uncomfortable summers, air conditioning has traversed this path as well. Not only are these activities seen as bestowing an important element of personal comfort or convenience, but to them are also attached important status connotations.

It is impossible from our data to prove that air conditioning has attained a high status position among Pittsburghers. From our summer survey data, though, it is apparent that many see it as desirous, even if expensive. Beyond that, there is a hint of a status connotation to air conditioning in the factors which relate to conservation. Innovative people are more likely to use air conditioning, as are materialists and those with higher incomes. If the status connotations to the activity are added to its attractions, then the task of inducing conservation will even more difficult.

A common way to prevent people from doing desirous things in a democratic society is to attach a high price to them. Already we have seen that the price of air conditioning prevents many Pittsburghers from using it. If this price were to be lowered, then additional usage would be stimulated -- as it was by the cheap pricing of energy in the years after World War II. If the price were to be increased, on the other hand, more conservation in the use of air conditioning could probably be induced in households. Some attention should, of course, be paid simulutaneously to methods for reducing usage among those who already own air conditioners and the kinds of savings that might result. The fact that cost consciousness does not relate more to conservation here, though, seems to suggest that price increases would have to be substantial -- at least more substantial than they have been heretofore. Cooling conservation appears, at least as far as we can discern from cross-sectional data, to lack a high degree of elasticity in response to price.

As we have argued previously, though, a pricing policy for inducing conservation must be coupled with feedback to the consumer about the cost implications of his activity. In cooling, like in heating, it is difficult for people to know how much they save by using their air conditioning a little bit less or setting the thermostat for their central air system a little bit higher. Nor can consumers considering the purchase of air conditioning gain much of an appreciation of its operating costs, especially in comparison to other methods of cooling -- such as the use of attic fans. Because they are in the business of selling energy, utilities may not have much incentive for telling how much certain high-intensity usages cost the customer. Federal and state regulatory policy might have to be used to overcome this reluctance. Knowledge of how their actions affected their energy costs, on as detailed a basis as possible, would enhance substantially the effects of a pricing policy for encouraging conservation.

Chapter 8

Explaining Appliance Conservation

The modern American home is replete with appliances, large and small, which perform tasks done by hand in previous times and in many countries of the world still today. The most important of these is perhaps the refrigerator, which has revolutionized food buying habits by rendering unnecessary daily trips to the store and by making supermarkets feasible. Also of great importance are: the modern range which has made cooking a much less time-consuming task than before; the clothes washer and dryer, which have reduced the time required for cleaning clothes; and the hot water heater, which has made America a nation of bathers. Most American families have access to all of these major appliances. Among Pittsburghers, virtually everyone has a refrigerator, a range, and a hot water heater. Most -- 82 per cent and 73 per cent, respectively -- own a washer and a dryer.

Beyond these virtual necessities for modern living lies an abundance of other devices to make living simpler and more enjoyable -- dish washers, freezers, small appliances used in connection with cooking and other activities, and even radios and televisions. In the last decade or so, the American home has become a storehouse for little motors, so widespread has been the diffusion of these various appliances. In fact, it is fair to say that the continuing liberation of American women from a housewife's traditional role rests upon the foundation of home appliances.

To the contemporary American family, conservation in the appliance area most likely means efficient and economical use of a variety of appliances rather than a return to the pre-appliance usage days. It is difficult to imagine anyone forsaking these appliances in order to conserve on energy usage. Indeed, some of the appliances are more efficient users of energy than others, thus enabling conservation to take place within an "appliance-oriented" world. For example, cooking in toaster ovens uses less energy than using the oven in the range. Of course, the cheapest source of energy (at least in dollars and cents terms) is human labor, but there is little chance that conservation will be achieved at some future time by substituting human labor for many of the common household appliances. Conservation in the appliance area must involve, instead, more careful usage of the appliances Americans are already committed to and design changes by manufacturers to increase energy efficiency. The average American can purchase more energy efficient refrigerators and freezers; use dish washers, dryers, and clothes washing machines only with full loads; make more careful usage of the range; and so forth. More efficient usage in any one of these areas may not result in highly noticeable energy savings, but the cumulative total across the various areas may be substantial.

We have attempted to measure energy conservation in appliance usage by ascertaining responses to questions about temperature settings on hot water heaters, washing and drying only with full loads, and refraining from purchasing a more energy-intensive frost-free refrigerator. These three questions tap conservation both through usage of owned appliances and through purchase of more efficient appliances. The questions hardly begin to tap, though, the wide variety of appliance-related activities which bear upon conservation. Thus, even more than with our other measures of conservation activity, the appliance measure must be regarded as only a weak surrogate for appliance conservation behavior more generally.

Table 8.1 presents the distribution of Pittsburghers across the values of the appliance usage index. Unlike the case with most of our other measures, the distribution on the appliance index is heavily skewed toward the conserving end. Almost 90 per cent of our respondents have performed at least two of the three conserving activities -- typically washing and drying with full loads and not setting the hot water heater at its maximum temperature. Virtually no respondents do not conserve at all in their appliance usage. Many respondents have frost-free refrigerators, which use more energy than regular defrost models, and would not consider giving them up. This gives the index at least some variation, although, unfortunately, it is lodged primarily in purchasing habits rather than in usage. While the skewed nature of the appliance usage measure hampers multivariate analysis of its correlates by restricting variance and violates the normality assumption of regression analysis, we shall nonetheless investigate which of the background variables is most linked to appliance conservation.

TABLE 8.1

Distributions of the Appliance Conservation

Number of Conserving Activities	0	0.7%	Mean = 2.17
	1	11.5	Median = 2.15
	2	58.0	Standard Deviation = .64
	3	29.8	
		100.0%	(N = 695)

In spite of the limited representativeness of the appliance index and the skewed distribution of respondents on it, the explanatory variables used in previous analysis account for an important portion of the variation in the index scores. Table 8.2 presents the simple correlations between these variables and the index, the standardized regression coefficients for each set of variables, and finally, the standardized coefficients for a regression of the index on all previously important explanatory variables.

Simple Correlations. The simple correlations are generally low -- although not much lower than for other types of conservation. Only the relationships for income, age, political confidence, general conservation, and cost consciousness attain magnitudes above the arbitrarily selected level of .10. Income enjoys the most substantial relationship to appliance usage: the higher the income the less prone respondents are to conserve. The direction of the relationship, like for cooling, is as expected. Given the nature of the appliance index, this relationship reflects the much more common appearance of frost-free refrigerators in higher income homes, and probably not much else. It is as if the advantages of the frost-free models are apparent to most people and are chosen if the individual has the means with which to purchase them -- although the relationship is not overwhelming.

Four other variables have relationships of .10 or more, and all are in the expected directions. Respondents who are cost conscious are more likely to conserve and this relationship is stronger than it has been heretofore. Cost conscious respondents are generally less likely to purchase frost-free refrigerators. Respondents who derive satisfaction from general conservation in their lives are also more likely to conserve, as they are less likely to purchase the frost-free models. Age too is related to appliance conservation, although for reasons that are simply not as apparent as they were for the other independent variables. Finally, political confidence is correlated with conservation.

Equation 1. The picture is clarified when we move beyond the simple correlation to consider the simulaneous effects of the variables within the same generic cluster, as are presented in column 2. These results reflect quite well what would be surmised from the simple correlations standing alone. The demographic variables and the attitudinal variables are the most important. The situational and perceptual variables lack significance overall. That situational variables exhibit no significant relationships to appliance usage should hardly be surprising. They reference properties of the home and home ownership and can be expected to have little bearing upon appliance habits. The perceptual variables might be expected to exhibit some impact, on the other hand, since they tap the perceived importance of events and campaigns for energy savings. Thus, it is perhaps a bit surprising that they are not important where appliance usage is concerned.

The demographic variables account for 8 per cent of the variance in appliance usage. Four of them have significant relationships with appliance usage, even when the effects of each of the others are partialed out. Income still enjoys the most substantial relationship, dwarfing the others in size. Age and income decline are next in the order of importance. Older respondents are more likely to conserve, perhaps because they are less willing to change their old life patterns to adopt new appliances. Those respondents who anticipate that their income will not keep up with inflation, somewhat surprisingly, are not conservers in this area -- even though economic rationality would seem to point them in this direction. Finally, race appears as a significant predictor. Whites are more likely to conserve in appliance usage, other things being equal. It seems likely that they are more apt to do the little things that lead to energy efficiency.

The attitudinal variables account for 6 per cent of the variance in appliance usage. The most important of them is clearly cost consciousness, the original effects of which are undisturbed when simultaneous effects are considered. The more cost conscious the individual, the more likely he is to conserve.

TABLE 8.2

Explaining Appliance Conservation[a]

	Simple Correlations	Equation 1	Equation 2
Demographic Variables			
Sex	.07		
Education	-.07	.08	.10*
Income	-.23	-.26**	-.25**
Age	.11	.10*	.09
Race	.08	.08*	.07
Income decline	-.02	-.10*	-.10*
DEMOGRAPHIC R^2		(.08)	
Situational Variables			
Age of residence	.07		
Size of residence	.05		
Ownership of residence	-.06		
SITUATIONAL R^2		(.01)	
Attitudinal Variables			
Political confidence	.10		
Political trust	.03		
Sophistication	-.08	-.07	-.05
Energy conservation	.09	.11*	.10*
General conservation	.12	.09*	.08
Energy pessimism	-.01		
Cost consciousness	.17	.17**	.15**
Non-materialism	-.03		
Energy concern	.00		
Innovativeness	.02		
Companies not cause	.05	.06	.07
ATTITUDINAL R^2		(.06)	
Perceptual Variables			
Energy impact	.05		
Coal strike impact	.03		
Group encouragement	.02		
PERCEPTUAL R^2		(.01)	
OVERALL R^2			(.12)

[a]The regression coefficients are standardized or Beta coefficients. They are single starred when significant at the .05 level and double starred when significant at the .01 level.

The two other significant variables point in the same direction and show effects that are hardly surprising. An interest in energy conservation specifically and generally yields conservation in appliance usage.

Equation 2. These relationships change somewhat when we move from Equation 1 to Equation 2 in order to consider the simultaneous impact of all endogenous variables. Income remains the most important contributor to appliance use. Its magnitude is hardly changed from Equation 1 or from the original simple correlation, and its direction is the same. It is the lower income respondents who are conserving the most in their usage of appliances, primarily by not purchasing frost-free refrigerators. Next in importance comes cost consciousness. Those respondents who are concerned about saving money are more conservation-oriented in their use of appliances. Thus, cost consciousness has effects which are independent of and reinforcing for income.

Two demographic variables other than income exhibit significant relationships to appliance conservation. Those people who anticipate falling behind with inflation are less apt to conserve. One wonders whether this is one of the reasons why they may be likely to fall behind, although cautious interpretations are required here because the income decline variable is perceptual in nature. Furthermore, the education variable appears in this overall equation, having experienced a sign change from the simple correlation with appliance usage and a slight increase in magnitude from Equation 1. Once the effects of other variables are controlled, especially of income which maintains a strong relationship to education, respondents with higher levels of education are apt to be more conserving. This relationship is an important one, for it counteracts the impact of income in quite an interesting fashion. Income, purely speaking, seems to condition people to conserve less in their appliance usage. They can afford more, so why should they not use appliances more and pay less attention to efficiency. At each level of income, however, it appears that the more educated respondents do conserve more. Perhaps it is they who are more attentive to and understand better messages about the energy situation in America today. They may be a more receptive audience to educational campaigns promoting conservation. Whatever the case, this analysis illustrates how important it is to look behind education and income to eliminate their joint (status-like) effects and isolate their differential predispositional qualities. Examining bivariate relationsips in isolation is simply not a sufficient strategy for establishing the foundations for a rational energy policy. Multivariate analysis is clearly necessary.

In addition to cost consciousness, which was discussed above, there are two attitudinal variables which have significant relationships to appliance conservation. People who are already predisposed toward conservation, hardly surprisingly, conserve more in their usage of appliances. This is true for those favoring in their attitudes both energy conservation in particular and general conservation in their lives. These relationships are about the same as they were for Equation 1 and changed only slightly from the simple correlations.

All of the variables together in Equation 2 explain 12 per cent of the variation in appliance conservation. While this is not a particularly impressive result, it does show that appliance conservation is far from a random activity. It is at least reasonable to expect that even more variation could be accounted for by a more representative measure of appliance usage than the one utilized in this study.

Conclusion. Given these results, what can be said about the possibilities of affecting appliance conservation, so as to induce more conservation? That the bulk of the variance in appliance conservation accounted for must be traced to the demographic variables does not hold out a great deal of promise for affecting appliance usage. These are the variables, after all, that are most difficult to change since they are essentially fixed characteristics rather than the more readily changeable attitudes or perceptions. The education relationship, though, does suggest one possible strategy: educational campaigns designed to promote greater conservation in the use of appliances may well be influential for more educated people. At least there is something about education that enhances conservation here, ceteris paribus.

The real promise for affecting greater conservation in appliance usage, though, lies with the attitudinal variables. Campaigns to point out how costly inefficient usage of appliances can be will continue to have effects on the cost conscious and possibly even increase the relationship beyond that which we report here. Continuing inflation (surely not a desired government policy) may make individuals more cost conscious, thus affecting this relationship in a quite different way by simply adjusting the distribution of the attitude, so that a larger number of people pay attention to cost. Also, campaigns focussed on those predisposed to conserve might make them more likely to extend their conservation into the appliance area. This could have a desired effect both for general and energy conservation.

It is crucial at this point, however, to qualify the results of this analysis and the interpretations we have derived from them. The measure of appliance usage analyzed here is a highly restricted one. Before we assign a high degree of confidence to its relationships to the various endogenous variables in the model, it is important to expand its coverage of appliance activities and to achieve greater variance in the distribution. We are less confident that this measure represents the underlying dimension of activity which is of interest here than we are for any of our other measures.

Chapter 9

Explaining Transportation Conservation

An important share of all the energy used by Americans lies in the area of transportation. Indeed it is in this area that the United States appears most different from other industrialized nations. Americans are highly attached to the automobile as the principal means of transportation -- on short trips around town, in the commute to work, and on vacations. We depend more on our own cars than do the citizens of any other nation in the world. Our dependence is so extensive that the American way of life is organized around the usage of the automobile. For years this has been encouraged by the relative inexpensiveness of gasoline, but beginning with the Arab boycott in 1973 and continuing with the OPEC cartel's setting of world oil prices, the relative cost of gasoline has increased. These rising costs of gasoline for the consumer and the increasing dependence of America on foreign supplies of oil have posed major problems for the nation. Transportation has become one of the primary areas where substantial energy conservation is urged by national leaders. Yet, the automobile is so integral to American life that transportation conservation has been very difficult to achieve.

Transportation conservation is measured in this study by an additive index including a number of usages of the automobile in which conservation can be achieved -- the use of the car for short trips around town and for longer vacation trips, carpooling and taking mass transit in the trip to work, purchase of an economy car, and driving speed on the highways. The distribution of respondents on this index is presented in Table 9.1. Deleted as missing data is the significant number of people who own no car, so that the index understates transportation conservation.

What is immediately apparent from Table 9.1 is that almost all Pittsburghers conserve to some extent in their use of the automobile. Some of them achieve minimal conservation by reporting compliance with the law (as generally enforced) in driving under 60 MPH on the highway. On the other hand, very few Pittsburghers conserve a great deal: only slightly fewer than 17 per cent conserve on more than half of the six activities. Least likely to be the focus of conservation are vacation trips by bus or train and leaving the car at home in the trip to work. Thus, the data show that there is considerable room for further conservation in the transportation area. They also show, from a methodological perspective, that the transportation measure assumes the general shape of the normal distribution, which makes it ideal for correlation and regression analysis.

TABLE 9.1

Distributions of the Transportation Conservation Index

Number of Conserving Activities	0	3.4%	
	1	18.7	
	2	32.9	Mean = 2.40
			Median = 2.35
	3	28.3	Standard Deviation = 1.15
	4	13.2	
	5	3.0	
	6	0.5	
		100.0%	(N = 562)

Conservation in the transportation area has been the focus of considerable effort by both the government and private campaigns for conservation. The results of these efforts have not been very substantial. Although the Arab oil boycott did lead to more conservation in the use of gasoline in the short run, Americans have not changed their transportation patterns very much over the long run, except perhaps to be more willing to purchase economy automobiles. Undoubtedly, more success in these efforts could be achieved if there were a better understanding of the characteristics which differentiate conservers from non-conservers. It is to this task that we now turn, focussing upon the relationship between the independent variables used so far in this study and our transportation conservation index.

Table 9.2 presents the results of our analysis of the relationships between the independent variables and transportation conservation. Column 1 contains the simple correlations between transportation and each independent variable. Column 2 contains the standardized regression coefficients for equations estimated with each set of independent variables separately. Finally, in column 3 are the standardized coefficients for each of the important predictors from column 2, now considered together.

Simple Correlations. Looking first at the simple correlations, it is immediately apparent that few of the independent variables are related to the usage of the automobile. None of the demographic variables is substantially related to transportation, although three of them are significant. The automobile is used less by those with lower incomes and less by those who expect declines in future real incomes. It is also used less by women. That affluence and role are related to conservation in the usage of the automobile is to be expected, but that these relationships are so modest may be a bit unexpected. They may simply bear witness to the fact that automobile usage is such an integral part of American life that no group of Americans is differentially disposed to it.

A few relationships of similar or greater strength emerge from the attitudinal and perceptual variables. Those respondents who derive more satisfaction from energy conservation are more likely to conserve in their use of the car. So too are those to whom saving money is an important consideration, and, to a slightly lesser extent, those who are concerned about the energy situation today. Among the perceptual variables, perceived impact of both the energy situation and the coal strike are related to transportation conservation. In each case, perceptions of impact are related to greater conservation. Attitudes and perceptions, in short, do seem to have some effect on conservation in the transporation area, although we must await the results of the multivariate analysis to weigh their effects more precisely.

Finally, it is gratifying to find that none of the situational variables attains the levels of relationship of these other independent variables. This is because there are no theoretical reasons why one should expect a relationship. The situational variables measure characteristics of the home and home owning -- matters which only incidentally involve use of the automobile. These low correlations, and the absence of any significant regression coefficients in Equations 1 and 2, justify on empirical grounds an elimination of discussion of these independent variables, precisely what we would want to eliminate on theoretical grounds.

<u>Equation 1</u>. The demographic variables explain a very modest 2 per cent of the variation in transportation usage. Only one of them enjoys a significant relationship with transportation conservation even after controlling for other demographic factors, but three achieve magnitudes near significance. Those

TABLE 9.2

Explaining Transportation Conservation[a]

	Simple Correlations	Equation 1	Equation 2
Demographic Variables			
Sex	.07	.07	.07
Education	.02	.09	.01
Income	-.10	-.11*	-.11*
Age	.03		
Race	.04		
Income decline	.09	.07	.08
DEMOGRAPHIC R^2		(.03)	
Situational Variables			
Age of residence	.06		
Size of residence	-.06		
Ownership of residence	-.04		
SITUATIONAL R^2		(.01)	
Attitudinal Variables			
Political confidence	.05		
Political trust	.06		
Sophistication	.03		
Energy conservation	.13	.11*	.15**
General conservation	.04		
Energy pessimism	.06		
Cost consciousness	.10	.12**	.06
Non-materialism	.03		
Energy concern	.08		
Innovativeness	-.03		
Companies not cause	.05		
ATTITUDINAL R^2		(.04)	
Perceptual variables			
Energy impact	.07	.07	.13**
Coal strike impact	.08	.08	.11*
Pacesetter recognition	.01		
Group encouragement	-.01		
PRECEPTUAL R^2		(.01)	
OVERALL R^2			(.07)

[a]The regression coefficients are standardized or Beta coefficients. They are single starred when significant at the .05 level and double starred when significant at the .01 level.

with lower incomes are significantly more likely to conserve than those with higher incomes. Females are more likely to conserve in their use of the automobile than males. Finally, those who feel less confident that their future income will keep up with inflation and those with higher levels of education are more likely to conserve.

These relationships were hardly unexpected. Use of the automobile is such a central feature of American life that it occupies a special niche in status determinations. It is a fair assumption that driving is the higher status activity of any other form of transportation, and that, ceteris paribus, those who can afford to drive will do so. Public transportation, to work or on vacation, is left for those with lower levels of economic affluence and for women. The relationship of sex to transportation conservation is an interesting one. In the focus group sessions conducted before our field work began, we uncovered the tendency of males who were strongly attached to the car as a means of transportation to, nevertheless, be willing to have their wives use mass transit even when they themselves would not do so. This makes women appear more conservation-oriented than men in the same family. The regression equation which contains these variables, though, can account for so little variation that we must look elsewhere if we are to explain transportation conservation.

One of the remaining equations in column 2 does a bit better. The attitudinal variables account for more variation than the demographic variables, although the amount is still small. Two attitudes attain individual significance. The respondent's cost consciousness, an index of how likely he or she is to seek out lower prices, is related to transportation conservation. Here is the operation of the rational consumer: since transportation conservation is likely to be cost effective, there appears to be some willingness to give up the car for some purposes or to use "economy" cars. The other attitude which enjoys a significant relationship to conservation is our measure of whether energy conservation *per se* is a good thing. Here again the expected relationship appears: those who value energy conservation are more likely to practice it, although the magnitude of the relationship may be surprisingly low.

The perceptual measures, on the other hand, account for a trivial 1 per cent of the variation in transportation usage. Two of them, perceived impact of the coal strike and of the general energy situation, come close to being individually significant. At first glance, that the coal strike variable has even some impact seems rather puzzling. After all, what does the coal strike have to do with gasoline conservation or usage of the automobile? Given more careful consideration, however, it seems likely that our coal strike impact question measures a sensitivity to the dangers inherent in today's energy situation. Such a sensitivity may make someone more likely to conserve across the board, including transportation.

Equation 2. When all of the Equation 1 variables are placed in a regression equation with transportation conservation, the picture reported above changes very little. The equation explains 7 per cent of the variance in individuals' usage of the automobile. More of the factors related to conservation remain unspecified in our equation for transportation than was the case in any of the other energy usage areas. In this equation, general attitudes toward energy conservation and perceived impact of the energy situation and the coal strike emerge as the most important variables. All of them represent a general sensitivity to the energy situation, and, as a result, concern for conservation.

Communications designed to induce conservation and to increase concern about the energy situation in America have apparently had some effect, for those who are energy conserving in attitude and those who feel affected by the energy situation conserve more in the transportation area. But, they do not conserve much more than those who do not share these attitudes! The many Pittsburghers who are conserving and affected, but who do not practice transportation conservation, form an important audience for future communications. More attention to persuade them to be consistent in attitudes and behavior, following the dictates of cognative dissonance theory (Festinger, 1957), might produce handsome dividends.

In comparison with the effects for these attitudes, the impact of demographic variables is meager indeed. Only income exhibits a significant relationship, with the poor practicing greater conservation. This may well reflect the pervasiveness of the American's attachment to the automobile -- an attachment that permeates most sectors of society. Our entire society is organized around usage of the car -- from the sprawling suburbs to the superhighway system throughout the nation.. So strong and pervasive is this attachment that it cuts across all sub-groups of the American population. Indeed, even many who conserve in the usage of the automobile do so, not because they want to, but because they have little choice. Mass transit ridership in Pittsburgh, as perhaps in other American cities, is heavily concentrated among the poor. Even among those in our sample who understand the need to conserve, conservation is more likely to be achieved in other areas than in transportation.

This interpretation suggests that federal policy to induce conservation by appealing to people directly is likely to achieve less success in the transportation area than in the other areas. One reason for this is that, in the absence of a clear distinction between conservers and non-conservers using the kinds of independent variables adopted in this study, it is difficult to identify the levers for affecting energy usage in transportation at the individual level. A much more productive path is likely to be an indirect approach: to modify the nature of the automobile usage choices that Americans face. Instead of trying to drive Americans away from using the car, energy savings are more likely to be accomplished by forcing manufacturers to make the cars that Americans buy more energy efficient. Likewise, the provision of incentives to mass transit riders (for instance, by making mass transit faster and more comfortable) is likely to be more effective. Auto efficiency standards for producers and support for mass transit are also likely to be much more acceptable politically than sanctions against use of the automobile. When the government moves beyond trying to persuade people to do socially beneficial things, particularly where so "sacred" an activity as driving is concerned, it risks widespread public resentment of government. In a democratic society (and even in non-democratic ones), this resentment can be quickly translated into political action. Thus, policies which attack automobile usage directly are likely to fail and to undermine other conservation efforts.

Data on perceptions of the different modes of transportation which come from the summer study lend some support to the interpretation we have outlined here. The most important impacts on the <u>desirability</u> of using various modes of transportation to get to work and to go on vacations are, invariably, comfort and convenience. Noticeably less important are cost considerations. And most Pittsburghers believe that driving their own cars to work, rather than taking mass transportation, or on vacation, rather than taking a bus, is much more comfortable and convenient. Thus, even in these days of higher gasoline prices, the automobile maintains significant advantages in most peoples' minds, advantages which are unlikely to be erased by governmental efforts of any sort, or, it seems, from additional sharp increases in gasoline prices.

Finally, one additional explanation must be suggested for the weak predictive power of our model where transportation conservation is concerned. In Chapter 3, we found that self-reports of transportation conservation were highly exaggerated. In fact, only in the transportation area was there reason for concern about the unreliability of self-reports. We detected little relationship between our independent variables and biased reporting, signifying that the tendency to exaggerate was randomly distributed within the sample. Such a wide incidence of random exaggeration has the effect of attenuating the relationships between the independent variables in our model and transportation conservation. Attenuation in the transportation area is disturbingly high. If we could correct for this attenuation, we have little doubt but that the relationships for transportation would achieve the magnitudes of those for the other types of conservation. Of course, the fact that exaggeration is large only for this type of conservation underscores the interpretation outlined earlier in this chapter: the use of the automobile is so central to the American way of life that many will protect it even if it means over-reporting the extent of their conservation.

Chapter 10

Explaining Electricity Reduction

During the winter of 1978, the United Mine Workers were on strike against American coal producers. The effects of this strike were most severe in those states which made heavy use of coal in the generation of electricity and for industrial purposes, and in which most of the miners were members of the UMW. Pennsylvania (along with other states just to the west of it) was hit particularly hard by the strike. And it was the western part of Pennsylvania which was most affected, as this was the section most dependent upon coal for the generation of electricity and also a center of UMW strength. As the coal strike wore on through the month of February, there were dire predictions that Allegheny County utilities and industries might run out of coal. These predictions proved highly exaggerated for coal supplies held up even as the strike was prolonged into March. However, for a time, Allegheny County residents were led to believe that they could expect severe shortages of coal and the electricity that it produced.

Since we began our Wave I survey in late February when the coal strike was at its peak, we attempted to measure how Pittsburghers were reacting to the prospect of coal shortages. About half of our respondents reported that the coal strike had already had some impact on them. Most of these anticipated higher costs of energy as the principal impact, but some reported experiencing shortages and having their work hours changed or reduced. We also asked our respondents if they had reduced their usage of electricity recently, assuming that recent reductions could be explained as responses to pleas to conserve because of the coal strike. Reductions in four areas were measured by respondent self-reports. The areas were lighting in the home, outdoor lighting, television viewing or stereo/hi-fi listening, and electric appliance usage. Only in the usage of indoor lighting did a substantial number of our respondents report any recent reduction: just over two-thirds of them said they had reduced lighting used in their homes, with about a third of these saying that they had done so a lot. In the other three areas, no more than one third reported a reduction, and the reductions made were typically not very substantial.

We used responses to these four questions to compute an electricity reduction index by simply counting the number of areas in which the respondent had cut back on electric usage. An unusually large total of 268 respondents were excluded from the index, almost all of whom did not use outdoor lighting. For those who remained, the distributions of index scores are presented in Table 10.1. This table shows that only a few respondents cut their usage of electricity across the board at the time of the coal strike. Only 9 per cent cut on all four activities, while another 17 per cent cut on three of the four. More common was no reduction whatsoever or a reduction on one activity, usually indoor lighting. From these results, it seems fair to say that most Pittsburghers did not heed the strong admonitions to conserve. Perhaps they did not believe that the coal strike would have the serious consequences many had predicted -- consequences, it should be added, which turned out to have been vastly overstated. Or perhaps they left conservation for other people, feeling that they were doing all they could already to conserve in their usage of electricity.

Some of the variations in electricity reduction can be accounted for by the demographic, situational, attitudinal, and perceptual variables we used in our earlier analysis. Table 10.2 presents the simple correlations and the two regression equations for these variables and the reduction index.

TABLE 10.1

Distributions of the Electricity Reduction Index

Number of Conserving Activities	0	21.8%	
	1	26.3	Mean = 1.65
			Median = 1.57
	2	25.7	Standard Deviation = 1.24
	3	17.2	
	4	9.0	
Total		100.0%	(N = 513)

Simple Correlations. While none of the simple correlations is high, there are a few variables which show substantial relationships to electricity cutbacks since January. Women were more likely to report cutbacks than men, perhaps because they are more likely to be in the home for long periods of time and are the ones to carry out the cutback. (We did not ask what the division of labor was between husband and wife in the area of electricity usage. In use of the thermostat, though, the wife was much more likely than the husband to make the decisions. Electricity usage control and heat control are similar activities, and it seems likely that the wife would be the decision-maker here as well.) Cutbacks were also reported more frequently among those with higher income. Among the situational variables, ownership of a home stands out: home owners were much more likely than renters to reduce, possibly because the effects of a reduction on electric bills were more apparent to them since some renters did not pay electric bills. Among the attitudinal variables, two explanatory variables enjoy some prominence.

Those who were pessimistic about the energy situation and those who were worried about it were both more likely to take steps to reduce electric usage. Finally, no variables stand out among the perceptual set. What is rather surprising here is that perceived impact of the coal strike has virtually no relationship to electricity reductions. Perception of impact, then, clearly does not induce someone to cut back.

Equation 1. Because many of the explanatory variables are themselves interrelated, regression equations were estimated for each set of explanatory variables to attempt to isolate their true contributions to reductions in the usage of electricity. The results of this analysis are presented in the second column of Table 10.2 which contains the standardized regression coefficients. Clearly, the most important set of explanatory variables is that which contains the demographic attributes of the respondents. This set accounts for 7 per cent of the variance in reductions, while the situational and attitudinal sets can account for only 5 per cent each, and the perceptual set virtually none (at 1 per cent).

Each of the demographic variables has a larger impact once the effects of the other demographic variables are taken into account. Income becomes the best predictor in the set, with sex falling into second place. Education, previously only weakly correlated with electric reductions, doubles in size from the simple correlation.

The nature of the relationship with education, though, is rather puzzling. The more education one has, the less likely reductions are to be made. What is puzzling about this relationship is that it runs directly opposite to that for income -- a variable which is usually assumed to operate very much like education. Income and education are highly correlated themselves ($r = .58$), but their relationship is pulled apart in the multiple regression

TABLE 10.2

Explaining Electric Conservation[a]

	Simple Correlation	Equation 1	Equation 2
Demographic Variables			
Sex	.17	.19**	.14**
Education	-.08	-.16**	-.11*
Income	.11	.21**	.18**
Age	.03		
Race	-.03		
Income decline	-.02		
DEMOGRAPHIC R^2		(.07)	
Situational Variables			
Age of residence	.08	.11*	.06
Size of residence	.05		
Ownership of residence	.19	.20**	.11*
SITUATIONAL R^2		(.05)	
Attitudinal Variables			
Political confidence	.06	.08	.14**
Political trust	-.02	-.08	-.06
Sophistication	-.03	-.03	
Energy conservation	.09	.09	.08
General conservation	.07		
Energy Pessimism	.10	.09*	.08
Cost consciousness	-.04		
Non-materialism	.01		
Energy concern	.14	.12**	.11*
Innovativeness	.04		
Companies not cause	.02		
ATTITUDINAL R^2		(.05)	
Perceptual Variables			
Energy impact	.00		
Coal strike impact	.03		
Pacesetter recognition	-.02		
Group encouragement	.07		
PERCEPTUAL R^2		(.01)	
OVERALL R^2			(.11)

[a]The regression coefficients are standardized or Beta coefficients. They are single starred when significant at the .05 level and double starred when significant at the .01 level.

equation. Perhaps what is happening here is that the more powerful variable (income) captures the basic relationship, carrying with it those highly educated and high income respondents who are reducing. What remains are those respondents who do not follow this pattern, because they are not reducing. Thus, our analysis is probably somewhat artificial in separating the effects of the two variables, although the original negative relationship between education and reductions does not permit attribution of total artificiality to it. It seems fair to conclude that income does induce more conservation, but not because it is a surrogate for higher levels of education. Perhaps people with higher incomes are simply more attuned to the cost of utilities and are conserving as a result. This is an interpretation which runs counter to our expectations and seems to contradict the dictates of economic rationality. One alternate explanation is that the poor are already frugal users of electricity and cannot make marginal reductions without undergoing real suffering.

The results of the regression analysis with the situational and perceptual variables are little different than they were with the simple correlations. For the situational variables, home owners still are substantially more likely to reduce their electric usage, as are those in older homes. The relationship for age of residence is a bit stronger than it was for the simple correlation. For the perceptual variables, no relationship passes the threshold for significance.

For the attitudinal variables, on the other hand, the originally important variables remain important, and they are joined by other variables that did not appear to have much relationship to electric reductions in the correlational analysis. Pessimism about the ability of the United States to avoid severe energy shortages in the future and general concern or worry about the energy situation both contribute to the individual's reduction in electric usage during the coal strike period. Favorable attitudes toward energy conservation also have an impact. These relationships appeared in the correlational analysis, but two of the three are slightly lower in the multiple regression run.

The variables which emerge as important for the first time in Equation 1 involve attitudes toward the political system. Those respondents who have confidence in the ability of the authorities to handle the energy situation are more likely to have reduced their usage of electricity. Perhaps their confidence predisposes them to adhere to the injunctions of political leaders to attempt to cut back in order to avoid the dire consequences of the coal strike. By contrast, those who exhibit more trust in political authorities generally were less likely to cut back. This is a puzzling finding for us, since it contradicts the interpretation we posed for the confidence-reduction relationship. But, it seems to be largely artifactual as is demonstrated in the original simple correlation and in the results of Equation 2 where it disappears when other kinds of explanatory variables are taken into account.

Equation 2. The third column of Table 10.2 contains the standardized regression coefficients for our final regression equation, in which all previously important explanatory variables were entered simultaneously. These variables together account for 11 per cent of the variance in electricity usage. While most of the electricity usage remains to be explained, this equation accounts for a clearly significant and meaningfully large amount of it.

The demographic variables are the most important. While their effects are reduced from what they were in Equation 1, they are still generally higher than the coefficients for the other sets of variables. Income is substantially related to electricity usage: those with higher incomes reduced their consumption of electricity during the coal strike period, while those with lower incomes did not tend to do so. Females were more likely to reduce their usage than males. Finally people with less education are more likely to reduce than those with more.

Each of the relationships between a demographic variable and electric reductions should give pause to those who have offered simple demographic accounts of energy conservation and reactions to the coal strike. Those likely to be hit the hardest (in marginal terms) by higher prices, the poor, were not the ones most likely to react to the situation early in 1978. It is probable that the effect on the pocket-book did not govern behavioral reactions to the coal strike. One clear reason for this is that coal-strike-induced increases in electric rates had not yet been passed on to consumers. Coal strike conservation must be explained on other grounds. The putatively greater attention of those with higher status to messages about the need to conserve and the effects of the coal strike also did not have much apparent effect. While we may expect these individuals to be a bit more aware of what was being said about the dire consequences of the strike, the negative relationship between education and electricity usage during the time period indicates that the better educated were definitely not more compliant. Indeed, compliance seems to cut the other way. At each income level, it is the less educated who have complied more with requests to conserve. Education probably leads our respondents to be less willing to comply unquestioningly. It may be that the lack of congruity between warnings of a coal shortage and the maintenance of coal stockpiles was seen by the better educated, leading them to ignore the crisis rhetoric.

The relationship between sex and electric usage seems explicable by the presumed tendency of females to make the decisions in electric usage in most families. If anyone is to cut back in the home, it is likely to be women since the male engages very little in those activities and may even leave conservation explicitly to his wife. The message which may be derived from this discussion is that communications designed to induce electric usage conservation should be directed to women more than men, since women are more likely to conserve and may be more likely to make the conservation decisions in the area.

Next in importance are the attitudinal variables. The effects of one of the attitudes seems to have been masked by the effects of other predictors. This attitude is political confidence, which attains now the highest magnitude of the attitudinal variables. Those who are more confident are more likely to have reduced their usage of electricity. The most reasonable explanation for this is that these respondents have complied with the requests of the authorities (who were urging conservation in electric usage) because of their confidence that the authorities had a firm grasp of the energy problem and were making requests which should be honored. In this view, confidence in the authorities at the national level gives a certain legitimacy to messages consonant with their pleas and brings about compliance. It is also of considerable significance that the rather puzzling negative relationship between political trust and electric usage falls far short of significance in this equation. The more robust relationship found earlier in Equation 1 can be attributed to the relationship of each of these variables to some third variables in the demographic or situational sets. There is no anomaly to be explained here.

One additional attitudinal variable is significantly related to electricity reductions. Concern about the energy situation increases one's reported reduction of electric usage -- another finding that is very much as might have been expected. This attitude seems very close to the behavior in question. Worry about the energy situation should increase the likelihood of action. What is perhaps unexpected about this relationship is that it is not higher. There are a lot of people who are concerned about the energy situation who did not take special steps in the wake of the coal strike.

It is also of importance to examine those attitudes which did not exhibit any relationship to electric usage reduction. General conservation and pessimism might be expected to lead one to take steps to reduce given the nature of the coal strike. No relationships are found for them, indicating that the strike did not activate the full range of energy-relevant attitudes. Furthermore, a concern with saving money generally had no impact on electric reductions. Thus, while rational economic behavior might have led one in this instance to attempt to cut back in order to avoid higher future electric bills, this behavior was not considered relevant in this context. It is more likely that Pittsburghers regarded the coal strike as an isolated event and did not think much about future cost increases to pay for other more expensive energy sources. That higher electric bills did not appear until much later certainly supported them in this orientation.

The only situational variable that bears a significant relationship to electric usage is ownership of residence. Owners are more likely to cut back than renters in spite of the fact that the other attributes of home owners (higher income, higher education, and the like) have been controlled. There is apparently something about being a home owner that predisposes one toward greater responsibility in conservation. Since almost all of our respondents paid their electric bills, that something is manifestly not connected to money saving. It is not immediately clear why, but the greater conservation-proneness of home owners is undeniable.

Conclusion. What are the implications of these findings for inducing conservation among the Allegheny County public? For one thing, campaigns directed at changing attitudes would appear to have a chance of achieving some success in effecting crisis cutbacks. Concern about the energy situation, a disposition which has presumably been affected to some extent already by the talk about the energy situation, does lead people to cut back in a crisis situation. If these attitudes were more widespread and the reported relationship held up, there would have been more responsiveness to appeals to reduce in view of the coal strike. Furthermore, greater emphasis on the attitudes might make people realize the dissonance between their attitudes and their behavior.

It is much more difficult to conduct a campaign to increase popular confidence in the policy performance of governmental authorities in the energy area. To some extent, respondents who lack this confidence share the feelings of cynicism toward government which are widespread in America today and which have been pronounced since the mid-1960's. Only an entirely different political climate, such as was operative in the late 1950's and early 1960's, could yield changes in these attitudes. In the face of the pervasive cynicism of our times, changes in attitudes along the confidence lines will be difficult to achieve. Perhaps the best that can be hoped for is decisive performance of governmental leaders in the energy area. Passage of the energy bill may be of some help, although the lengthy squabbling within Congress and between the President and Congress over the shape of the bill may well have been detrimental to public images that either or both could be counted on to handle the energy situation. It is likely too that "doomsday" rhetoric about the energy situation, like that which accompanied the coal strike and predicted serious consequence which never appeared, further saps the confidence of the public in the performance of its leaders in this area.

Beyond attempts to change attitudes, opportunities to produce greater energy conservation in a crisis situation (as was the case for the coal strike) would seem to be limited. The demographic attributes of individuals, while they provide us with some insight into the composition of the conservers and some grounds for accounting for conserving behavior, are not manipulable. It might be worthwhile, though, to direct energy conservation pleas more to females than males. At least women exhibit a greater willingness to comply with them in the Pittsburgh area. Furthermore, some attempt should be made to determine why it is that those with lower levels of education are more inclined to respond to a crisis situation by reducing their usage of energy. Perhaps they are more obedient in general, as previous psychological studies have found, and this obedience generalizes to the electricity area. Nor is it very likely that the relationship between home ownership and electric reductions can prove exploitable in the future. Home ownership is manipulable by government through interest rates and a variety of other tools, but it is foolish to manipulate it for energy policy purposes. Thus, here too our results offer little advice to those whose task it is to induce more energy conservation.

This discussion must end with a consideration of the kind of behavior which is under examination here. During the coal strike in this part of the country, people were asked to reduce their usage of electricity because of short-run problems -- the potential shortage in coal supplies. Our data indicate that some complied with this injunction. However much they had been conserving, they conserved even more in the early part of 1978. We can account for a part of this reported conserving behavior, but it is important to make clear that we are not accounting for long-term or continuous conservation in the electric usage of Pittsburghers. Instead, we have shown which variables are related to crisis-response energy saving. These are not necessarily the same variables as appear to affect longer-range behavioral changes, as can be seen in our analysis of the other measures of energy usage.

Along these same lines, a much more qualified judgment should be passed on. A number of our respondents mentioned to the interviewers in passing that they had been misled concerning the seriousness of the coal strike. They felt that the consequences of the strike had been severely exaggerated purposively, though they did not agree on the motivations which lay behind this misrepresentation. Leaders should be aware of the great danger in overreacting to a potential crisis, just as they are aware of the grave problem which occurs from underreaction. There is a threat in the coal strike aftermath that people will be less willing to believe their leaders when they talk about how serious an energy-related crisis may be in the future. Since a key problem in the energy situation is to convince people to conserve so as to head off possible shortages and much higher prices in the future, the credibility of leadership pronouncements is important. This credibility was surely strained by inflated coal strike rhetoric and the subsequent failure of the coal strike to have consequences that were as serious as predicted. If our respondents are typical, Americans may be less responsive if a new energy crisis occurs in the future.

Chapter 11

Conclusion to Part II

An enormous amount of ground has been covered from Chapter 4 through 10 in identifying the factors related to energy conservation. The regression model incorporating demographic, situational, attitudinal, and perceptual variables has accounted for differing amounts of variation across the types of energy conservation. The variable types themselves have not been consistent in their explanatory strength. Finally, different variables have emerged as important from one type of conservation to another. From these results, it is clear that energy conservation is a highly complex set of activities requiring complex explanations -- explanations which may not be the same for any two kinds of conservation behavior. Thus, in order to see the broader canvas in explaining energy conservation, it is critical that we attempt to summarize at a more general level what has been found in the preceding chapters.

<u>The Explanatory Power of Our Models</u>. The variable types individually and the final regression models vary considerably in terms of their relationships to energy conservation types. Table 11.1 summarizes the results from the preceding chapters in terms of variance explained or the R^2 statistic. The dissimilarity of results is seen quite clearly as the table is read across each row.

In terms of overall variance explained (row 5 of Table 11.1), our ability to account for conservation behavior with the important variables in our model ranges from an impressive 29 per cent to rather modest 7 per cent. We do the best in accounting for general conservation. This dependent variable itself possesses the greatest variability among the conservation measures and is probably, as a result, the most reliable of all our measures. But methodological reasons alone do not account for the impressive results. Rather, the findings for general conservation make

TABLE 11.1

Relative Importance of Variable Types*

	General	Winterization	Heating	Cooling	Appliance	Transportation	Electricity Reductions
Demographic Variables	8%	8	3	7	8	3	7
Situational Variables	16	16	2	3	1	1	5
Attitudinal Variables	10	5	5	5	6	4	5
Perceptual Variables	3	1	4	0	1	1	1
All Important Variables	29	24	10	12	12	7	11

*Entries are the percentages of variance in the column variable explained by the different row variables. These figures are taken directly from the entries in parentheses which appear in columns 2 and 3 of Table 4.2, 5,2,6.2, 7.2, 8.2, 9.2, and 10.2.

it clear that conservation is not a random activity. There is considerable patterning to it, at least at the general level: people with similar traits and dispositions tend to behave similarly with regard to general conservation. This result gives us very good reason to believe that we can understand much better why people do and do not conserve. Such an understanding lays the foundation for rational energy conservation policy.

The results are also impressive for winterization conservation. Almost one quarter of the variation in that reported behavior is accounted for by our "explanatory" variables. The winterization index itself varies much less than the general conservation index and is probably less reliable. This makes our ability to account for a substantial amount of variance in it all the more impressive. We have surmised that winterization requires more commitment, particularly of a financial sort, than any other type of conservation. This makes the steps between each level of the index steeper, allowing our predictor variables to be more discriminating. Rather than a measurement-induced quality, this is surely a feature of winterization activities themselves. Each of them is simply harder to perform. Whatever the explanation, it is obvious that there is clear patterning to winterization behavior. People with the same traits are led to do the same things here, as they were with general conservation.

Beyond these two types of conservation, there is a substantial drop in the explanatory power of our models. Four types of conservation, involving usage of appliances, cooling, electricity, and heating, are explained only about half as well as winterization. While methodological factors may influence this in part, it seems more likely that the reasons for conservation in each of these cases are simply more complex -- that behavior is less patterned than before. Because the determinants of behavior are less apparent here, successful energy policies are less likely to be achieved for these conservation types.

After all, it is difficult to change behavior when the reasons for that behavior are unknown.

Finally, our model does least well in accounting for conservation in the transportation area. Measurement unreliability is high for this index, and this surely reduces the explanatory ability of our model. Furthermore, as we suggested in the chapter on transportation, reliance on the automobile may be such a pervasive feature of American life that diversity in orientation toward it is dampened. The automobile has become a psychic and material necessity of American life. Americans aspire to own automobiles. Indeed, many aspire to own the least energy efficient automobiles. Furthermore, those who own automobiles have grown used to driving them. This suggests that reductions in automobile usage will be very difficult to achieve. Not only are Americans highly attached to their cars, but also the weak patterning to variations in that attachment gives us precious few levers for changing those attachments. Detecting the dispositional correlates of transportation conservation must rank at the top of the agenda for future research.

The Explanatory Power of the Variable Types. The first four rows of Table 11.1 present the results of Equation 1 in terms of variance explained for each variable type separately. These results too are characterized by a wide range of values -- although not quite as extensive a range as was found for overall variance explained. Overall, the situational variables are the most potent, explaining 16 per cent of the variance in two cases. Least potent are the perceptual variables, which explain no variance in one case and only 1 per cent of the variance in four other cases. Except for the perceptual variables, each variable type ranges fairly widely in explanatory power across the types of conservation. The situational variables, for example, explain only 1 per cent of the variance in two cases in contrast to 16 per cent in two other cases. Thus, the complexity of the energy conservation picture increases dramatically when we move a step closer to the specific factors.

The demographic variables account for their greatest amounts of variation in general conservation, winterization, appliance usage, cooling, and electricity reductions. Except for electric, these types of conservation share one characteristic which may make the demographic variables relatively more important than they are elsewhere: they all involve costly purchases. Conservation requires outlays of capital in winterization and general conservation, while it requires people to refrain from purchasing costly (but desirable) items in the cooling and appliance areas. Heating, by contrast, involves discretion in the usage of things already possessed, as does transportation to a lesser degree. Purchases impose a financial constraint on behavior which may be stronger than predispositional factors, and it is income that is the most significant demographic variable. Income cuts both ways where conservation is concerned. Where conservation is enhanced by purchases (i.e., winterization), those with more income are more conserving. Where conservation is limited by them (i.e., air conditioning), the poor appear to be more conserving.

However, that demographic variables do not account for more variation, even before controls for other types of factors are imposed, suggests that energy conservation can not be fully understood by examining social structural attributes of our respondents. The fact that such attributes are measured more reliably than most of the other variables, furthermore, increases their measured impact relative to other variables. The promise of greater understanding and certainly greater possibility to effect change would appear to lie more with situational and attitudinal variables.

The situational variables account for substantial variation in general conservation and winterization, but for almost trivial amounts in all other areas of conservation but electric reductions. Home ownership is the predominant situational factor here. It stands to reason that ownership will affect one's willingness to invest in insulation for the home and general conservation, which builds in winterization activities. Conversely, situational factors should not and do not have an impact on appliance or transportation conservation, since these activities bear no relationship to features of the home. It is rather puzzling, though, that situational factors relate to electricity reductions since so few of our respondents do not pay electric bills. Perhaps renters, whether or not they pay their electric bills, think less about possibilities for electric conservation around the home because of the weak attachments to the home inherent in renting.

The attitudinal variables also show considerable variation in their relationships to the different types of conservation. They do best with general conservation, where the characteristics of the different types are submerged. The reason for this may be that the relationships of attitudes to conservation are expected to be rather constant across the types, while the situational and demographic relationships may be expected to vary in size and even direction. Of great significance is the fact that the attitudinal variables are never trivial in impact. They account for about the same amount of variation across the specific types.

Finally, the perceptual variables exhibit no better than weak relationships to conservation. Where the general conservation and heating conservation measures are concerned, the perceptual measures do best -- although relatively poorly in comparison with the other factors. Since heating conservation requires marginal alterations in behavior only (however difficult these alterations may be to induce), there is room for perceptions to have their greatest impact here. General conservation incorporates heating and several other items which require only marginal discretionary changes, so it too may be open to slight modification due to perceptions. Most of the remaining types of conservation, on the other hand, demand at least some foregoing of luxuries or monetary investments. Thus, it is not surprising that they are less affected by perceptions.

The Relative Importance of Different Variables. The results of the preceding seven chapters can be summarized in another way. This is by examining the relationships between each of the individual variables and the particular types of conservation. The data for this focus come from Equation 2 in each chapter. These data are presented, in summary form, in Table 11.2. It bears repeating that this table is based on standardized regression coefficients which have been controlled for other independent variables.

Five independent variables appear as important for more than several types of conservation. They are income, home ownership, a predisposition toward energy conservation, cost consciousness, and perceived coal strike impact. Income bears a significant relationship to conservation for four of the particular sub-types of conservation. In one case (appliance usage), the magnitude of this relationship exceeds the .25 level. However, income is not significantly related to general conservation. The reason is that the impact of income changes direction when we move from one type of conservation to another. For cooling, appliance usage, and transportation, income has the expected effect: people with lower incomes are more conserving. These relationships are consistent with the view that the marginal impact of energy price increases is felt more by the poor, thus leading them to conserve more. Such an interpretation

TABLE 11.2

Relative Importance of Different Variables*

	General	Winterization	Heating	Cooling	Appliance	Transportation	Electricity Cut
DEMOGRAPHIC							
Sex				-X **			X**
Education					X *		-X*
Income				-X**	-X**	-X*	X**
Age							
Race	X **		X*				
Income decline					-X *		
SITUATIONAL							
Age of residence				X **			
Size of residence							
Ownership of residence	X **	X **					X *
ATTITUDINAL							
Political confidence				X **			X **
Political trust		-X **					
Sophistication	X**						
Energy conservation	X**				X *	X**	
General conservation			X*				
Energy pessimism	X *			X *			
Cost consciousness	X**	X **			X **		
Non-materialism	X**			X *			
Energy concern	X**						X *
Innovativeness				-X *			
Companies not cause							
PERCEPTUAL							
Energy impact			X*			X **	
Coal strike impact	X *		X*			X*	
Pacesetter recognition	X *		X*				
Group encouragement							

Entries represent standardized regression coefficients from Equation 2 in Tables 4.2, 5.2, 6.2, 7.2, 8.2, 9.2, 10.2. X refers to a coefficient that was significant at the .05 level. X** refers to a coefficient that was significant at the .01 level. With one exception, a minus sign in front of the entry indicates that the relationship went in the opposite direction from that hypothesized. The exception is income where a minus sign indicates an expected relationship.

seems accurate where economy in usage is concerned. The poorer respondents in our study use air conditioners, appliances, and automobiles less. In addition, income plays an important role in whether poorer people have the items which consume electricity. Thus, income may have its impact in two ways: it may lead to economization in usage and to limitations in purchases in the first place.

The case for the constraints on purchasing imposed by income is illustrated also by one of the three insignificant relationships. People with lower incomes in our sample are slightly <u>less</u> likely to winterize their homes (B = .09). This is not because such people are uninterested in winterizing so as to save energy; they probably are. Rather, it is because the costs of winterization are simply too steep for these respondents. Given the same strength of motivation, those with higher incomes will be more likely to winterize. This highlights the importance of reducing the relative costs of winterization.

The relationship of income to heating, however, is not consonant with the marginal cost interpretation offered above. For some reason, income is not significantly associated with conservation here, even though the effects of other conditioning factors (such as greater education and home owning) have been removed. We remain puzzled by this finding, especially in light of the applicability of the marginal cost interpretation for other types of conservation. For some reason, heating conservation is different. Perhaps poorer respondents are not interested in reducing the marginal operating costs of energy after all, but are only constrained from additional purchases. Where these additional purchases would add to their energy usage, the reluctance of those with less income is seen as conserving. Where the purchases would cut their energy usage, on the other hand, the reluctance is tallied as non-conserving behavior. Thus, the marginal cost explanation holds up more where purchases are concerned than where usage or operation is the focus.

The importance of income is paralleled by the importance of an attitudinal variable, cost consciousness, which lends itself to the kind of explanations we have employed with income. In three cases, including significantly general conservation, those respondents who report paying close attention to cost conserve more in their energy usage. This finding holds even with controls for income. Furthermore, only for electricity reductions (which involve responses to crises more than to prices) does cost consciousness not emerge as significant in either Equation 1 or Equation 2. These findings show quite clearly that the picture of conservation as economizing is internalized by many. That the relationships are not larger, however, suggests that this message has not been received by all.

Attitudinal predispositions to conserve energy are related to energy conservation in three cases. This attitude comes closest to measuring conservation intent, and it should hardly be surprising that it does so well. But the relationship fails to achieve significance in four areas. It is difficult to explain why, but there is the possibility that conservation proneness is overwhelmed by other considerations here. Alternatively, these activities may be less identified by our respondents with energy conservation.

Two additional independent variables are significant for three of the types of conservation. The most important of these is clearly ownership of residence. The two highest coefficients in our entire analysis, both exceeding .30 in magnitude, appear when this variable is related to general conservation and winterization. When there is an energy-saving investment to be made, it is undeniable that home owners are more conserving than renters. This is probably not because they pay the utility bills and can expect to realize a return on their investments in energy savings. Most of the renters in our sample pay their utility bills also. Rather, we have hypothesized that ownership gives people an attachment to their residence that makes them think about improving it--to increase their equity because it belongs to them. Renters seem to be much less likely to develop this attachment.

The other independent variable which has a significant relationship to three types of conservation is perceived impact of the coal strike. Energy impact and Pacesetter recognition, the two other perceptual variables which appear as significant, overlap considerably with coal strike impact, even though they each generate significant relationships in one less case. There seems to be a pattern in the impact of the perceptual variables, for it is concentrated on general conservation, heating, and transportation. We can not offer any explanation for this patterning, and the question remains as to why perceptions are important in these instances and not for other types of conservation.

Six variables--sex, education, race, political confidence, energy pessimism, and energy concern--achieve significant relationships with two conservation types. Women were more likely to reduce their electricity during the coal strike but less likely than men to conserve in cooling. With electricity usage, we have perhaps entered a female domain. Women are more likely to make decisions on thermostat settings, as we have discovered in our analysis, and we surmise that electricity usage is a similar activity. Both involve what goes on within the home -- a traditional province of female dominance. The results for cooling, though, stand in sharp contrast to those for heating. Here men are more likely to conserve than women. There is no clear explanation for this result, and it seems to run counter to the explanations offered above.

Where education is concerned, the more frequent result is the unexpected one. We had expected that education would induce conservation. This expectation was derived, in part, from earlier studies which found higher support for conservation among the more educated. Not only did no significant relationships emerge for general conservation and four other types, but the two significant relationships which did emerge ran in opposite directions. Only where appliance conservation is concerned did people with higher education conserve more. The most that can be concluded from this is that the influence of education varies with the type of conservation being studied. The absence of significant relationships also leads us to suspect that education effects in previous studies may have been spurious.

The relationships between political confidence and cooling and electricity reductions are particularly intriguing. They document what may have been suspected but not demonstrated before -- that attitudes toward government do affect energy conservation. (See Sears et. al., 1978, for the finding of no impact.) A probable reason for this relationship is that energy conservation is championed by the government more than by any other institution in American life. Our respondents clearly identified it with the government, as is seen in their perceptions that the government encourages virtually all types of conservation activity. Given this, it should hardly be surprising that confidence in government in the energy areas relates to conservation in these two cases, particularly where cutbacks of electricity in a crisis situation are concerned. Credibility of the government as a source surely influences compliance with messages which emanate from that source.

Given this explanation, it is perhaps puzzling that the more general measure of trust in government, what we have called political trust, is not more strongly related to conservation. That relationship fails to reach the level of significance in all but one instance, where it is unexpectedly negative. Political confidence and political trust are related to one another ($r = .30$), but trust is quite general in its focus while confidence is mostly concerned with energy matters. For the various levels of political trust, our results seem to suggest that specific energy-related confidence is linked to conservation in ways that the levels of trust themselves are not. One possible explanation for this is that the attitude of political confidence is more proximate to energy matters.

Of all the variables used in our analysis, only size of residence, age, companies not cause, and perceived group encouragement were not significant in any of the regression equations. The remaining variables were significant in one case and could not form any meaningful pattern. Thus, we shall not discuss them in this summary. The reader should consult the preceding chapters for a discussion of each of them in the context of the conservation types with which they were related.

How Similar are Explanations for the Different Types of Conservation? Our identification of seven separate types of energy conservation implies that efforts to promote energy conservation will be more effective if tailored to specific activities than if generalized. Only where the same variable emerges as important over and over again for the different types can the differences in conservation activities be ignored. As we saw above, only five independent variables -- income, ownership, energy conservation, cost consciousness, and coal strike impact -- attain significance for at least three of the seven conservation types. Among these, the effects of income are not entirely consistent. Thus, we are left with only four variables as generalized "levers" for inducing greater conservation. For encouraging conservation in general, then, efforts should be geared to these variables. That the common denominators are principally attitudinal or perceptual in nature suggests, furthermore, that campaigns designed to have an impact on attitudes are good general approaches in promoting conservation.

There is another way to approach the question of similarity in explanations as we move from one type of conservation to another. That is to simply count the number of times coefficients are significant and in the same direction for any pair of energy conservation indices. Table 11.2 can be analyzed to provide these totals. The results of this operation underscore how different the various types of conservation really are. The measure of general conservation, contrary to what would be expected since it is aggregated from five of the six specific measures, shares very few variables with any of the other indices. Of the ten variables which are significant in the general equation, no more than two are significant in any other equation. Only two other pairs of indices have two variables in common. Each type of conservation, it seems fair to say, is unique. This calls for specific, rather than general, models of energy conservation behavior.

Conclusion. The results discussed in the preceding chapter and summarized to some extent here can help to form the empirical base for rational policies to promote individual energy conservation. The specific policy recommendations implied by these findings will be presented in our final chapter. Yet, the results are important beyond what they imply for specific policy-making activities. They constitute the first step toward the kind of understanding of human behavior that is necessary if attempts to change that behavior are to be truly effective.

It is important to reiterate, in closing, that these results come from a sample of Allegheny County residents interviewed during the winter of 1978. We are not sure how much we can generalize them to other places and other times. Furthermore, we have fit only the simplest of regression models to our data, leaving non-linear and non-additive models for later work. Thus, this study truly is only a first step toward greater understanding of conservation behavior at the individual level. Additional steps must be taken to improve the measurements of concepts used in our models to estimate more complicated models, and to extend these findings to other settings and other times.

PART III

THE IMPACT OF CRISES AND CAMPAIGNS

Having considered in systematic fashion the relationship of a variety of variables to energy conservation, we now turn to a more extended examination of two factors bearing upon the study respondents which were unique to the Pittsburgh area and the time of our study.

The first was the existence of a major campaign, called Project Pacesetter, to promote energy conservation in Allegheny County. This campaign was initiated before our study began and continued through the two surveys. All of our respondents had the opportunity to be exposed to it. Because the Pacesetter campaign was unique to the Pittsburgh area, and no comparable campaigns were underway anywhere else, its successes limit generalization of the results from our study to other locales.

The second factor was the prolonged strike of the United Mine Workers against the coal operators. This strike continued through the first month of our winter interviewing and potentially affected all of our respondents in both the winter and summer studies. The greater its impact on Pittsburghers, the more our generalizations are limited to the set of locales which were affected as much as Pittsburgh by the coal strike. But, the existence of the coal strike during the study period also provides us with an opportunity to examine popular responses to energy-related crises -- an opportunity which we designed our survey instruments to exploit.

Chapter 12

The Impact of Project Pacesetter

Allegheny County has been the site since Fall, 1977, of a major privately-financed campaign to reduce energy usage, Project Pacesetter. The Pacesetter campaign was launched by Americans for Energy Independence (AEI), a national public interest group. It has been well supported, through financial support and donated services, by the community and has drawn into active sponsorship and participation a broadly representative set of community leaders. Initially focussed on encouraging conservation through the mass media, Project Pacesetter has broadened its scope in the past year to include working through a wide variety of groups in the Pittsburgh area. The major objective of Pacesetter now seems to be to play an indirect role in fostering energy conservation by influencing opinion leaders and important groups who will influence consumers of energy in turn.

Many urban counties in the United States have undertaken preparations for future energy shortages. Project Pacesetter, however, sets Allegheny County apart as a special case. AEI chose it as the first county in the nation in which to develop and implement a concerted and comprehensive energy conservation program that could serve as a prototype for urban counties nationwide. Allegheny County was selected for a number of reasons: Energy intensive industry is highly important in the county. Many energy-producing firms are headquartered in the area. There have been a large number of energy research and development efforts here, and the energy knowledge base in the community is substantial. The population of the county is well-distributed along socio-economic lines. Finally, as is demonstrated by the Pittsburgh Renaissance movement in the 1950's, the community has responded previously to large-scale social programming efforts.

One of the goals of Project Monitor, as it was originally conceived, was to attempt to assess the impact of Project Pacesetter on Pittsburghers. Project Pacesetter was included as one of the variety of factors which might affect the energy conservation behavior of household and business conservers. Thus, while our major focus was on the relative contributions of all of these factors, we had a special concern for the impact of this unusual campaign for inducing energy conservation. Knowledge of the effects of Project Pacesetter, it was hoped, could provide some basis for evaluating the role that energy conservation campaigns could play in coping with the energy situation in America.

Unfortunately, this study has not been able to assess the effects of Project Pacesetter as well as had been hoped. The principal reason is that funding for the study was not provided until shortly after the Project Pacesetter campaign had begun. This prevented us from implementing the type of before-after design which is essential for gauging the effects of a campaign of the Pacesetter type. The absence of a pre-campaign benchmark also obviated our plans to examine energy conservation in some other site with a before-after design.

A second reason why we have not been able to assess the impact of Project Pacesetter as we had intended is that the nature of the Pacesetter campaign itself has undergone important changes. The early emphasis on the mass media to publicize Pacesetter and Pacesetter efforts was purposively reduced soon after Pacesetter began. In its place a more indirect approach to promoting energy conservation was adopted -- to use the group and institutional infrastructure of the community to proselytize for conservation. This approach placed Project Pacesetter in a background role and, more important for our purposes, uncoupled knowledge of Pacesetter and participation in the campaign itself from more distant effects of Pacesetter. This change in emphasis, which developed after

Project Pacesetter had been launched, promises to enable Pacesetter to have more lasting effects on the Pittsburgh community. At the same time, however, it makes our task of evaluation much more different than it was originally conceived to be. Not only did the change mean that the design we adopted for studying Project Pacesetter (to focus on recognition of and involvement in the campaign) was no longer fully appropriate, but it also made much more difficult any full evaluation of Pacesetter. By its very nature, indirect or mediated influence is hard to document. This is especially true over the short run since a campaign of the type now being run by Project Pacesetter has (when it works) snowballing effects. Even enormous successes over the long run are unlikely to be presaged in the early stages of the program.

Perhaps the best research design for capturing the impact of Project Pacesetter would be one in which conservation in Pittsburgh could be compared to that in some other equivalent site. The inherent danger in such a design, of course, is that one can never locate an entirely equivalent comparison point. Statistical controls, thus, must be introduced to effect the proper comparison, and they are always less satisfactory than design controls. Another problem peculiar to the task of evaluating a campaign is that of <u>when</u> the comparison ought to be made. Since the opportunity to establish a pre-Pacesetter benchmark has been lost, the question of proper timing becomes all the more important. That time is not now but at some future time after the efforts of Pacesetter have had the opportunity to reach the target audience.

These remarks are not designed to absolve ourselves of the responsibility for providing some kind of assessment of the Pacesetter campaign to date. Rather, they are intended to place that assessment in the proper perspective. We have collected data on recognition of Pacesetter and on direct involvement in the campaign.

The rest of this chapter will be devoted to examination of those results. But these data tell only a part of the Pacesetter story; unfortunately, it is a small part. A true evaluation of this campaign can only be rendered by a more extensive study design at a future time.

Recognition of Project Pacesetter. The first piece of evidence we have on the effects of Project Pacesetter involves simple recognition of the Pacesetter name by people in the community. Early in the interviews, in both the winter and the summer studies, we asked if our respondents recognized projects Action, Pacesetter, Save, and Conserve, in that order, as community programs in the Pittsburgh area mainly associated with energy conservation. Two of these projects, Pacesetter and Conserve, were actually energy-related, although only Pacesetter could be said to be strictly a community program in the Pittsburgh area. The other two projects, no matter how much the name seemed to fit energy purposes, were not at all involved with energy. There is a federal agency called Action which has programs in the Pittsburgh area. As far as we know, there is no program here with the name of Save.

Table 12.1 reports the percentages of our winter and summer samples who said that they recognized each of the projects. Project Pacesetter was recognized by about 17 per cent of those responding to the question in the winter and about 19 per cent of those responding five months later. The differences in recognition levels at these two time points lie within the realm of sampling error, so the most that can be said is that Pacesetter was recognized by about the same number of people at the two points in time. It did not become more conspicuous, nor did it become less.

What is to be made of this level of recognition? This is a question which is very difficult to answer, for it depends to a significant degree on what one expects to find in terms of recognition of community campaigns. From the

TABLE 12.1

Recognition of Project Pacesetter and Fictitious Conservation Programs

	Winter	Summer
Project Action	33.9%[a]	33.2%
Project Pacesetter	16.8	19.3
Project Save	12.6	16.4
Project Conserve	14.6	20.7

[a] Entries are the per cent who recognized the program of all who answered the question.

standpoint of market research for commercial products, a comparison that is not entirely wide of the mark here, that amount of recognition would seem to be gratifying. Advertisers of a new product would be generally happy to attain such levels of recognition. Furthermore, the 17 per cent figure seems higher than that reputedly achieved in energy conservation campaigns in other cities, although we have no precise figures for comparison.

Seen from another perspective, though, the level of recognition for Pacesetter is not high at all. Almost twice as many people in our winter and summer samples recognized Project Action as a community program involving energy conservation. Yet Project Action is an almost entirely fictitious name. Its relatively higher level of recognition is common for the first item in a list. The fact that it achieves so much higher a level than Project Pacesetter suggests, moreover, that there may be a troubling amount of error in the Pacesetter recognition itself. Comparisons with the recognition levels for Project Save and Project Conserve reinforce this interpretation, although it is gratifying that the one wholly fictitious program ranks last in recognition in both studies. Thus, from these data, the inference that the number of people who recognize Project Pacesetter is artificially inflated by guessing seems warranted. Of course, it is always possible that people are aware of a program in the Pittsburgh area for energy conservation, but that they are not cêrtain of its name. This may explain the guessing to some degree.

Probably a better estimate of recognition levels of Project Pacesetter in the Pittsburgh community comes from the patterns of answers to the four recognition items. Table 12.2 presents these data from the winter study for four patterns. Rows 1 and 2 of the table are patterns which can be thought of as being correct. Even though Project Conserve is really not a community program, it is

TABLE 12.2

Patterns of Recognition of Real and Fictitious Conservation Programs, Winter Survey

	Number	% of Sample
Recognize Pacesetter, but no other	57	7.3
Recognize Pacesetter and Conserve, but no other	4	0.5
Recognize one or more fictitious programs	349	44.8
Recognize no program	369	47.4

a state program which has had some activities in the Pittsburgh area (though these activities have often come through the aegis of Pacesetter). Row 4 shows the percentage who recognized no program and are probably not aware that there is a conservation campaign being conducted currently. Row 3 includes those people who felt that some type of campaign was being conducted but could not correctly identify its name. Some of these people undoubtedly were guessing that there must be a campaign if our interviewers were asking questions about one. Others may have been aware of a campaign without knowing or remembering its name. Given the data that we have, unfortunately, there is no way to estimate the relative proportions of these two groups.

The data in Table 12.2 show an even lower level of awareness of Project Pacesetter. At best, no more than 8 per cent can pick the two real campaigns out of the list. Over 7 per cent select Project Pacesetter as the only campaign which satisfies the criteria in the question. These are the only respondents who have given the correct answer to the question. This percentage should be judged against the percentage which could obtain these two "correct" patterns through mere guessing. To determine the chance likelihoods of patterns, we have first eliminated the pattern of no recognition of any program. It is safe to assume that no guessing was occurring here. This leaves 15 different combinations of recognition for the four programs. The chances of arriving at any one of the remaining patterns by guessing are, 1 in 15 or 6.7 per cent. Because the no recognition pattern has been eliminated, we must eliminate also from our calculations those respondents who held this pattern and recalculate the distributions across patterns. Eliminating the Row 4 respondents almost doubles the percentage of Pacesetter recognizers to 13.9. Compared with the 6.7 per cent who would be expected to hold this pattern through sheer guessing, it is obvious that there is substantial true recognition of Project Pacesetter. Even if widespread guessing is going on, probably half of those who say they recognize Pacesetter and no other program are truly able to distinguish it from the imposters. This is not a high level of recognition, but it does not compare unfavorably with levels of recognition one might expect from community campaigns.

There is yet a third way that the levels of awareness of the Pacesetter campaign can be estimated. Those respondents who said that they recognized Project Pacesetter were asked in a follow-up question to tell us what they understood the project to be. Sixty-six of those who identified Pacesetter in the winter could not add anything at all to their earlier identification, even though an adequate answer to this follow-up question was contained in the instructions to the preceding question. By contrast, 58 respondents (46.8 per cent of the total who identified Pacesetter) could add some substance to their answers, and 48 of these people were able to add some of the proper identifying features of the campaign. There is no doubt that these 58 respondents were aware of Pacesetter. That they total 7.5 per cent of the entire sample reinforces our earlier finding, drawn from Table 12.2, that over 7 per cent of our respondents could identify correctly the one community program in energy conservation from the list of our programs we provided. This figure of a little more than 7 per cent is our best estimate of the "true" recognition level of Project Pacesetter among Allegheny County householders during the winter of 1978.[1]

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[1]The figure providing substantive identifications rises to 12 per cent in the summer study, but this total is inflated by the inclusion of people in the summer survey who, as panel members, were sensitized to the question.

A [illegible] per cent recognition level has no meaning in absolute terms. Instead, that figure must be compared with the recognition levels for other conservation campaigns and other campaigns of a persuasive nature. Such comparisons are justified, however, only if the same method is used to generate the the estimates. How the recognition question is asked and how respondents are sorted out in terms of the answers they give can have an enormous effect on the levels of recognition obtained. As can be seen from our series of questions, for example, there is a tendency for people to identify the first item in a list if they are guessing. Thus, if people had been asked only whether they had heard of Project Pacesetter and about no other program, much higher recognition levels would have achieved.

It is imperative that we reiterate the point made in the introduction to this chapter. While widespread recognition of Project Pacesetter and understanding of the nature of its campaign may be desirable, recognition is not a good criterion for gauging the progress of the Pacesetter campaign. In the initial stages of the campaign, there was substantial publicity focussed on the Pacesetter name. By the time of our interviewing, however, this focus had clearly taken a "backseat" to efforts to spread the word in behalf of conservation through the institutional and group network of the community. The sponsorship of Pacesetter for these efforts was not conspicuously publicized. Thus, as much as recognition of Pacesetter might be useful in its efforts, it is clearly not necessary. A good deal of success could be achieved by the Pacesetter campaign without much recognition of the Pacesetter name.

Involvement with Project Pacesetter. There is another approach to assessing the efforts of Project Pacesetter. That is to estimate the percentage of people in our sample who have been touched in some way beyond mere recognition by the campaign. Some people may have been actively involved in it, working directly and consciously for Project Pacesetter. Others may have been recipients of the indirect influence of Pacesetter by belonging to groups which, in turn, have been a part of the Pacesetter campaign. Indeed, since the nature of that campaign has shifted heavily in the direction of groups, the path of indirect influence may be the more common effect of Pacesetter.

Our analysis of these indicators of involvement in Project Pacesetter requires substantial qualification. The research design we have employed is simply not adequate for tracing the paths of influence from Pacesetter to the members of our sample. Instead, we have to search for indirect evidence that these paths may have been taken. The result is a pair of measures, to be discussed in full below, which provide only weak circumstantial evidence of Pacesetter effects. The most that can be said is that we can identify the potential for influence without being able to attribute that influence to Pacesetter.

The first indicator of involvement in the campaign is a straightforward one. We asked respondents who were able to identify Pacesetter if they or anyone they knew had been involved in the campaign. Only a few people in either the winter or the summer studies answered this question affirmatively. In the winter, slightly over 1 per cent of the total sample reported that they knew someone who was involved, and only 6 of 779 reported that they themselves or someone in their family had worked in the campaign. The percentage rose slightly to just over 2 per cent in the summer, but involvement by the respondent or his family declined a bit.

While only a tiny fraction of our sample was involved in Project Pacesetter at either point in time, the projection of our sample results to the county population suggests that a large number of people must have taken part in the campaign. The population of Allegheny County is roughly 1.6 million persons. About 30 per cent of these people are under the age of eighteen, using 1974 estimates for the entire state of Pennsylvania. This leaves an adult population of about 1.1 million persons. We can project the number of people in the county who were involved by using our sample estimates for respondent involvement.[2] One-half of one per cent of our winter respondents and six-tenths of one per cent of our summer respondents reported self involvement in the campaign. These figures are the best estimates of the population percentages for involvement, and the estimates can be translated directly into whole numbers. Through this calculation, we estimate that somewhere between 5,600 and 6,720 people were involved in Project Pacesetter during the past year. In percentage terms, the amount of involvement is very low. But when translated into the actual number of people playing at least some part in a community-wide conservation campaign, the number seems impressive.

Our second indicator of being "touched" by the Pacesetter campaign is far removed from conscious involvement. The Pacesetter people have been in contact with a large number of groups within the Pittsburgh community. Their reach is well indexed by the extensive size of their mailing list. On the individual side of things, a number of our respondents mentioned that groups to which they belonged had encouraged them to conserve in their energy usage. Twenty-two per cent of our total sample mentioned such group encouragement in the winter study. Almost exactly the same percentage (23 per cent) mentioned group encouragement in the summer study.

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[2]If we were to include those whom the respondent reported were involved, our estimates would be inflated because of the possibility of double, etc., counting.

Those who reported such encouragement were asked to provide the name of the group and the activity or activities that were involved. Our interest was in how many of the mentioned groups had been contacted by Project Pacesetter. Thus, we compared the groups named by our respondents with the groups listed on the Pacesetter mailing list -- the only available list of Pacesetter "contacts." Where a mentioned group appeared on the mailing list, there is the possibility that the Pacesetter campaign was responsible for the group's encouragement of conservation. But there is only a possibility, for it is entirely plausible that the group had undertaken the efforts on its own initiative. Therefore, we must interpret this figure with great caution. On the other hand, location on the Pacesetter mailing list would seem to be a good first condition for Pacesetter influence. For those groups absent from the list, we would be very hard pressed to argue that Pacesetter could have achieved influence.

Respondents in our winter study mentioned groups on the Pacesetter mailing list as encouraging them to conserve in about 63 per cent of the cases where some group was mentioned. This strikingly high level of matches between the mentions and the list is, in the first instance, a tribute to the widespread coverage of the Pacesetter mailing list. The campaign has done an excellent job of establishing channels to the organizational infrastructure of the Pittsburgh area. The important first step for influence through the group network has been achieved with considerable success.

These data on indirect influence via groups are very weak at best. The most that we can conclude from them is that circumstantial evidence of indirect Pacesetter influence appears. If none of the groups mentioned, or only a small proportion of them, appeared on the Project Pacesetter mailing list, we could assume that the campaign had achieved little indirect influence -- at least where the respondents were conscious of it; but this was not our finding, leaving open the possibility that the goal of indirectly inducing conservation through the medium of community groups and organizations has met with some success. The extent of success, however, is something which is entirely beyond the reach of this study.

Pacesetter Recognition and Conservation. The ultimate question about Project Pacesetter success, of course, involves the extent to which the campaign has induced people to conserve more than they would have otherwise. For many reasons, some of which were identified in the earlier portions of this chapter, this question is immensely difficult to answer. Proving influence is one of the seemingly intractable problems of social science research. When you add to that the problems of measuring Pacesetter contacts with a person, as were alluded to above, it should be obvious that we can not say much about the effects of Pacesetter on conserving behavior.

Nonetheless, we offer a "first-cut" approximation to answering this question. In Chapters 4 through 10, we attempted to determine what factors were related to the various forms of energy conservation. One of the factors built into our model was recognition of Project Pacesetter. What we know from the current chapter about the reliability of the recognition measure should give us pause in interpreting the results of this analysis. There is considerable error in that variable because many people who reported that they recognized Pacesetter seem to have been guessing about the existence of such a campaign and its name. It seems likely, though, that the effect of this guessing would be to drive down, to attenuate, the relationships between the recognition variable and conservation behavior indicators. Thus, there is very good reason to believe that the relationships reported in those chapters would have been far more substantial had we been able to fashion a reliable measure of Pacesetter recognition.

Given the attenuation of relationships due to substantial measurement error, the results reported in earlier chapters on the impact of Project Pacesetter recognition should not be disheartening. Pacesetter recognition has a significant impact on general conservation and heating conservation, even after controls are imposed for all other predictors. This means that those who say that they recognize the campaign are also more likely to conserve where at least these two activities are concerned.

The more troublesome methodological problem arises over the causal direction of that relationship. Does attention to Pacesetter lead to more conservation? Or are conservers more likely to pay attention to a campaign of the Pacesetter sort? We can not answer this question with the data that we have, and it is quite reasonable to believe that the causal flow could go in either direction. The demonstration of some relationship between these two variables, though, is a necessary step for there to be Pacesetter influence. If no significant relationships were reported, we would be more inclined to say that Pacesetter had not had any impact, even while realizing that error may have obliterated traces of that impact in our survey data. The fact remains that there are some significant relationships and that a positive interpretation can be placed on the consequences of the Pacesetter campaign.

Conclusion. The analysis conducted in this chapter supports two conclusions about the impact of Project Pacesetter on Allegheny County residents. First, that impact is virtually impossible to assess fully. Our research design is more sensitive to traces of awareness of the campaign than it is to actual influence by the campaign, and it is largely upon awareness that our analysis has focussed. Beyond that, though, there is no research design which could adequately capture the effects of Project Pacesetter now that the possibility of establishing a pre-Pacesetter benchmark has been lost. Thus, we must settle for imperfect tests even in the ideal case, and we hardly have the ideal case before us.

Given all these caveats, is there anything we can say about the impact of Project Pacesetter in about a year's activity in the county? The answer to this question is a cautious "yes." In terms of awareness alone, Pacesetter has reached a sizable, though hardly overwhelming, share of the Pittsburgh area adults. They number in the thousands and may even be close to one hundred thousand (7 per cent of 1.1 million people is about 77,000). Many community-wide appeals might be gratified with such a level of saturation. The number of people actually involved in the campaign, by best estimates, is also gratifying large although only a fraction, of course, of those who are aware of Pacesetter. The Pacesetter people have also done a good job of contacting groups in the community, and there is some limited evidence that these contacts may have resulted in group encouragement of energy conservation. Finally, of course, recognition of Pacesetter is correlated with certain types of conservation -- perhaps an indication that the campaign is beginning to achieve its ultimate goal. All in all, our data show that Project Pacesetter has important achievements to its credit in the first year of operation. Even so, the existence of Project Pacesetter has not thus far been a major factor in determining levels of conservation. The Pacesetter campaign does not limit markedly the generalization of our findings.

Chapter 13

The Impact of the Coal Strike

As we entered the field with our winter survey in late February, Allegheny County residents were experiencing the effects of the United Mine Workers' (UMW) strike against coal operators. The strike had begun in December with the expiration of the UMW contract. By January local electric utilities and other coal users were voicing their concern over the dwindling supply of coal. The utilities requested that Governor Shapp use his emergency powers to force conservation in the use of coal, and they asked the public to engage in voluntary conservation. By February concern over the coal shortages by the utilities had reached the crisis level. Duquesne Light, the major electric utility in the county, warned of the possibility of rolling blackouts of electricity. Throughout the period, the utilities reported that their coal stockpiles were diminishing rapidly. Duquesne Light registered a drop from 38 days' supplies to 25 days' supplies in the three weeks between January 23 and February 14. A month later (reporting on March 11) Duquesne Light's supplies had shrunk to between 4 and 14 days' worth of coal.

The alarm voiced by the electric utilities was not shared by all public officials, at least in their public statements. Both Governor Shapp and the State Public Utility Commission (PUC) stated that the utilities were exaggerating the seriousness of the situation and refused to take the extreme actions requested by the utilities. In late February, however, the PUC did go so far as to accede to utility requests to order some cutbacks in coal and electric usage.

The coal shortage affected our respondents in two major ways, both involving the use of electricity. Coal is the major fuel used to generate electricity in this area, and a shortage of coal threatened the supply of electricity for residential usage. A more distant impact was on the price of electricity. As coal supplies dwindled, utilities turned to other, more expensive sources of electricity. These costs were to be passed on directly to consumers, although they would not turn up in fuel bills for several months. Thus, the immediate concern of Pittsburghers was probably more with shortages of electricity in their homes, their work places, and elsewhere than with the rising costs of electricity. But, at least in the homes, no one had to experience an electricity shortage yet.

The month of March brought a continuation of the coal strike through March 26, when the miners finally accepted a contract with the mine owners and operators. On March 4 and 5, a contract approved by the UMW leadership was voted on by the rank and file -- and defeated. In spite of the continuation of the strike through the better part of the month, the coal supply situation seemed to improve. In part, it seems that utilities were able to purchase electricity from elsewhere to service their customers. It also seems that substantial amounts of coal were being delivered to the utilities. For whatever reason, the crisis rhetoric cooled and at just the time when the situation should have reached crisis proportions, the problem seemed to vanish. Concern now turned to the cost of electricity and away from the threat of shortages.

Thus, our respondents were exposed to a variety of twists and turns in the coal situation (and, indirectly, the electricity situation) during the two months of interviewing. In February and early March, crisis rhetoric was at a high pitch, although some public officials were challenging the utilities' dire predictions. In mid-March, in spite of the continuation of the strike, the rhetoric had cooled considerably and predictions of shortages had virtually ended. After the UMW miners went back to work on March 27, though, the threat of shortages vanished. All that was left was the prospect of having to pay a heavy price in the near future for the more expensive energy purchased during the strike and a higher price in the long run to pay for the contract settlement.

The existence of the coal strike during a substantial portion of our interviewing period provided us with an excellent opportunity to monitor the effects of an energy crisis on the attitudes and behavior of household consumers. We altered our original questionnaire in several respects to take advantage of this situation. An open-ended question about impact of the coal strike was inserted as the first question in the interview. Responses to this question were expected to shed considerable light on how Pittsburghers were affected by and were reacting to the strike. Later on, in the section of the questionnaire in which we requested information on conserving behavior, we added four questions about changes in electricity use since the early stages of the coal strike. The purpose of these questions was to gauge the extent of behavioral changes induced by the strike and its related shortages -- over and above the conservation behavior already practiced by the respondent.

The principal purpose of this chapter is to analyze the data produced by these questions. Additionally, we shall briefly discuss the results from earlier chapters in which the perceived impact of the coal strike was used as an independent variable in attempting to account for conservation behavior and the results from our analysis of the determinants of electricity cutbacks during the coal strike period.

Perceived Impact of the Coal Strike. As is shown in column 1 of Table 13.1, not quite a majority of our respondents reported that the coal strike had some impact on them. More may have been worried about possible consequences of the strike if it were to continue, but in terms of having felt its effects concretely a majority were spared. To be sure, it was yet too early for the costs of additional purchases of energy by the utilities to appear on consumers' electric bills. But the threat of shortages was raised consistently in western Pennsylvania and some electricity curtailments had been ordered. Thus, it is rather surprising that less than a majority perceived an impact of any kind. For all of the crisis rhetoric surrounding the coal miners' strike, a majority of Allegheny County residents still felt untouched by the strike during the winter of 1978. Furthermore, perceptions of impact were less widespread among respondents interviewed during the strike than among those interviewed after the strike had ended.

Column 2 of Table 13.1 shows the distribution of responses as to type of effect among those who perceived an impact. References to higher fuel costs and conservation predominate. Over one-third of the impacts mentioned involve higher fuel costs. Some respondents were referring to the "pass through" of higher wages to the consumer as a result of the settlement of the strike, and some, curiously, made reference to higher natural gas bills. Most, however, seemed to be aware of the increased cost of obtaining electricity from sources other than coal. In both cases, we may surmise that impact was anticipated rather than felt at the time of the interview, reflecting a substantial degree of sophistication regarding fuel costs. Of course, that most respondents did not see fit to mention costs as an impact of the strike suggests that this level of sophistication is not spread widely among Pittsburghers.

TABLE 13.1

Perceived Impact of the Coal Strike

	% of respondents	% of responses for those who perceived an impact
No impact perceived	53.2%	
Impact perceived	46.8	
Higher costs		33.8%
Reduced employment		10.1
Worsened work conditions		11.2
Hindered entertainment/ shopping		9.5
Experienced shortages		2.7
Adopted conservation measures		23.8
Other		8.9

Higher fuel costs were mentioned by about 18 per cent of the respondents. Given the substantial cost increases that could be traced to the coal strike, it is perhaps surprising that so few Pittsburghers perceived this kind of impact of the strike. However, the higher costs due to the strike had not yet been passed on to our respondents and were to turn up in electric bills in subsequent months. Thus, it seems likely that the full impact of the strike had not yet been appreciated by most people. This suggests that many people have difficulty in linking higher prices to particular energy crisis, particularly during the crisis. Such an absence of immediate cause-effect relationships and a failure in causal thinking dampen the impact of the crisis on Americans, making it more difficult to achieve responses to the crisis.

About a quarter of the responses were focussed on actual conservation. Since respondents were allowed up to four mentions of coal strike impacts, it seems reasonable to presume that conservation behavior was mentioned in conjunction with a specification of in what ways the coal strike had hurt the individual. The one was concerned with impact; the other with response. This presumption turns out to be incorrect: 61 per cent of those who mentioned conservation in response to this question said nothing else about the impact of the coal strike. It is quite plausible that they were conserving in response to a general situation, rather than as a consequence of personal hardships produced by the strike. An additional 12 per cent mentioned conservation first among their various responses, indicating that they too may have thought more about the general situation than their special circumstances. Seen in this way, it seems most likely that the figure of 47 per cent who perceived an impact of the coal strike is itself an exaggeration. Discounting this figure by the 73 per cent of those giving conservation responses who mentioned only conservation or conservation first, we arrive at a more reasonable estimate of those who felt the impact of the strike -- about 39 per cent of the sample.

Additional responses were scattered widely among a number of categories, no one of which attracted a substantial number of mentions. Very few reported that their jobs were affected, that working conditions worsened, or that their recreation and shopping activities were hampered by the strike. It appears that media attention to these three areas of impact may have exaggerated reality. While there may have been a threat to jobs and other things, that threat had not materialized for more than a very few of our respondents.

It is clear from these data that the effects of the coal miners' strike did not reach anything near crisis proportions for Pittsburghers. Dire predictions of crippling shortages of coal and coal-produced electricity simply were not borne out. In particular, it seems that the media magnified the problems which resulted from the strike. The utilities and some public leaders also contributed to this exaggeration of coal strike impact by their crisis rhetoric. In the future, more caution must be exercised in portraying the effects of an energy crisis and predicting further effects. Continual exaggeration risks diminution of the credibility of those most aware of the energy situation. While these leaders have the responsibility of issuing effective early warnings, they must realize that the price of being wrong, or reacting too strongly, is that they may be ignored when a real crisis threatens.

Within the sample, those respondents at higher levels of income and education were more likely to perceive an impact of the coal strike.[1] The strongest relationship was exhibited by education. As can be seen from Table 10.2,

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[1]Perlman and Warren (1975) found that income was related to belief in the reality of the 1974 energy crisis in a sample of Hartford, Connecticut; Mobile, Alabama; and Salem, Oregon respondents.

TABLE 13.2

Education and Perceived Impact of Coal Strike

	% perceiving an impact	# of cases
No more than grade school	37.8%	82
Some high school	42.1	107
High school graduate	44.6	341
Some college	55.3	94
College graduate	64.0	89
Post-graduate degree	72.7	33
		746

perceptions of impact rose steadily across the six categories of successively higher respondent education. From just over 37 per cent of those with no more than a grade school education, perceptions of impact rise steadily to almost three-quarters of those with a post-graduate degree. The relationship for family income (not presented here) parallels that for education to some degree but lacks both the consistent rise across income levels and the wide range of differences between the extremes.

Taken together, these two relationships suggest that perceptions of impact may reflect abstract and maybe even vicarious responses to the coal strike more than palpable hardship. A coal strike impact was more likely to be perceived at higher than at lower income levels. Yet, it is the lower income respondents who would be most likely to feel the consequences of higher energy costs as a result of the coal strike. Energy expenditures in general surely consume a larger proportion of income for the lower income respondents making the marginal impact of the higher costs induced by the coal strike greater for them. Perhaps the fact that these costs had not yet appeared on utility bills dimmed these perceptions, although the poor <u>were</u> more likely than others to mention cost-related impacts where they had perceived some impact.

The failure of the expected "marginal impact" relationship to appear can be explained by the relationship between education and perceived impact, which is more robust than that for income. It seems quite likely that respondents at higher educational levels were more exposed to communications regarding the coal strike and more inclined to internalize their messages. They may also have been more inclined to appreciate the cause, effect relationship between declines in coal production and future price increases for electricity. Thus, the most plausible interpretation of these relationships (for education and income) is that the perceived impact question elicits abstract and vicarious conceptions of impact more than palpable effects. The better educated simply understand more about what is going on even if they will suffer less as a result of it. It is through its relationship with education, in other words, that income appears to have an effect. Indeed with controls for education, the income impact relationship virtually vanishes.

This interpretation of the education-perceived impact relationship is supported by an examination of the effects of another variable not explicitly tied to the coal strike. At the termination of the interview, the interviewers were asked to make a subjective rating of the respondent's knowledge of the energy situation. As would be surmised, this rating is substantially correlated with education, and it elicits an equally wide range of perceptions of coal strike effect as can be seen in Table 13.3. Those rated as possessing exceptional knowledge about energy matters were more than twice as likely to perceive an impact as those seen to possess very little knowledge. While the numbers of respondents who populate these extreme categories are small, the differences between the categories are impressive and buttress our contention that it is attention to the energy situation in general that influences perceptions of impact, rather than degree of actual hardship imposed. When controls for energy knowledge are imposed, the impact-education relationship is substantially depressed -- as the preceding interpretation would lead us to expect. It is the greater knowledge and attentiveness of the educated concerning energy matters which makes them more cognizant of impacts.

<u>Coal Strike Electricity Conservation</u>. In addition to asking respondents whether they had perceived an impact of the coal strike, we asked specifically about modifications in electric usage during the strike period. We asked if

TABLE 13.3

Knowledge of Energy Matters and
Perceived Impact of Coal Strike

	% perceiving an impact	# of cases
Very little knowledge	30.8	78
Some knowledge	45.7	462
Great deal of knowledge	53.2	190
Exceptional knowledge	64.5	31

home lighting, outdoor lighting, television viewing and stereo/hi-fi listening, and electric home appliance usage had been reduced since the beginning of January -- and by how much.

By focussing on recent reductions only, these questions were designed to elicit changes in conservation behavior induced by the coal strike. These changes were over and above those already made in response to the general energy situation and, thus, reflect a response to crisis rather than a general tendency to conserve -- although the two are empirically interrelated as was shown in Chapter 10.

A substantial number of Pittsburghers appear to have responded to the "crisis rhetoric" of the coal strike period by reducing to some degree their usage of electricity. Table 13.4 displays these percentages. Over 70 per cent of the sample reduced their indoor lighting during this period, but only around a third managed reductions in any one of the other three areas. By their own admissions, though, even those who reduced in any one of these areas did not typically reduce a great deal. There appears to have been substantial room for further conservation in response to coal conditions. It is of further significance that most of the conservation was achieved in the use of indoor lighting, where the least sizable reductions in consumption can be made, and that very little conservation was practiced in the use of electric appliances which probably account for a much larger share of home energy consumption.

These figures are consistent with the figures on perceived impact. Many Pittsburghers do not seem to have been overly concerned by the coal strike and failed to take any action to contribute to reducing its potential impact. Our interviewers reported that some respondents felt strongly that the predictions of imminent shortages were merely a ruse designed to justify higher prices. We have no way of estimating how many people really felt that way, except to

TABLE 13.4

Reductions in Electric Consumption since January.

Amount of Reduction	Indoor Lighting		Outdoor Lighting		TV/Stereo		Appliances	
A Lot	23.9%		16.5%		7.7%		7.7%	
Some	26.7	70.4	8.7	35.4	12.6	30.6	14.5	31.4
A Little	19.8		10.2		10.3		9.3	
None at All	29.6		64.6		69.4		68.6	
Number of Cases	769		520*		764		767	

*An additional 123 respondents reported that they did not have any outdoor lighting.

cite the behavioral evidence that people did not act as if they expected serious coal shortages would occur. It may be surmised that it would have taken a great deal of "crisis rhetoric" to produce more of a response than catalogued here -- and that even more crisis rhetoric will be required next time to produce the effects registered this time, because the crisis warnings were exaggerated. After the coal strike was over, many respondents mentioned to our interviewers that they would be less likely to believe official and utility pronouncements the next time.

For use in the analysis of determinants of conservation behavior, we constructed an index of electricity reductions. That index and the steps taken to construct it are discussed in earlier chapters. The distributions for that index, reported in Chapter 10, only partially confirm the conclusions drawn in the preceding analysis. Only [illegible] per cent of those coded in the index reduced their electricity usage in each of the four possible areas, while almost half did no more than one of the reductions (typically indoor lighting). That a slim majority did engage in reductions in more than one area, however, indicates that conservation in response to the coal shortage was more widespread than it earlier appeared. This is because behaviors were not cumulative here; some respondents did one thing but not another.[2]

It is evident that Pittsburghers did respond in substantial numbers to pleas for conservation during the coal strike period. Fewer than a quarter did nothing further to conserve, while over half conserved in two or more ways. However, we must

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[2] If these behaviors were totally cumulative, only about [illegible] per cent of the respondents would have reduced their electric usage in two or more categories. As it is, 51.9 per cent have engaged in conservation at least twice across the four categories we have chosen.

be cautious not to exaggerate the implications of these reports on behavior. Many of those who reported conservation admitted that they only reduced their electric usage a little or some. Furthermore, the major reductions came in the area of indoor lighting where the savings were probably least. This does not add up to a picture of overwhelming compliance with requests to conserve. Rather, it buttresses the suggestion offered before: that many Pittsburghers, for one reason or another, did not believe it necessary that they contribute to conservation efforts. Perhaps they were suspicious of the pleas to conserve, or perhaps they were already conserving to the limit. Whatever the reason, it seems undeniable that there is more room for conservation in response to crisis the next time -- the problem will be, as it was here, in inducing people to engage in it.

Characteristics of Conservers. In Chapter 10, we considered the kinds of characteristics which differentiated conservers from non-conservers where recent cutbacks in electricity usage were concerned. For a full discussion of these characteristics, readers are referred to that earlier chapter. In this section, though, we would like to isolate those factors which have been discussed already in the present chapter, to determine their impacts on electricity conservation.

Most significant is the fact that perceptions of an impact of the coal strike do not lead to more conservation of electricity during the coal strike period.[3] The simple correlation between the two variables is .03, and this

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[3]This finding appears to be consistent with the results of two of three previous studies in which belief in the existence of an "energy crisis" was related to conservation behavior. Using sample from four Texas counties, Gottlieb and Matre (1976) found that those who believed that the world faced an energy crisis were not more likely to conserve. Morrison and Gladhart (1976) reported that belief in the reality of the 1973-1974 energy crisis among a Lansing, Michigan, sample did not diminish the energy consumed in the household. On the other hand, Sears et al. (1976) found that a personal impact of the 1973-1974 shortages among people in Los Angeles did produce behavioral compliance with requests to conserve energy.

relationship does not even approach significance in the subsequent multivariate regression analysis. We argued before that perceptions of impact were largely abstract and visceral. The absence of a perception-behavior relationship provides a measure of support for that interpretation. Some of those who perceived an impact did follow up that with additional conservation. But, on the whole, this did not happen very often or very consistently. In this case, perceptions were not translated into coping behavior.

Perhaps conservation is better explained by moving to the major factor we considered in trying to account for perceived impact _itself_ -- education. But this approach proves to be fruitless too. Conservation declines with education, even in the simple correlation case. Clearly the kind of explanation offered to account for perceptions of impact will not apply to actual electricity conservation. For all the receptivity of the educated to general messages about coal strike consequences, there is no evidence of a behavioral response to the messages. This puts quite a damper on educational campaigns designed to induce energy conservation in a crisis period.

Conclusion. Concentration on responses to the coal strike does not leave us with a great deal. We have documented the limited acknowledgement of coal strike impacts among the Pittsburgh population. More widespread was their activity to reduce, though not by a very substantial amount, their usage of electricity during the coal strike period. But, significantly, a perception of impact and a reduction of usage do not travel together; rather, they are essentially independent of one another. This fact, we believe, has serious implications for energy policy-making in a crisis situation. Those people who can be reached by conservation campaigns and persuaded that the crisis is real are not necessarily those who will conserve. The situation is more complicated than that. Just what can unravel this complication is, for the moment, uncertain. An energy conservation policy predicated on convincing people that any particular crisis will harm them in the short run does not, on the basis of this evidence, exhibit much promise of success.

PART IV

SUMMARY AND RECOMMENDATIONS

This report contains extensive analysis of the energy-related characteristics and behavior of Pittsburghers during the winter, and in a few cases the summer, of 1978. Numerous inferences about factors which lead to energy conservation have been drawn. In this concluding part of the report, the analysis is taken one step further: drawing upon our findings and inferences, we make concrete recommendations of ways to increase energy conservation among Americans. These recommendations are offered within the narrow context of this study. Many other considerations must be brought to bear in evaluating them. We have attempted to anticipate some of these considerations, but for the most part the responsibility for dealing with our recommendations in the context of other needs is left to the Department of Energy policy-makers who will read the report.

The findings from the Project Monitor study and the recommendations they imply may be divided into four general areas. First, we discuss strategies for conservation campaigns. The major objective of our study was to understand better the individual bases of conservation. This understanding can be used to devise campaigns to promote energy conservation among the American public. Second, we consider how our findings bear upon crisis management in the energy area. Since the winter study was conducted during and immediately after a prolonged coal strike, it sheds some light on public reactions to a crisis and to the pleas for conservation which typically accompany it. Third, by revealing some of the factors which differentiate present conservers from non-conservers, some insight is gained into the validity of the assumptions which underlie important components of current energy policy. Finally, we examine some avenues for future behavioral research on energy conservation.

Strategies in Conservation Campaigns

Perhaps the least controversial tool for affecting energy policy is a campaign promoting voluntary energy conservation. Some of these campaigns are purely educational, premised on the notion that if people knew more about the energy situation they would conserve more. Others have more of a persuasive slant to them. Beyond providing information, they emphasize that conservation is beneficial to the individual and to the nation. Government and private campaigns of both types have been launched, stimulated by the hope that considerable conservation can be achieved without resort to palpable incentives and disincentives or more stringent allocating mechanisms. We can not answer the question of whether these campaigns achieve their goals. Nor can we estimate how much conservation they promote.[1] What our findings do permit us, though, is to advance some suggestions about which approaches in conservation campaigns are most likely to pay off. That is the task of this section.

Some General Remarks on Conservation Campaigns. There is ample evidence in our data in support of a role for campaigns to induce voluntary conservation. Considerable variation in present energy usage is related to factors which can be affected by such campaigns. These factors are primarily attitudinal and perceptual in nature. The variables of this type which we incorporated into our study account for between 5 and 13 per cent of the total variation across the different kinds of conservation. Further attention to them could surely have pervasive effects, for energy conservation is patterned at least in part

[1] Our evidence on Project Pacesetter does show, however, that those who recognize this campaign are more likely to conserve in general. What we can not resolve from our limited evidence is the causal nature of this relationship.

on these orientations. Thus, our first recommendation is a very global one.

1. Given existing relationships between factors which can be manipulated in conservation campaigns and conserving behavior, <u>conservation campaigns have the potential to increase conservation and should be encouraged</u>.

We could not support this recommendation if we had found that attitudinal and perceptual factors were not related to conservation.

Generally speaking, there are two ways in which conservation can be promoted given an impact of attitudes and perceptions. The first is by changing these orientations so that they are more favorable to conservation. Holding constant the relationship between a particular attitude or perception and a type of energy usage, more conservation could be achieved by making the distribution of attitudes or perceptions more favorable to conservation. Below, we suggest which attitudes and perceptions are most likely to be responsive to such efforts.

The second way to promote conservation via an attitudinal/perceptual approach is to change the relationships between these orientations and behavior. Inconsistency exists between pro-conservation orientations and non-conserving behavior. Extending the dictates of cognitive dissonance theory (Festinger, 1957) to behavior, it is clear that the more salient this inconsistency becomes to the individual, the more compelled he will be to reduce it by changing either the predisposition or the behavior. Given current pressures towards conservation, we think that behavior will sometimes be changed in a more conserving direction to reduce dissonance. We also believe that the risk is acceptably small that conservers with non-conserving predispositions will be affected in the adverse direction. A second approach of conservation campaigns, then, is to raise the level of salience of attitude-behavior inconsistencies.

This rather complicated notion of dissonance reduction can be illustrated by means of a concrete example. Even after other important variables have been controlled, cost conscious respondents are more likely to conserve in general. The relationship, though, is far from perfect. Some cost conscious people are clearly not conserving very much, and some people who lack cost conscious attitudes are conserving. A campaign following the cognitive dissonance theory approach might emphasize the financial savings to be gained from conservation in order to increase the salience of the inconsistency between attitude and behavior for cost conscious non-conservers in particular. The theory would predict that people would be more forced to resolve their inconsistency as it became more salient to them.

These considerations lead us to a two-pronged recommendation about the focus of conservation campaigns.

2. Conservation campaigns should try to change attitudinal and perceptual predispositions so that they are more favorable to conservation, and to make the public more aware of inconsistencis between pro-conservation orientations and non-conserving behavior.

The two approacnes outlined above should not be pursued on a scattershot basis. Rather, they must be focussed on those orientations which have proven to be related to conservation if any results are to be expected. This is where the data on the relationships between individual factors and characteristics and conservation become so important. They identify which levers are available for conservation campaigns. Thus, we are led to another general recommendation.

3. Conservation campaigns should focus on those predispositions which are related to conservation.

For instance, efforts could be made to underscore the cost savings of conservation to appeal to cost conscious non-conservers. Or, the enormous and spiraling costs of energy could be emphasized to make more people cost conscious. In general, it is crucial to bear in mind which group is the target group and whether the goal is to increase its awareness of inconsistency or to change its orientations.

By contrast, influencing conservation through a concentration on demographic or situational factors holds much less promise for success. The reasons are twofold and are implied in the preceding discussion. First, because demographic and situational variables tend to be fixed over long periods of time, they are not likely to be affected by conservation campaigns. No energy conservation campaign is going to be able to increase family incomes, provide individuals with more formal education, make more of them home owners, or change their sex so that they will be more favorably disposed toward conservation. The immutability of these factors severely limits their utility as tools for increasing conservation.

Likewise it is difficult to increase the relationship between demographic or situational variables and conservation. Due to the nature of these variables, we can be relatively sure that the relationships which do emerge between them and conservation are usually produced by other mediating factors.[2] People with higher levels of education, for example, may conserve more because education produces certain types of attitudes or perceptions. For a conservation campaign to have much impact, it must be framed by an understanding of what these "mediating" factors are. We have identified some of them, as is evidenced by the decreases in magnitude of some demographic and situational variables as we move from the simple correlations to Equation 2. Nonetheless, many mediating factors remain unspecified in our model.

Given the considerations outlined here, it is of considerable significance for conservation campaigns that the situational and demographic variables do not dominate our regression models. Only home ownership emerges as a really important predictor. Attitudinal and perceptual variables are identified as important in the case of every type of conservation. Thus, they provide levers for affecting energy usage through educational and persuasive campaigns. Later we will consider which ones specifically are important, so that we can pinpoint

[2] The principal exception to this rule lies with income which often signifies ability to purchase goods with some bearing on energy usage.

more precisely some approaches for conservation campaigns.

Before turning our attention to this matter, we should consider the nature of conservation itself and what it tells us about conservation campaign strategy. Two important findings emerged from analysis of the relationships among various energy-usage activities (Chapter 1). First, we concluded that it is meaningful to speak in general terms about conservation. General conservation is not simply an umbrella term for highly different and unrelated activities. Rather, with only a few signal exceptions, conservation activities tend to be related to one another. People who conserve in one way are more likely than not to conserve in other ways. This finding justified the creation of a general measure of conservation. It also leads to another general recommendation about conservation campaigns.

4. Effort should be directed in conservation campaigns toward emphasizing the similarity, perhaps even the substitutability of the various types of conservation activities.

The more people are led to see a common element throughout the various areas of conservation (i.e., to see all activities as involving conservation), the more likely they are to transfer their conservation from one domain to another. In particular, campaigns could be devised to pair activities which achieve similar results. Both increased insulation and turning down thermostats, for example, can reduce fuel bills. By pairing these activities, those people who already practice one of them may be induced to engage in the other.

The second important finding from Chapter 1 was that meaningful clusters of conservation activities also emerged. These clusters embrace activities which involve the same type of energy usage. That clusters emerge so clearly in most cases suggests that conservation campaigns also might be usefully tailored to the specific types of conservation. This suggestion is reinforced by the Part II findings that the independent variables are related to the different conservation types in quite different ways. Thus,

5. Conservation campaigns require different designs for the different sub-types of conservation.

What exhibits promise of success for one type may not for another. In fact, no single factor in our model bears a significant and positive relationship to more than two of the conservation sub-types.

What are the types of campaigns which seem most promising? We approach this question from two perspectives. First, we shall examine the factors which are related to conservation in general. Our model has explained the greatest amount of variation here, thus providing the firmest foundation for our recommendations. Second, we shall turn to the various conservation types themselves to see what kinds of efforts may be productive there.

Promoting General Conservation. Several different types of attitudinal and perceptual variables are related to general conservation. Sophistication, energy pessimism, and energy concern all seem to reflect awareness of the energy problems facing America today. Some might dispute our assumption that greater awareness and understanding of this situation will heighten pessimism and concern and diminish the tendency to find a convenient scapegoat for the problems which arise, but we are convinced that any rational informed person will find cause for concern and no easy target to blame. Substantial increases in general conservation, then, can be achieved by educational campaigns which increase sophistication, energy pessimism, and concern.

6. Educational campaigns should be encouraged which set out the facts on the present and future energy situation.

Such campaigns may promote conservation by increasing the number of sophisticates, pessimists, and concerned. Perhaps conservation may even be promoted by stimulating dissonance reduction among those non-conservers already holding these attitudes.

Likewise, the attitudes we have identified as energy conservationism and non-materialism could be a productive focus of conservation campaigns. Both exhibit highly significant relationships to general conservation and evidence personal satisfaction with non-material things in life. Since thes attitudes are likely to be more deeply seated than the preceding ones, however, the dissonance reduction approach is the only one likely to be productive.

7. <u>Persuasive campaigns should focus on the non-material satisfactions to be derived from conservation in general</u>.

Another approach would be to take advantage of a group which holds a rather specific materialistic orientation -- the group which is highly concerned with cost in its consumption decisions. Cost conscious people are significantly more likely to conserve in general. The objective of persuasive communications should be to increase both the number of people who are cost conscious and the relationship between cost consciousness and general conservation. More success is likely to be achieved in meeting the latter than the former goal. To accomplish these ends, we recommend:

8. <u>Conservation campaigns should focus on identifying conservation of energy with cost saving</u>.

Finally, the owner/renter variable enjoys by far the strongest relationship to general conservation. Renters are especially unlikely to undertake winterization activities. Yet, because ownership is a relatively fixed characteristic, we can not be very sanguine about the chances for taking advantage of our knowledge to promote conservation. One possible approach would be to increase the number of home owners. We have hypothesized that it is something about ownership <u>per se</u> which induces conservation. As attractive as this approach might be in principle, it is unlikely to be adopted in practice. Too many competing considerations are involved for home ownership to be increased in America for the purposes of energy conservation. In fact, even though home owners appear more conserving by our measure, a public policy of encouraging home ownership through tax incentives and lost-cost loans has rather perversely increased the nation's appetite for energy. It is only within that context that renters appear as less conserving.

The most promising approach through the ownership variable undoubtedly lies in inducing renters to be more conserving, particularly in energy usage within the home. Since almost all of them already pay their utilities, making them more aware of energy costs does not seem to be the answer. Instead, we must recognize that there is something intrinsic to home ownership (such as a long-run orientation or a sense of attachment to the home) that is not captured by the other variables in our equation but which makes home owners more conservation-oriented. With these considerations in mind, we offer several suggestions.

9. <u>It is imperative to focus specific campaigns on renters, showing how they are affected by the energy situation and what they can do to reduce their energy costs.</u>

The current conservation campaigns seen biased toward home owners and neglect the needs or concerns of renters.

10. <u>While our findings have no direct bearing upon landlords, it is important that landlords be provided with more incentives to make conservation investments where they do not pay utility bills.</u>

Landlords may eschew winterization investments if the energy savings benefit their tenants, while renters may fail to consider them because they do not own the building. Ways of sharing both costs and benefits between these two groups should be explored more fully. It is also obvious that one important topic for future research is identification of the attitudinal factors which differentiate owners from renters, making the former more likely to conserve. We shall deal with this suggestion later in the report.

The recommendations outlined in the preceding pages deal primarily with general conservation. Our recommendations are most useful for this summary variable, for the model we have estimated in this study can account for a substantial amount of the variation in general conservation. Comparatively less is revealed about the factors involved in the specific types of conservation. Nonetheless, our analysis does support recommendations about how conservation can be achieved even for them. That the factors differ as we move from one type to another underscores a point made earlier -- campaigns to induce conservat in a particular type of energy usage must be individually tailored to that type.

<u>Promoting Winterization Conservation</u>. Among the specific types, our regression analysis does the best job in accounting for winterization conservation. Home owners, the cost conscious, and (rather curiously) the non-trusting are significantly more likely to conserve here. Campaigns to promote additional winterization should be based on the knowledge derived from these relationships. These campaigns must capitalize upon the identification of winterization with money saving by the cost conscious and the lack of winterization activity among renters. The relationship for those low on political trust, on the other hand, does not provide us with much guidance about how to increase conservation.

More specifically, our findings support several recommendations.

11. <u>To promote winterization, campaigns should emphasize its cost-saving advantages</u>.

Estimates of likely returns on investments should be diffused more widely through the population, and the tax credits for insulation should receive more emphasis. The greatest challenge in promoting winterization conservation undoubtedly lies in inducing renters to take more personal responsibility for it.

12. <u>Special campaigns to promote winterization should be developed for renters</u>.

For example, it might be pointed out perhaps that renters too can receive tax credits and make savings on their energy bills. Beyond this effort to design campaigns to reach renters, it is important that those factors be isolated which are inherent in home owning and make owners more conserving where winterization is concerned.

<u>Promoting Heating Conservation</u>. As we turn to heating conservation, we leave behind the kinds of factors discussed earlier to focus on a general predisposition to conserve and several of the perceptual factors. In some respects, heating conservation would seem to be easier to accomplish than some of the other types considered. No costly investments are required. Life styles do not have to be disrupted very much. Rather, more heating conservation can be achieved

with only marginal changes in behavior. If everyone were to turn down their thermostats by a degree or two in the daytime and regularly set them even a degree or two lower at night, substantial energy savings would be realized.

The question is how people can be convinced to do these things. Our regression results support some suggestions of what might be done, and additional insights into this matter emerge from other parts of the analysis.

13. Turning down the thermostat and other heating conservation activities should be emphasized as pure conservation acts.

This might persuade those who value conservation but do not presently conserve to bring their behavior into conformity with their attitudes. (One gimmick which might be effective would be to administer a "conservation" test, so that those who wrongly think of themselves as conservers will be made more aware of the dissonance.)

14. More attention should be paid to educating the American public about the impact of the energy situation on them personally where heating costs are concerned.

Our evidence suggests that a greater realization of impact would be translated into more heating conservation.

15. Campaigns like Project Pacesetter should be encouraged, since those who are aware of them are more likely to conserve in their use of heat.

Because heating conservation is relatively easy to accomplish (it requires incremental behavioral changes), persuasive campaigns seem to have greater chances of success.

Our data suggest that campaigns to promote heating conservation could be aided greatly by improving the performance of home thermostats. We found widespread compliance with requests to set thermostats at or below 68° F (see Chapter 3). It is the discrepancy between settings and actual temperature which reduces heating conservation levels. If this discrepency could be reduced, or even distributed more evenly above and below the settings, more conservation would result. To this end, we urge that:

16. <u>People should be encouraged to check the accuracy of their thermostats and to replace or repair those which are not working well.</u>

Even greater savings could be achieved if people were to replace their old thermostats with newer thermostats possessing automatic nighttime settings.

<u>Promoting Cooling Conservation</u>. The factors related to cooling conservation are also quite different from those considered heretofore. A majority of them lie outside of the realm of campaign influence. That males, the poor, and those in older residences are more likely to conserve in their use of cooling is interesting, but these findings alone give us precious little guidance on how to promote greater conservation. They are essentially fixed characteristics. We have not discovered the less fixed attitudes and perceptions which mediate between them and conservation and which could conceivably be changed. What this means is that campaigns to promote cooling conservation are likely to be less successful. Other approaches, outlined in a later section of this chapter, are likely to be more productive here.

Even so, three attitudes are significantly related to cooling conservation, and two of them can serve as the basis for conservation campaigns. People who report pessimism about America's ability to solve energy problems in the future are more likely to be conservers. So too are non-materialists. Pessimism is an attitude that can be influenced by educational campaigns, while non-materialism has such deep roots that it probably can not be affected by conservation campaigns. Thus, the dissonance reduction approach can be utilized with both, but the attitude change approach holds promise only for pessimism. These considerations lead to two different recommendations.

17. Educational campaigns should focus on the problems likely to arise in the future where energy is concerned, so that more people will become pessimistic about that future unless changes are made.

This approach assumes a constant relationship between pessimism and cooling conservation and attempts to make people more rationally pessimistic.

18. Campaigns should be conducted which highlight the relationships between both pessimism and non-materialism and cooling.

For example, conservation should be shown to be a highly non-materialistic activity. Perhaps cooling could be used as a special example in a dissonance reduction campaign for general conservation. By raising the salience of the inconsistency between those who hold these attitudes but do not conserve, greater conservation could perhaps be achieved.

An explicitly political attitude, political confidence, also exhibits a significant relationship to cooling conservation. The more confident people are more likely to conserve, even after other important characteristics have been controlled. Our measure of political confidence reflects a person's confidence in the performance capabilities of government (the President and Congress) in the energy area. Its relationship to conservation underscores the role that political attitudes can sometimes have in compliance with governmental programs. Insomuch as perceptions reflect realities, greater compliance with government requests to conserve would probably result if the government were more consistent and accurate in its energy-related messages. At least this possibility arises where cooling is concerned, and political confidence seems even more important where responses to crisis warnings are concerned.

Given these findings, one can imagine the damage that is done by division and conflict within the government over energy policy. Particularly troublesome is disagreement over basic facts and projections into the future. We are not so foolish or undemocratic to recommend that division and conflict be submerged in this controversial area. It is the very stuff of democratic politics and is the crucial cauldron for shaping energy policy. Instead, we only wish to reemphasize the responsibility of government officials to prevent controversy from corroding leadership capabilities. It is crucial that the public respond to energy policy initiatives when they are adopted, and great care needs to be exercised lest the process of adoption undermine public acceptance of the ultimate policies.

Promoting Appliance Conservation. As with cooling conservation, the majority of the variables which are significantly associated with appliance conservation do not provide much guidance for conservation campaigns. Income and education are relatively fixed characteristics, and the effects of education are surely carried by important intermediary attitudinal and perceptual channels which lie outside of our model.

Only the relationship between income decline and appliance conservation appears to offer a possible lever for stimulating conservation via campaigns. The problem is, however, that this relationship is in a counter-intuitive direction. It is those who anticipate no decreases in real income who conserve more, not those who expect declines. This relationship is surely a puzzle, and it seems reasonable to try to reverse it by encouraging those pessimistic about their financial position in the future to refrain from investments in appliances which are energy inefficient and to use appliances already owned in a conserving fashion.

19. Conservation campaigns should emphasize the purchase of energy-efficient appliances and conservation in appliance usage as hedges against inflation.

Reversing an empirical relationship is never easy but appeals to economic self interest may be the best way to accomplish this.

Two attitudinal variables exhibit significant relationships to conservation in appliance usage -- favorable orientations towards energy conservation and cost consciousness. They imply that appliance conservation is seen as a part of energy conservation in general and as cost saving. Since it will be somewhat difficult to change the two initial attitudes in these equations, the better approach is to attempt to increase consistency between attitudes and behavior by persuading the pro-conservation and cost conscious people to bring their behavior into agreement with their attidues.

20. Persuasive campaigns should focus on how appliance conservation contributes to energy conservation generally and how it can save money in order to raise the salience of these attitudes and behaviors so that forces for dissonance reduction might be set in motion.

In studying appliance conservation, we have not been entirely satisfied with the properties of our appliance usage measure. It embraces only a few appliance usages, and our respondents vary little in their scores. This problem constrains our analysis, leaving us much less confident about the generalizability of our findings and recommendations to the broad array of appliance activities. Clearly more research is necessary on the factors which affect appliance conservation.

Promoting Transportation Conservation. Our findings must be qualified here too, but for a different reason. The analysis in Chapter 3 raised serious questions about the reliability of self reports for certain key transportation activities. By contrast, reliability was relatively high where other activities were involved. Fortunately, there appears to be no systematic pattern to the bias in transportation reports. The principal effect of the bias is rather to attenuate the relationships between the independent variables in our analysis and the transportation index, obscuring the empirical relationships for transportation conservation to a much more significant degree than for any other activity index. Given the expected effects of attenuation, it should come as no surprise that our regression equation accounts for the least amount of variance where transportation is concerned.

In spite of these problems, some of the factors incorporated into our model manage to achieve significant relationships with transportation conservation. That there is a negative relationship with income bears out the assumptions underlying pricing strategies for attaining conservation. This will be the topic for discussion in a later section. The other three significant relationships will be the object of attention here, for they offer opportunities for promoting conservation through educational or persuasive campaigns.

The greatest opportunities appear to lie with predispositions toward energy conservation. Those with pro-energy-conservation attitudes are more likely to report conservation in the transportation area. This relationship seems real since these respondents are not significantly more likely to exaggerate their conservation (see Table 3.3). Both this relationship and the dissonance experienced by those who deviate from it are convenient targets for conservation campaigns.

21. <u>Campaigns should highlight the conservation possibilities in the transportation area for those who value conservation.</u>

The objective would be to raise the salience of this matter, thus increasing the drive for consistency among those whose pro-conservation attitudes are not matched by behavior. Our assumption is that the behavior would be modified in a significant number of instances.

22. <u>Campaigns should also attempt to promote pro-conservation attitudes.</u>

Here the emphasis shifts to making people feel better about doing their part to conserve, with the expectation that such attitudinal changes would lead to behavioral change.

Additional opportunities for achieving greater conservation are offered by perceptions of the impact of both the energy situation and the coal strike. In both cases those who feel an impact are already more likely to conserve. These relationships too seem real, and if corrected for attenuation would probably be much higher because respondents who perceive an impact are not significantly more likely to exaggerate their transportation conservation (see Table 5.5). The existence of these relationships offers the same two levers as above for affecting conservation. On the one hand, attempts can be made to strengthen the empirical relationship: on the other, more people can be persuaded that energy problems affect them.

23. Campaigns should highlight how the impact of the energy situation may be reduced (in transportation activities) for those who already perceive an impact.

We hope that increasing the saliency of the relationship will stimulate a drive toward consistency through behavioral modification. In addition, by identifying ways in which people can reduce the personal impact of the situation, we hope to aid those who feel affected.

24. Educational campaigns need to be stepped up to show what the personal impacts of different energy crises are.

One potentially useful approach would be to depict how an average family has been affected. Surprisingly, few people perceive personal effects of energy-related problems. These perceptions are doubtlessly inaccurate, and substantial dividends can be realized by making them more accurate.

More reliable measures of transportation conservation would undoubtedly yield an even clearer picture of what can be done in conservation campaigns to promote energy savings in the use of the automobile. Since we feel that an understanding of the factors which relate to conservation is crucial to devising effective energy policies, one of the top priorities for future research should be the development of more objective measures of transportation conservation. A recommendation along these lines is reserved for a later section.

Promoting Short-Run Electricity Usage Reductions. This last type of conservation differs substantially from the others in that it reflects a short-run response to crisis warnings rather than long-run conservation. Those who cut back during the coal strike were not necessarily, as our analysis shows, the same people who were conservers in the other areas.[3] Thus, in examining reductions in electricity usage during the course of the coal strike, a distinctly different phenomenon, responses to urgent pleas to conserve, is being treated. Our findings identify the kinds of people most likely to heed these pleas.

The most significant finding is that those respondents who express confidence in the ability of government leaders (the President and Congress) to handle energy problems are more likely to respond to leaders' pleas to conserve. In

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[3]In three of six cases, scores on the Electricity Reduction Index are not significantly related to scores on the other indices. These cases are the cooling, appliance, and transportation types of conservation. On the other hand, the relationships are significant for general conservation (r = .14), winterization (r = .13), and heating conservation (r = .10). That no one of these relationships is large, however, leaves considerable room for people to respond differently to an immediate crisis than they respond to the more lasting situation.

other words, responses to crisis rhetoric are at least partially dependent upon confidence in the source, when that source is government leaders. Two other relationships are as high or higher, but they involve demographic variables which are not directly amenable to manipulation.

Building public confidence in leaders in any particular policy area is no easy task, and this study offers no clear recipes for achieving such a result. Levels of general trust in government are substantially lower now than they were prior to the mid-1960's (Miller, 1974). The Vietnam War and the unrest of the 1960's, among other things, contributed to this decline in trust. A low level of trust with roots this deep can not be upgraded easily.

Confidence in the performance of government in the energy area is surely hampered by the low levels of overall trust in government. Nevertheless, it should be possible to achieve higher confidence levels here in spite of the more general atmosphere. Both general trust and the more specialized confidence in energy performance capabilities were measured in this study. The two measures have similar distributions, skewed in the nontrusting and nonconfident direction, and are moderately associated with one another ($r = .30$). Yet, even a correlation of this magnitude leaves ample room for people to have different orientations on these two items. One difference is quite apparent: whereas political confidence is tied to electricity reductions, political trust (the more general measure) is not. Thus, an emphasis on improving energy-related confidence levels can be adopted without attempting to affect generalized trust. It is also likely that such an emphasis can succeed in encouraging more compliant short-run responses to energy-related crises.

How can energy-related confidence levels be increased? We offer no ready answers but suggest two possible approaches which might be promising. One is for leaders to exercise extreme caution in their use of crisis rhetoric. Warnings must be tailored to the realities of the situation, for publicly perceived disjunctures between rhetoric and reality will seriously erode confidence levels. This matter is discussed more fully in the section on crisis management below.

The other possibility for increasing energy-related confidence levels is to strive to maintain consistency in governmental messages to the public about energy crises and the general energy situation. Inconsistency and squabbling surely undermines confidence. If leaders disagree over diagnosis and cure, then the public seems unlikely to follow their lead. These considerations lead us to recommend concentration on a different sort of conservation campaign.

25. Public leaders are urged to build public confidence in their capabilities for handling the energy situation by refraining from exaggerated crisis rhetoric and unnecessary conflict over energy policy.

In other words, more attention to "public relations" regarding energy matters could pay dividends in increasing public confidence in government's energy policy capabilities. We offer this recommendation cautiously. Both crisis rhetoric and conflict are necessary elements in the execution and making of energy policy. All we can reasonably urge is moderation in both, stemming from a realization that its absence will erode confidence and make it even more difficult to solve our energy problems.

The relationship between concern about the energy situation and electricity reductions leads us in a different direction. It supports the suggestion that educational campaigns designed to increase people's concern about the energy situation will also increase their willingness to heed calls for conservation in crisis periods.

26. Educational campaigns should attempt to increase public concern about the energy situation in order to bring about compliant responses to short-run energy crises.

We must again emphasize the danger in exaggeration, particularly where short-run crises are concerned. Nonetheless, we submit that a good case can be made for concern about the future energy situation merely by detailing, in an impartial manner, likely future scenarios for energy costs and supplies.

The relationship between one of the demographic variables, sex, and electricity reduction provides support for a final recommendation. Women are more likely than men to have restricted use of electricity during the coal strike period. In part, this may reflect their greater control over the use of electricity in the home, although we can not confirm this supposition. Beyond that, it may show greater female receptivity to appeals to conserve in crisis situations. The greater response among women should be capitalized on in conservation campaigns.

27. Crisis-induced conservation campaigns should be targeted more at women than at men.

Priorities in Energy Conservation Campaigns. The findings of the Project Monitor study support numerous recommendations concerning the kinds of approaches most likely to be successful in conservation campaigns. In addition, these findings would surely lead to other recommendations if more specific or different questions were to be addressed to them. In short, there are many ways to promote greater energy conservation through campaigns. The problem is to choose those few apt to provide the greatest benefits for the least cost. In other words, we need to prioritize the approaches.

One reasonable way to set priorities is to order the recommendations by the magnitude of the empirical relationships which support them. By this procedure, campaigns targeted specifically to renters would lie at the top of the list. A complementary approach would be to work first with those types of conservation we can account for best using our explanatory model. Following this procedure, general conservation and winterization would be at the top of the list, while transportation conservation would be at the bottom. An initial focus on general conservation has an additional advantage: it treats all different types, while the other foci are more restrictive.

Another reasonable way to prioritize would be to work with the information on immediate propensities to conserve analyzed in Chapter 2 (see Table 2.2 especially). For twelve individual activities, we were able to compute an index score of conservation potential. These scores suggest that winterization is the area in which the greatest immediate potential for conservation exists. By contrast, the scores for activities in two other areas, heating and transportation, suggest that these types of conservation offer little potential for immediate conservation.

These approaches to setting priorities for conservation campaigns have several common elements which will serve as the foundation for our final set of recommendations.

28. <u>Campaigns focussed on winterization (and, to a lesser extent, general conservation) are likely to be most successful in the near future and should be favored.</u>

29. <u>Campaigns focussed on transportation conservation are the least likely to be successful in the near future and should be deemphasized until more is understood about the factors which affect transportation usage.</u>

30. <u>Renters should be a principal target group of conservation campaigns.</u>

Crisis Management in the Energy Area

Most Americans have been affected by the spiraling prices for energy over the past few years. In addition, most sections of the country have experienced serious short-run energy shortages. The most widespread of these was the Arab oil boycott of 1973-1974 which depleted oil supplies, leading to the unforgettable long lines and restricted hours at gas stations. In northern states, the unusually cold winter of 1977 led to such heavy usage of natural gas that supplies were severely strained and serious spot shortages appeared. The most recent supply crisis occurred in the winter of 1977-1978, when the strike of the United Mine Workers disrupted coal production and shipment and generated shortages in coal and electricity in some areas. To date, each of the major fuels used by Americans has been affected by shortages of crisis proportions. As this report is being written, heavy cutbacks in the production of Iranian oil threaten yet another energy supply "crisis."

These energy supply crises, of course, pose severe problems for American consumers and policy makers. For energy policy-makers, however, they offer an opportunity to dramatize the seriousness of the energy problem. Policy-makers have not been at all hesitant to exploit this opportunity in order to persuade Americans that they must exercise more conservation in their use of energy. Leaders' "crisis rhetoric" is by now a familiar refrain in times of supply shortfalls. This rhetoric is designed in part to prevent really severe shortages of energy, and policy-makers are fully aware that it is their responsibility to sound effective alarms at the proper time. But it seems that the crisis rhetoric is also put to another purpose: to frighten people into more conservation in the long run.

Herein lies a problem of crisis rhetoric. The more a crisis is exaggerated so that non-crisis-related objectives can be realized, the greater the danger is that the public will become insensitive to future cries of crisis. The principle which operates here is familiar, expressed perhaps best in the children's story about the boy who cried "wolf" once too often. Each time a crisis occurs, the public is able to compare the severity of its impact on them with the predicted impacts. If they perceive that the predicted impact did not materialize, their possible conclusion that crisis rhetoric inflated it undermines credibility in the source of the rhetoric -- usually the government. And confidence in government is an important factor in individual conservation, as we have seen in the preceding section. In other words, it is imperative not to cry "wolf" too often when the wolf is unseen in the forest!

If a crisis materializes without adequate warnings, of course, the government has quite a different problem on its hands, probably one of even more serious proportions. It is very difficult for policy-makers to steer the correct course between exaggerating and underplaying the impact of potential energy shortages, particularly given the large number of factors over which they have no control. The problem is made even more difficult by the fact that conserving responses to crisis rhetoric may well reduce the probability of the crisis against which the warnings are issued. This means that the seeds of unfulfillment and the resulting loss of confidence may be sown by reasonable warnings themselves.

The United Mine Workers' strike between December, 1977, and March, 1978, provided us with an excellent opportunity for gauging the effects of crisis rhetoric. In western Pennsylvania, the impact of coal shortages during the strike period fell well short of what was predicted by most public leaders and the utility companies. Coal supplies never ran out. In fact, they seemed to maintain a steady state during the last month of the strike. With the benefit of hindsight, we can say that the crisis was overly exaggerated. It is conceivable, of course, that the warnings served their purpose in heading off a serious situation. Unfortunately, we do not possess the data to determine how much of the supply-demand balance during the period could be accounted for by decreases in demand, although we have documented some decreases.

What our data do suggest, however, is that about half of the citizens in Allegheny County did not perceive any personal impacts of the coal-strike. Even those who experienced some impact typically reported it to be minor. Furthermore, in the course of interviewing, our interviewers encountered charges by numerous people that the crisis was phony. In other words, at least some Pittsburghers did not believe the warnings. The fact that the predicted crisis never materialized convinced them that their perceptions were accurate. This fact also made those who had believed the warnings much more skeptical, as our interviewers learned in post-strike interviews.

We offer no recommendations to make the task of leaders easy in preparing the public for energy shortages. Rather, we can only emphasize the considerable risk of overblown crisis rhetoric and suggest one means through which this risk can be reduced. It is important that this risk be dealt with more successfully in the future, for if Americans impugn the credibility of their leaders when they issue future energy warnings, the nation's ability to cope with future energy crises without severe dislocations will be seriously impeded.

31. Warnings about short-run energy crises must be tailored to that crisis only, and not exaggerated.

That is, crisis rhetoric must be cooled or there is a good chance that it will be increasingly ignored. Leaders must resist the great temptation to use energy crises as vehicles for achieving levels of conservation beyond those required by the crisis itself. While such an achievement is desirable, crisis rhetoric is not the appropriate tool for it.

32. Post-crisis feedback on the role the public played in lessening the crisis should be employed to reduce perceptions that the crisis was artificial.

33. The extra costs associated with the crisis should be plainly marked on utility bills.

More feedback about crisis is necessary to combat the ever-present, and perhaps increasing, perceptions that it was engineered for financial gain.

Finally, our findings show that having experienced energy problems in the past does not always induce one to conserve more. To be more exact, those who perceived some impact of the coal strike were not significantly more likely to have reduced their usage of electricity during the strike period, although they did report conserving slightly more in the unrelated heating and transportation areas. Also slightly more conservation was recorded on heating and transportation, (but only in these two areas) by those who felt that they had been affected by the general energy situation. Thus, the perceived impact of the energy crises seems linked to conservation in some cases but not others. Even where a relationship appears it is not large. Much more than a sequence of crises will be required to achieve substantial across-the-board reductions in energy usage at the household level.

Examining Some Assumptions Underlying Energy Policy

One of the critical assumptions underlying the planned deregulation of energy prices is that price increases will dampen consumer use of energy. The validity of this assumption, of course, depends upon the elasticity of demand for the different types of energy. If demand is inelastic, as it apparently has been for gasoline, at least over recent price ranges, then a major justification for deregulation is absent. This assumption can be tested fully only with over-time data on different energy price and consumption levels.[4] The cross-sectional data we have, though, will support some inferences concerning the relationship of price and demand.

For one thing, the marginal utility of energy-related savings does not seem to decrease consistently with increases in income. Other things being equal, one would expect that conservation would be practiced most among those with lower incomes. The higher the income, so this argument would go, the less incentive there would be to conserve since energy costs would represent a more and more negligible proportion of disposable income. This expectation is not consistently fulfilled! For four of the seven types of conservation, conservation <u>increases</u> with income, while the expected decreases occur for the other three types. Even after controls are imposed for the types of things which might predispose higher income people to be more conserving (such things as pro-conservation attitudes, education, and the like), only the three original relationships were in the expected direction. With the controls, though, three of the four unexpected relationships become insignificant.

The pattern of these relationships hints at an explanation for the failure of the expected income-conservation relationships to materialize regularly. Cooling, appliance, and transportation conservation all involve engaging in an activity that is desired by most people -- air conditioning a home, purchasing a frost-free refrigerator, and unrestricted use of an automobile. Each of these activities costs money, though, and poorer respondents are less likely to be

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[4] Current interstate price differentials for some types of energy might provide a nice static test of the impact of price on demand.

able to perform them. The initial investment is probably more prohibitive than the operating costs, so poorer people abstain from doing something they desire and only incidentally conserve in the process. Where the expected relationship appears, then, cost plays a significant role. This interpretation is supported by the income-winterization relationship. Higher income respondents, who can afford this investment, are more likely to conserve. Applying the same principle, we achieve a different result! People with higher incomes conserve more when it requires, as is the case for winterization, a costly investment.

For heating conservation and electricity reductions, conservation also rises with income. Only the latter relationship is significant in the final regression equation. These activities are entirely volitional, unconstrained by investment costs. That poorer people do less here provides the final piece of confirmatory evidence for our investment cost interpretation. It is not marginal utility considerations at all which are operative for the poor, but simply the lack of funds with which to invest in energy-saving _or_ energy-intensive activities.

That marginal utility considerations do not emerge dramatically in our cross-sectional data suggests an important constraint on the elasticity of demand for energy. Energy consumption may be so tied to the "good things in life" for Americans that the cost of energy (at least at present levels) is insignificant for many in their usage decisions. Indeed, it is not inconceivable in some cases that energy wasting is a "status-earning" activity. We advance this conclusion cautiously, given the limits of cross-sectional data. Nonetheless, it should be obvious that our findings have serious implications for energy policy. The pricing of energy alone may be a much less effective instrument for dampening demand that is commonly supposed. A far more effective approach may be to modify the cost-benefit trade-offs for energy investments. Several recommendations follow from this.

54. Financial incentives, such as those provided for in the 1978 National Energy Act, should be provided for energy-saving investments.

These incentives could be extended to purchases of economy cars and energy efficient appliances. There has been considerable talk of expanding the incentives approach, and our data suggest why it might be effective.

55. Financial disincentives should be used to discourage energy-intensive investments.

For example, an energy use tax could be added to the cost of air conditioners, frost-free refrigerators, and the like. This recommendation too is not new. What appears to be new is the firm support our data provide for it. Investment costs seem to figure more prominently than operating costs in consumer decision-making about energy usage.

Another finding from our study bears upon the relationship between energy price and demand, again suggesting departures from normal expectations. We measured the degree to which people felt that they took cost into account in general consumption decisions. For general conservation, winterization, and appliance usage, the most cost conscious people did conserve more as would be expected. For the four other types of conservation, no significant relationships emerged, even though the relationships were usually in the expected direction. Clearly, conservation is not seen in cost-saving terms for the majority of energy uses. Such an orientation is most conspicuously absent in the areas of almost pure volition. It takes no outlay of funds to turn down the thermostat in the winter or to turn it up in the summer, to drive less, or to turn off more lights. Yet those people who pay attention to cost in other realms of life do not seem to do so where these activities are concerned. Energy conservation is not seen as achieving economy in personal financial terms, particularly where operating costs are concerned. It follows from this that:

3a. <u>More effort must be directed towards developing popular awareness of the cost consequences of energy usage.</u>

Operating costs should be emphasized in these efforts, since investment costs already seem well appreciated. This recommendation reinforces those made elsewhere.

The results of our research raise an important question: why do household consumers of energy not see energy conservation more as a cost-saving activity? Unfortunately, our quantitative data do not provide any answers to this question. Comments by many respondents to our interviewers, however, give us some insight into the matter. Over and over again, our respondents voiced futility in arresting the increases in their utility bills. Many said that they had taken action to reduce their consumption only to see their bills increase even more. A common conclusion was that their efforts had been inconsequential. We believe that this conclusion was often unwarranted, and that it illustrates widespread confusion on energy matters. In a period of price increases, it is probably not unusual for people to be unable to disentangle the savings from their conservation and the price increases. They should be comparing the usage figures on their utility bills, not the cost figures. The crucial question is not how much real money they have saved but how much they have saved in comparison to what they would have spent at previous usage rates. Variations in the weather-induced need for energy from year-to-year also confound consumer analysis.

Most utility bills are not organized so as to highlight the data for these comparisons. They don't provide usage figures from a similar period the year before, much less adjust the figures to hold weather constant. Nor do they project what the bill would have been at constant prices. Feedback to consumers on the consequences of their operating decisions must be improved. Perhaps the most effective way to do this would be to redesign utility bills to encourage usage comparisons. Experimentation with utility bills will be necessary to find the most effective ways of doing this, as we shall discuss below. For right now, a more general recommendation is in order.

37. <u>Utility bills should be designed so as to enable consumers to easily compare current usage with past usage (perhaps correcting for weather) and perhaps even real costs with projected costs under different assumptions.</u>

The recommendations set out in this section are designed to deal with the troubling inelasticity of demand for energy. Better understanding of the sources of that inelasticity, improved feedback on the consequences of individual conservation, and measures which focus on investment costs hold some promise for avoiding the consequences of this inelasticity. Of course, our findings and inferences leave undisturbed the other rationale for higher energy prices -- to increase the supply of energy.

An Agenda for Further Conservation Research

This report demonstrates the utility for energy policy of research on the factors associated with individual-level energy consumption. With this knowledge, the assumptions which underlie current policies can be examined and some guidance provided for new policy directions. Both activities are of considerable importance in the energy policy area. This study represents only a beginning for these activities. To carry them further, the Department of Energy must support a wide-ranging program of empirical research on the factors involved in energy consumption and conservation. A major component of that program should be additional survey work of the type we have done, although not necessarily using the same variables. Because of the relationships among the various factors which might be considered, though, it is necessary that the analysis of the survey data be multivariate in form. Only in this way can the relationships between individual attributes and orientations and conservation decisions be uncovered. Thus, our first recommendation in this section is of general form.

38. The Department of Energy should commission more behavioral research, and multivariate analysis, on individual conservation.

Beyond this general recommendation, there are other specific elements which should be contained within a program of behavioral research on the factors underlying conservation. We shall outline some of them here.

In our study, we attempted to determine the reliability of self-reports on energy usage. On the whole, these self-reports were surprisingly accurate, and most people appear to have resisted the temptation to portray themselves to our interviewers as more conserving than they really were. The activities involved in the transportation area were a striking exception to this general pattern. Not only did the self-reports appear to deviate substantially from actual behavior, but the deviations were in a self-serving direction: people reported themselves as being substantially more conserving in their use of automobiles than they seemed to really be. Thus, in future studies of conservation at the individual level, more attention must be paid to the measurement of activities in the transportation area.

39. <u>More objective measures than self-reports need to be developed for measuring energy conservation in the transportation area.</u>

Perhaps more careful and detailed questioning can elicit more accurate responses. Nevertheless, there seems also to be a need for collecting information in ways independent of the respondent.

Another surprising finding arose in the heating conservation area. Extensive use of objective measurement techniques to determine thermostat settings and home temperatures was made. In contrast to the transportation area, we found that self-reports were reasonably accurate estimates of behavior. Bothersome discrepencies between thermostat settings and actual temperatures recorded in the homes were also found. Thermostat settings were typically lower than home temperatures. Thus, there was the curious situation of people appearing to comply with requests to lower thermostats, but complying far less than they supposed in reality. Initially puzzled by these results, we searched extensively for measurement problems and other sources of explanation for them. No evidence could be uncovered that they were artifactual! In any case, additional research needs to be conducted on the relationship between home temperatures and thermostat settings.

40. <u>Additional studies of thermostat accuracy need to be conducted.</u>

More should be known about thermostat sensitivity and the factors (such as age, location, and the like) which contribute to inaccuracies.

We do not wish to leave the impression that the other measures of conservation used in this study are entirely satisfactory. Rather, we regard the specific activities we have measured as only samples of the larger number of activities which could have been included for each type of energy usage. The validity of our conservation indices depends, of course, upon how well we have sampled from the universe of possible activities. There is no systematic way in which to determine this validity. But, it would be fair to say that we would be more confident about the validity of our measures had we been able to include more activities of each type. Lack of representativeness seems to be a particularly serious problem for the appliance measure. Given the constraints of our study, it would have been difficult to expand collection of self-reports, and more objective measures to confirm them, beyond the twenty activities we included. Future studies, though, should try to be more inclusive than we have been able to be, perhaps by focussing attention on only one or a few of the conservation types at a time.

41. <u>Future studies should strive for greater representativeness and inclusiveness in the choice of activities for which conservation levels are measured.</u>

A second specific area for future research should involve more careful testing of the relationship between energy prices and the demand for energy. Of course, this relationship will be carefully monitored at the aggregate level. But extensive aggregation hides revealing complexities in relationships, and we urge that parallel studies be undertaken at the individual level of analysis using surveys.

42. <u>A panel study of energy consumers should be conducted so that responses to price changes over time can be mapped at the individual level.</u>

The current situation of rising energy prices provides an excellent opportunity for gathering information on the attitudinal and behavioral responses to the increases and on the factors which are related to the different responses.

43. <u>Inter-state comparisons should be made of the relationships of income, cost consciousness, and other such variables to conservation.</u>

Variation in energy prices among the states provides an opportunity to study current consumer behavior at different price levels. This could be done to some extent by disaggregating national surveys into different "price" contexts. A more sensitive design would be to conduct parallel state or local surveys in areas with different pricing levels.

The importance of cost consciousness for some types of conservation illustrates one of the limitations to a purely pricing policy for promoting conservation and suggests an important focus for future surveys. Many people do not pay a substantial amount of attention to the prices of things they buy, at least within certain broad intervals. Certainly we all know people who search for discounts on brand-name goods and others who seem unconcerned with discounts or sales. The lack of responsiveness to price increases among the less cost conscious undoubtedly lowers the elasticity of demand for energy. Seen in this way at the individual level of analysis, the aggregate relationship between cost and demand becomes two different relationships -- one for the cost conscious, another for those who are not cost conscious. Using cost consciousness as the key discriminator, perhaps greater understanding of demand elasticities can be gained by decomposing the aggregate relationships into different group relationships. This leads us to suggest a specific area for additional research on the elasticity of demand for energy.

11. <u>Estimates of changing demand as the price for energy changes should be separately derived, at the individual level, for those who are cost conscious and those who are not.</u>

Greater understanding of less cost conscious people seems an essential ingredient to sound energy policy.

It was suggested earlier that the absence of feedback to consumers on the cost consequences of their energy usage inhibits conservation in a period of rising prices. There is substantial evidence of a qualitative sort in support of this notion. One major problem is that many utility bills, and certainly utility bills in the Pittsburgh area, do not provide very useful feedback to consumers on the consequences of their energy-usage decisions. We recommend that the utilities do a better job of providing feedback through their billing systems, but it is not entirely clear how this should be done. More research is necessary on the impact of different types of feedback on conservation behavior.

45. <u>The Department of Energy should sponsor experiments with different utility bill formats and provide incentives for utility companies to do the same in order to determine how much feedback on energy usage, through utility bills, can promote conservation.</u>

Of these two approaches, it would seem to be far better to encourage a variety of utility-company experiments and the diffusion of those with successful results.

A fourth important area for future research involves gaining a better understanding of why home ownership is so strongly related to general conservation, winterization, and electricity reductions during the coal strike period. That these relationships remained after controlling for a host of possible explanatory variables means that the predispositional factors accounting for greater conservation among home owners lie outside of our model. We have hypothesized that there is something intrinsic to ownership (be it a long-run orientation or the commitment to property that equity brings) which predisposes owners towards greater conservation. Future research needs to be directed to testing this and other hypotheses, for the impact of ownership is too large to be ignored in conservation campaigns.

46. <u>Specific studies of why home owners are more conservation oriented than renters need to be supported.</u>

Finally, it has been increasingly apparent to us in our behavioral research on individual conservation that more effort needs to be directed towards building a research community around this important aspect of energy conservation. Some research has been conducted on energy conservation, but its results have been neither analyzed nor communicated extensively. Absent is the level of competition and exchange which characterizes highly successful research areas. Research into the individual determinants of energy conservation is currently in its early stages. For it to attain maturity, a community of researchers and policy-makers exchanging data and results, challenging one another's assumptions, and reaching towards general laws must be developed. Without such a community, the individual-level foundations for an effective energy policy will continue to be only dimly understood and, as a consequence, energy policies will be less effective. We believe that the primary responsibility for creating such a research community lies with the Department of Energy -- the principal client for energy research.

Several important steps should be taken immediately to begin developing such a community.

47. <u>The Department of Energy should encourage secondary analysis of all conservation surveys conducted under its auspices.</u>

Placing these data in readily accessible form in some central archive is a step already taken by certain DOE divisions, and this policy should be followed throughout the department. Beyond this, it is necessary to provide scholars with incentives for analyzing the archived data. Small research grants could accomplish this purpose quite well. Encouraging more analysis is only a first step toward developing more of a community among energy conservation researchers. A second important step is to promote interaction among these researchers. Here too the Department of Energy, as the major user of research results, has a primary responsibility.

48. <u>The Department of Energy should promote interchange among scholars doing behavioral studies of energy conservation through professional conferences and workshops as well as more effective exchanges of reports and papers.</u>

Such a research community surely exists in some areas of energy research, particularly those involving the development of energy technologies, and may serve as a model for what we are suggesting here. It is equally important to develop a research community around questions involving individual dispositions to conserve. Research on these questions seems likely to expand dramatically in the coming years. Now is the time to put in place those mechanisms which will insure that this research has its maximum benefit for energy policy making. Existing data must be analyzed from different perspectives. Findings from current research must be disseminated as rapidly as possible and subjected to careful scrutiny by those who are experienced in such research. Most importantly, rapid progress must be made toward developing a corpus of behavioral "laws" in the energy conservation area. The Department of Energy must play a leadership role if such a research community is to develop.

Conclusion

The findings of the Project Monitor study have supported a number of recommendations of ways in which energy conservation might be increased. These recommendations are premised on the notion that information about the factors related to individual conservation is vital for formulating effective energy policy. Such information enables us to gain some insight into why people do and do not conserve. Knowing this, in turn, helps us to assess the assumptions underlying current energy policies and to understand what policies have been effective in promoting conservation in the past and why.

As important as these findings are for understanding energy conservation behavior, we need to emphasize their limitations. They are drawn from one metropolitan county at roughly one point in time. We simply do not know whether the findings can be generalized to other sites, although there is no good reason for believing that the factors which affect the conservation behavior of other Americans (particularly in parts of the country with similar climates) are substantially different from those affecting Pittsburghers. We also do not know the extent to which our findings can be generalized to other times. Surely the price of energy, which has varied considerably over time, governs the nature of the relationships we have uncovered. Other factors which are time-related may also inhibit the temporal generalizability of our findings.

Another limitation of this study is the inherent difficulty in making inferences about change from static, cross-sectional data. Energy policy-makers need to know how people can be induced to conserve more than they currently do. Our investigations show how those who conserve more differ from those who conserve less at a single point in time. The recommendations offered here assume that these relationships reflect fundamental principles of conservation behavior. Only with over-time data on the same people, however, can we begin to estimate the causal relationships with some degree of certainty. For example, from the finding that attitudinal cost consciousness is now more common among conservers, we have inferred that conservation could be increased by making more people cost conscious. With over-time data, we could place this inference on much firmer footing by determining if those who became more cost conscious over time really did increase their conservation. The proposed second phase of Project Monitor is designed to take advantage of the summer and winter baselines already in place to conduct such an over-time study.

These limitations underscore the need for more research on energy conservation. But they do not undermine the importance of our results and the recommendations they have supported. Knowledge of what factors are associated at present with higher levels of individual conservation is a necessary foundation for sound energy policy-making. The tasks which await us are to strengthen this foundation temporally and geographically and to build upon it with data on changes in attitudes and behavior.

APPENDIX A

SAMPLE DESIGN AND SAMPLING PROCEDURES[1]

Wave I Household Survey

Sample Frame and Study Objectives. The purpose of the household portion of the study was to estimate population parameters of energy usage and related behaviors and attitudes toward certain energy-related issues in Allegheny County, Pennsylvania. The proposed data base was to be comprised of face-to-face interviews conducted with a permanent adult member (18 years of age and older) of each of the sample households.

The sample frame for this study, then, was Allegheny County, Pennsylvania. The basic sample elements were individual housing units. In view of the fact that there is no readily available listing of all housing units and in order to reduce overall study costs, a two-stage sampling procedure was employed. The units for the first stage, the primary sampling units (PSU), were the United States Census Bureau's Enumeration Districts (ED) and Block Groups (BG). Individual housing units were selected in the second stage.

The objective of this portion of the study was to complete twenty (20) interviews in each of forty (40) PSUs, for a total of eight hundred (800) completed interviews. Assuming an 80 per cent response rate, we made an initial selection of 1,000 housing units, based on the following equation:

$$\frac{800}{.8} = 1,000$$

or 25 housing units from each of the 40 PSUs.

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[1]Originally prepared by Phillip Windell, University of Pittsburgh Center for Urban Research.

Due to the substantial variation in the size of the PSUs, the sample was selected using a systematic Probabilities Proportional to Size technique (Kish, 1965:217ff). The fundamental PPS equation is given as:

$$\frac{N_a}{Fb} \times \frac{b}{N_a} = \frac{1}{F} = f \qquad (1)$$

where $\underline{f}$ is the sampling fraction; $\underline{N_a}$ is the number of elements in the PSU; $\underline{b}$ is the number of elements selected from each of the sampled PSUs; and $\underline{Fb}$ is the zone size, defined as:

$$Fb = N_t/a \qquad (2)$$

where $\underline{N_t}$ is the total number of elements in the sample frame; and $\underline{a}$ is the number of PSUs to be selected.

Substituting the relevant values for this case (using the appropriate data from the 1970 U.S. Census), we obtained:

$$\frac{376.86}{13,359.88} \times \frac{25}{376.86} = .002$$

In other words, the raw probability of a housing unit falling into our sample is approximately 2/1,000.

<u>The Study Region and Sampling Procedures</u>. Allegheny County is situated in the southwestern corner of the Commonwealth of Pennsylvania. It is one of four counties comprising the Pittsburgh Standard Metropolitan Statistical Area (SMSA), and it includes all of the city of Pittsburgh which is located approximately at the geographic center of the county. The city accounts for about

one-third of the total county population (520 thousand of 1.6 million), and for about 35 per cent of the year-round housing units (190 thousand of 534 thousand).

All of the study area is tracted and most of it is blocked. A "Block Group," or "BG," is "a combination of contiguous blocks having a combined average population of about 1,000" (U.S. Dept. of Commerce, 1970 - a). The portions of the study area which are not blocked are divided into "Enumeration Districts" or "EDs". According to the Bureau of the Census definition, "EDs average about 250 housing units," and are therefore approximately equivalent to BGs.

A complete listing of the EDs and BGs was obtained from the Pennsylvania Regional Planning Commission: the Master Enumeration District List, or MEDList. In addition, we relied on the Metropolitan Map Series and Block Statistics publications for the Pittsburgh urbanized area (U.S. Dept. of Commerce, 1970 - b). According to the MEDList, there are 1,797 BGs and EDs in Allegheny County, of which 160 are EDs, or approximately 9 per cent. Discrepancies between the three sources (MEDList, maps and Block Statistics) and aggregations due to the small size of EDs and BGs yielded a final count of 1,418 EDs and BGs. Again, there were 533,408 housing units in Allegheny County according to the MEDList, but resolution of discrepancies between the sources yielded a final count of 534,395 year-round housing units.

Stage One: To insure geographic distribution, the PSUs (BGs and EDs) were listed in a geographically serpentine fashion. The listing was begun in the northwestern corner of the county (ED423) and proceeded east along the northern boundary of the county. Once the eastern boundary was reached, the listing continued by moving south (from ED401 to Census Tract 4011), and then west, including the next "layer" of PSUs. The initial map-based listing was then checked for completeness against the MEDList and the Block Statistics publications. Discrepancies between the three sources were resolved in favor of the data reported in the Block Statistics publication since this is a later and more accurate report of the 1970 U.S. Decennial Census.

As the lists were checked for completeness, the total number of housing units for each ED and BG was entered on the list. When discrepancies between the maps and MEDList were encountered, the Block Statistics publication was consulted for the reasons cited previously. The lists were then reviewed and EDs and BGs with fewer than 50 housing units were aggregated with the smallest adjacent ED or BG. For example, since ED423 contains only 48 housing units (according to the 1970 Census), it was aggregated with ED422. The number of housing units was then cumulated over the entire list (N=534,395).

We then computed the first stage sampling interval by substituting the appropriate values into Equation (2), described previously. Thus,

$$Fb = N_t/a \qquad (2)$$

Using the final count of housing units for the County and the desired number of sample PSUs, we obtain:

$$\begin{aligned} Fb &= 534{,}395/40 \\ &= 13{,}360. \end{aligned}$$

The selection of sample PSUs originated from a two-step randomly designated point. First, using a table of random digits (Rand, 1955), we selected a number between '1' and '1,418,' the total number of PSUs. Let us denote this number as 'P'. We then selected a number from a table of random digits, between '1' and '13,360,' the length of the sampling interval. Let us call this number 'K'.

Beginning with the PSU appearing in the 'Pth' position in the geographically serpentine listing, we then cumulated housing units until we reached or surpassed a total equal to 'K.' The PSU which included the housing unit which brought the cumulated total to 'K,' was then selected. We then calculated K + 13,360 and selected the PSU which included the housing unit which brought the cumulated total to this sum. This procedure was repeated until the origin was reached once again, producing a final sample of 40 PSUs.

Thirteen of the forty sample PSUs were located in the city of Pittsburgh, or about 32 per cent, which compares favorably with the overall rate of approximately 35 per cent. The sample distribution of occupied housing units between the city and the county also corresponds relatively closely to the overall distribution. The distribution of the sample population, although absolutely close to the overall distribution (one percentage point difference) is significantly different statistically.

Similarly, although there is an absolute difference of only three tenths of a per cent in the proportion of whites in the sample areas in comparison with the overall rates reported in the 1970 census, the difference is statistically significant. Moreover, the sample areas in the city include about 3 per cent more nonwhites, while the county areas include about 2 per cent fewer nonwhites.

Finally, the sample areas in both the city and the county contain significantly fewer home owners than is indicated for the whole area by the data from the 1970 census. Thus, in terms of the overall number and distribution of the areas and the basic sample units (i.e., housing units), the sample areas can be said to be strictly representative of Allegheny County. The sample areas are slightly less representative of the county in terms of racial composition and home ownership.

Stage Two. The sampling frame for the second stage is comprised of all the occupied dwelling units in each of the forty PSUs selected in the first stage. For the best estimate of these totals, we relied on the MEDList and Block Statistics publications from the 1970 U.S. Census, as described previously.

We calculated a sampling interval (SI) for each of the PSUs separately, according to the following formula:

$$SI_i = \hat{OH}_i \times \frac{.8}{25} \qquad (3)$$

where $\hat{OH}_i$ denotes the total number of occupied housing units in PSU i; .8 represents the "shortfall" factor described above; and 25 is the desired number of sample housing units for each PSU.

Beginning from a geographically random point in the sample PSU, trained fieldworkers counted occupied housing units, recording the address and/or description of each 'SIth' house. In those cases where 'SI' was a decimal, the fieldworkers substituted a series of whole numbers equivalent to the nearest 1/10.

As we would expect, given the age of the Census source data, our count was more frequently not equal to the desired 25 housing units. In some cases, however, housing units as defined and identified by the Bureau of the Census are otherwise difficult to locate: rented rooms, for example, in which case there is no separate mailbox, lightmeter or doorbell; or, as a second example, residences which are on top of, or behind business establishments.

In addition, Allegheny County, especially the city of Pittsburgh, has been losing population and, although not at quite as rapid a rate, occupied housing units. In order to take both of these factors into account, we multiplied the total number of housing units in each PSU by .8. In the remainder of this presentation we shall refer to this as the "shortfall factor."

In only 9 cases did the resulting sample contain exactly 25 addresses. Indeed, the resulting samples ranged in size from 12 housing units to 91 housing units. Due, clearly, to the use of the "shortfall factor," 18 of the samples exceeded the desired size, while 13 fell short.

In a moment we shall explore some of the apparent reasons for these differences and the methods which we employed to handle the resulting problems. Before doing so, however, we should like to emphasize that the "shortfall factor" assisted in reducing the need for field resampling to a minimum: viz., in only 9 cases did the resulting sample consist of fewer than 24 housing units. Furthermore, as we shall see, in 2 cases the failure to achieve an acceptable sample size seems to have been due to fieldworker error rather than errors in the design procedures.

Problems and Solutions. The problems encountered in the construction of the stage one sample frame, and the solutions employed have been discussed in a previous paper (Windell et. al., 1976). In general, as noted previously, the problems involved discrepancies between the three sources of data. With few exceptions, those problems were resolved by relying on the Block Statistics publication (Department of Commerce, 1970 - b).

The problems encountered during the second stage of the sampling may be divided into two groups depending upon whether the result exceeded or fell short of the desired sample size (i.e., 25 housing units).

Oversample. A sample consisting of more than 28 housing units was considered excessive. There were two basic reasons for such errors: (1) a significant increase in the number of housing units in a given area; and (2) an error on the part of the fieldworker responsible for drawing the sample.

Altogether, there were eight PSUs in which the initial sample consisted of more than 28 housing units. In seven cases, the result was apparently due to an increase in the population of the area. In only one case was the excess clearly the result of a fieldworker error.

All of the seven cases of excess due to population increases were located in the non-city areas of the county, and the samples range in size from 29 units (three areas) to a total of 91 units. With the exception of this last PSU, however, all of the samples consisted of 36 or fewer housing units. In each of these seven cases, we calculated the difference between the initial sample size and the maximum acceptable sample size (i.e., 28 housing units), and then randomly deleted the specified number of units from the list.

In the course of sampling one of the areas, the fieldworker inadvertently included a portion of an adjacent blockgroup. As soon as this error was discovered, the improper portion of the sample was eliminated.

Undersample. The initial sample for seven of the PSUs consisted of fewer than 23 housing units -- four in the city and three in the non-city areas of the county. Once again, there were two basic reasons for the deficiencies: (1) population decline; and (2) fieldworker errors.

The population in four of the areas had declined such that even with the "shortfall factor," we were not able to generate an initial sample of acceptable size (i.e., 23 or more housing units). In one case the initial sample was less than half the desired size (tract 0502, blockgroup 2 in the Hill District, where N = 12). In the remaining three cases the initial sample consisted of 18, 21, and 22 housing units.

In each of these four cases, we recomputed the estimated total number of occupied housing units in the area based on the results of the initial sample. A new sampling interval was then computed based on this revised estimate and the PSU was resampled without replacement (i.e., the addresses in the initial sample were excluded from the re-sample frame).

In the remaining two cases, the fieldworker failed to include a portion of the designated PSU in the initial sample. In both cases we simply sampled in the initially excluded area using the original sampling interval.

Response Rate and Reasons for Nonresponse. As described previously, the sampling was conducted under the assumption that at least 80 per cent of the households sampled would agree to participate in the study. In order to complete 20 interviews in each of the 40 PSUs, therefore, we selected approximately 25 households.

In the end, the overall response rate was considerably lower: approximately 54 per cent in the city; and about 65 per cent in the county for an overall rate of about 61 per cent. These response rates are reported in Table A.1, along with the sources of nonresponse. The lowest response rate by PSU was 37 per cent, while in the highest rate was 84 per cent.

Table A.2 shows more clearly how the nonresponses were distributed across the various categories. In about two-fifths of nonresponse cases in both the city and the county, a member of the selected housing unit refused to be interviewed: nearly 39 per cent in the city and just over 44 per cent in the county for an

TABLE A.1

Response Rates and Nonresponse, Wave I Household Study

			Not at Home					
	Initial Sample	Moved, No Occupant	≥3 Callbacks	<3 Callbacks	Refusals	Breakoffs	Completed	Response Rate
City	462	25	66	39	83	1	248	53.7%
County Outside City	817	8	110	42	126	0	531	65.0%
Grand Total	1279	33	176	81	209	1	779	60.9%

TABLE A.2

Reasons for Nonresponse, Wave I Household Study

	City	County	Total
No Occupant	11.7%	2.8%	6.6%
Not at Home			
3 or more calls	30.8	38.5	35.2
less than 3 calls	18.2	14.7	16.2
Refusals	38.8	44.1	41.8
Breakoffs	0.5	0.0	0.2
Total Refusals	214	286	500

overall rate of about 42 per cent. In just over a third of the nonresponse cases, however, none in the selected household responded to three or more calls following the delivery of a letter.

As we would expect, there were over four times as many occurrences of unoccupied housing units in the city as compared with the non-city PSUs. Nevertheless, the lack of occupancy accounts for less than 7 per cent of the nonresponding units.

Resampling Procedures. Due to the unexpected low response rate, it was necessary to extend the initial sample in 28 of the 40 PSUs. The required number of new housing units in PSU 'i' ($S_i(2)$) was calculated using the following formula:

$$S_{i(2)} = \frac{25 - (C_i + NAH_i)}{R_i} \qquad (4)$$

where 'C_i' is the number of completed interviews in PSU i; NAH_i represents the number of housing units in which someone has not been at home; and R_i represents the response rate in PSU i, and is defined as follows:

$$R_i = C_i/(C_i + F_i) \qquad (5)$$

where F_i represents the number of refusals in PSU i.

In six cases, the required number of additional housing units was equal to or less than the number of excessive units which had been previously deleted due to oversampling. For the remaining 22 PSUs, it was necessary to reenter the field following the same procedures which were described previously, but with a new sampling interval ($SI_{i(2)}$) based on the following formula:

$$SI_{i(2)} = \frac{OH_{i(2)}}{S_{i(2)}} \qquad (6)$$

where $S_{i(2)}$ is the desired sample size, as defined previously, and $\hat{OH}_{i(2)}$ is the estimated number of occupied housing units, excluding those selected for the initial sample. Due to the small size or significant loss of housing units in three of the original PSUs, adjacent blockgroups were annexed.

Description of the Final Sample. The objective in Wave I was to complete 20 interviews in each of the 40 areas for a total of 800 interviews. In the end, we were able to complete only a total of 779 interviews, or 21 interviews short of the objective.

Table A.3 describes the characteristics of the final sample, comparing city and non-city components. A total of 248 of these interviews, or about 32 per cent, were conducted with members of households located in the City of Pittsburgh. Nearly 70 per cent of the respondents resided in homes which they owned -- somewhat fewer in the city (about 62 per cent), and more in the non-city areas of the county (approximately 73 per cent). Nearly two-thirds of the respondents were female. Once again, the rate is higher for the non-city areas of the county although the difference is considerably smaller. Indeed, in terms of sex distribution, there is no significant difference between the city and the county. As we would expect, the city sample contains a larger proportion of non-whites than does the non-city portion of the sample, and the city respondents have a lower median income.

Representativeness of the Sample. Table A.4 and A.5 compare the sample with the census data for the county and the city areas, respectively. Due to the lower response rate in the PSUs located in the city, the final sample is biased in favor of the county when compared with the data from the 1970 Census, either for the whole county or for the aggregate of the sample areas. With

TABLE A.3

Characteristics of Wave I Household Sample

	City	County	Total
Percentage of Total Households	31.8	68.2	100.0
Per cent Owner-Occupied Housing Unit	62.0	73.4	69.8
Per cent Married			71.1
Per cent Female	65.3	66.5	66.1
Per cent White	83.0	94.1	90.5
Median Income	$8,819	$13,419	$12,304

TABLE A.4

Wave I Household
Comparison Between Final 1970 Census Sample and Overall Area

		City	County	Total
Percentage of Total	Sample	31.8	68.2	100.0
Occupied DUs	Census	34.7	65.3	100.0
Percentage Owner	Sample	62.0	73.4	69.8
Occupied DUs	Census	50.3	72.4	64.8
Percentage White	Sample	83.0	94.1	90.5
	Census	79.3	96.1	90.7

TABLE A.5

Comparison Between Final Wave I Household Sample
and 1970 Census Data for Sample Areas

		City	County	Total
Percentage of Total Households	Final Sample	31.8	68.2	100.0
	Sample Area	35.1	64.9	100.0
Per Cent Owner-Occupied DU	Final Sample	62.0	73.4	69.8
	Sample Area	43.5	61.3	55.1
Per Cent White	Final Sample	83.0	94.1	90.5
	Sample Area	76.9	98.2	91.0

the exception of the non-city areas, the final sample is also biased in favor of home owners. Furthermore, the exception holds only when we compare the final sample with the Census data for the whole area.

With regard to race, the distribution of the final sample respondents compares favorably with the distribution in the 1970 Census for both the entire county and the aggregate of the PSUs. But the sample includes significantly more non-city nonwhites and fewer city nonwhites than we would expect based on the data from the 1970 Census.

Wave II Household Survey

Sample Frame and Study Objectives. This portion of Project Monitor had a twofold purpose. It was designed as a follow-up to a portion of the households contacted in Wave I. Secondly, it was designed to increase the overall data base to approximately 1,000 households in Allegheny County. For both purposes, the 40 PSUs selected in Stage One of the Wave I Household Study formed the basic sample frame in an effort to minimize study costs.

Sampling Procedures. The total sample for Wave II Household Study consists of two subsamples: (1) New Respondents: In an effort to extend the total data base to approximately 1,000 Allegheny County households, 200 interviews were to be conducted with the residents of newly selected households. (2) Panel Respondents: In order to compare attitudes and behavior over time, a portion of the Wave I participants were interviewed for a second time. For budgetary reasons, it was necessary to restrict the total sample to 500 interviews. Thus, our goal was to obtain 300 panel interviews.

New Respondents. Based on the Wave I experience, we anticipated a response rate of between 60 and 70 per cent. Based on the former rate, we would attempt to select slightly more than eight new households from each of the 40 PSUs, for a total of 320.

Relative to the Wave I Household Sample, the Wave II sample was to be drawn without replacement. That is, the sample frame for Wave II excludes all those households which were contacted during Wave I. For each of the 40 PSUs, then, we computed a sampling interval (SI_i) according to the following formula:

$$SI_i = \frac{\hat{T}_i - (S_{1i} + F_{1i})}{8} \qquad (7)$$

where $\hat{T}_i$ represents the best estimate of the total number of occupied housing units in PSU i*; S_{1i} stands for the total number of completed interviews, or the final sample for Wave I in PSU i; and F_{1i} represents the total number of refusals in PSU i for Wave I, including those not at home three or more times. Beginning from a random starting point, then, a fieldworker proceeded to count actual housing units using the prescribed sampling interval.

Panel Respondents. Assuming a 75 per cent response rate from the participants in the Wave I study, we decided to select a total sample of 400 households for the Wave II sample, or 10 households in each of the 40 PSUs. In general, then, each of the Wave I participants had just over a 50 per cent chance of being contacted for a Wave II interview. Because the size of the final sample differed slightly between PSUs, it was necessary to compute a sampling interval (SI) for each PSU based on the following formula:

$$SI_i = \frac{S_{1i}}{10}$$

where S_{1i} represents the final sample size for PSU i. Using a whole number series equivalent to the nearest one-tenth over the long run to the computed sampling interval, we selected households beginning from a random starting point.

---

*The basis for these estimates is described in greater detail in a subsequent section.

Problems and Solutions. The sample of Panel Respondents was selected from existing office files. Its selection, therefore, presented no problems. In an effort to minimize errors in the selection of New Respondents, we computed a revised estimate of the total number of housing units using the results of the initial sampling efforts for Wave I. Thus,

$$\hat{T}_i = SI_{1i} \times S_{1i} \qquad (9)$$

where $\hat{T}_i$ represents the revised estimate of housing units; SI_{1i} stands for the initial sampling interval; and S_{1i} represents the total initial sample.

As a result of these revisions, serious deviations from the desired sample size occurred in only three PSUs. In one case the resulting sample was too small. In the other two cases, the resulting sample exceeded expectations by more than two units.

Undersample: Due to a fieldworker error, the results of the initial sample could not be used to estimate the total number of housing units in one PSU. Relying on the data from the 1970 U.S. Census, the initial sample for Wave II turned out to be only five households. We, therefore, discarded this sample but utilized the results to arrive at a revised estimate of the total number of housing units. After recomputing the sampling interval, we resampled the PSU beginning from a random starting point.

Oversample. In two areas, the fieldworkers responsible for the initial Wave I sample apparently failed to count a substantial number of households. As a result, the initial Wave II sample of New Respondents consisted of 13 households rather than the desired eight. In each case we initially eliminated three names from the list. Due to initially low response rates, however, these households were subsequently included in the sample.

Response Rate and Reasons for Nonresponse. Table A.6 shows how the initial sample responded to the interviews and the ultimate response rates. In the Wave I sample, the city response rate was substantially lower than that for the county. The reverse was true for the Wave II sample, although the differences were less pronounced. Among Panel Respondents, the city response rate was better than 64 per cent while the county rate was about 60 per cent. Among New Respondents, the city rate was nearly 61 per cent, while the county rate was about 55 per cent.

Table A.7 displays the sources of nonresponse in percentage terms. In contrast to Wave I, the most frequent reason for the nonresponse is insufficient attempts to contact. If we eliminate these households from the sample frame, the response rate increases approximately 10 percentage points: from slightly less than 60 per cent to slightly more than 70 per cent.

Actual refusals account for above 12.3 per cent of the total Wave II sample. As we would expect, the rate is somewhat higher for the New households than for the Panel households. However, the rates are nearly equal for the two types of county respondents. In addition, about 5 per cent of the Panel Respondents had moved. As we would expect, this occurred about twice as frequently in the city as it did in the non-city sample areas.

Description of the Final Sample: The objective of the Household Wave II study was to complete 500 interviews -- 300 with respondents who were interviewed in Wave I (Panel Respondents), and 200 with residents of newly selected households. At the termination of the fieldwork, 282 Panel interviews had been completed, (18 fewer than our initial objective), together with a full complement of 200 New interviews.

The characteristics of Wave II respondents are shown in Table A.8. Altogether, two-thirds of the Wave II respondents reside outside the city and about three-quarters of them are home owners -- slightly more in the county, slightly fewer in the city. Approximately 70 per cent of the respondents are female and a similar percentage is married. But while there is a difference

TABLE A.6

Response Rates and Nonresponse, Wave II Household Study

		Initial Sample	Moved, No Occupant	Not at Home: $\geq$3 Callbacks	Not at Home: $<$3 Callbacks	Refusals	Breakoffs	Completed	Response Rate
PANEL	City	141	11	9	17	13		91	64.5%
PANEL	County Outside City	320	12	28	50	39		191	59.7%
PANEL	Grand Total	461	23	37	67	52		282	61.2%
NEW RESPONDENTS	City	115	1	11	13	20		70	60.9%
NEW RESPONDENTS	County Outside City	235	1	32	43	29		130	55.3%
NEW RESPONDENTS	Grand Total	350	2	43	56	49		200	57.1%

TABLE A.7

Reasons for Nonresponse, Wave II Household Study

	Panel			New Respondents		
	City	County	Total	City	County	Total
No occupant/ occupant moved	22.0%	9.3%	12.8%	2.2%	1.0%	1.3%
Not at Home						
3 or more calls	18.0	21.7	20.7	24.4	30.5	28.7
less than 3 calls	34.0	38.8	37.4	28.9	41.0	37.3
Refusals	26.0	30.2	29.1	44.4	27.6	32.7
Breakoffs	0.0	0.0	0.0	0.0	0.0	0.0
Total Refusals	50	129	179	45	105	150

of four percentage points between the city and the county in the sex distribution, there is a 13 percentage point difference in the marital status distributions. In both cases, the city rate is lower. The city sample also contains about 11 per cent fewer whites and the median income is more than $5,000 lower than the median income for the county sample.

Table A.9 compares panel and new respondents. With the exception of the per cent married and the per cent female for the city, the Panel and New samples are substantially similar from a statistical standpoint. Indeed, there are identical proportions of county females in the two samples and the per cent white in the city and percentage of home owners in the county differ only slightly.

Representativeness of the Sample. In terms of the simple geographical distinction between city and non-city residence, the Wave II sample corresponds very closely to the distribution portrayed by the 1970 Census data. This is especially true of the New participants, reflecting the somewhat higher response rate in the city. In terms of race, the Wave II sample underestimates the proportion of city nonwhites, but corresponds closely to the county distribution. Once again, this is especially characteristic of the sample of New Respondents in comparison with the county as a whole. Because the county sample is somewhat larger and tends to overestimate the proportion of nonwhites, the sample as a whole is statistically representative using these criteria. However, the sample contains substantially more home owners than is true especially of the city. The sample is also biased toward females and married persons.

TABLE A.8

Final Sample - Wave II

	City	County	Total
Per cent of Total Households (n) (n)	33.4 (161)	66.6 (321)	100.0 (482)
Per cent Owner-Occupied DU	72.0	78.4	76.3
Per cent Married	60.2	73.2	68.9
Per cent Female	68.3	72.3	71.0
Per cent White	84.4	95.0	91.4
Median Income	$7,110	$13,404	$11,705

TABLE A.9

Wave II Final Sample by Respondent Type

	Panel			New Respondents		
	City	County	Total	City	County	Total
Percentage of Total Households	32.3	67.7	100.0	35.0	65.0	100.0
(n)	(91)	(191)	(282)	(70)	(130)	(200)
Per cent Owner-Occupied Housing Units	72.7	78.6	76.7	71.6	78.1	75.6
Per cent Married	67.0	78.5	74.8	51.4	65.4	60.5
Per cent Female	63.7	72.3	69.5	74.3	72.3	73.0
Per cent White	84.6	94.2	91.1	84.1	96.2	92.0
Median Income	$8,749	$13,300	$12,220	$5,940	$13,634	$10,804

APPENDIX B

MEASURING BASIC ATTITUDES

Eleven different variables have been utilized in the household study to indicate respondents' basic attitudinal orientations. Three of these variables are simply dichotomized responses to questions asked directly to the respondents. These three variables were theoretically and empirically distinct, which justifies using them alone.

Of the other eight attitudinal variables, seven are additive indices based on responses to conceptually and, in most cases, empirically similar items. In each case, the original answers to the survey questions were dichotomized and then subjected to factor analyses to determine their structuring. First, we examined the results of a general factor analysis of all attitudinal items to determine how the items which seemed conceptually similar clustered together. Second, to further confirm treating the particular set of items as measures of the same concept, we performed a factor analysis on these variables alone. For both the general factor analysis and the sub-set factor analysis, the loading of the variables of interest on a single dimension or factor was considered justification for treating them as measures of a single overriding concept. In constructing the resulting measures of these concepts, each constituent variable was assigned equal weight in a simple count of the number of responses which were consistent with the dimension. Where this procedure was followed in creating an index, the results of the second factor analysis are displayed in Table B.1. Also displayed there are the correlations of each individual item with the index in order to show clearly the contribution of each to the overall measure.

TABLE B.1

Construction of Multivariate Attitudinal Indices

POLITICAL CONFIDENCE	Loading on factor in varimax rotation	Item correlation with index
Congress can be trusted to do what is necessary to deal with any energy problems.	.46	.58
We can trust the federal government to do what is right most of the time.	.50	.70
President Carter can be trusted to do what is necessary to deal with any energy problems.	.64	.73
People should be willing to do whatever the President asks to save energy.	.43	.64

POLITICAL TRUST		
The federal government wastes most of the money we pay in taxes.	.50	-.66*
The federal government is run by a few big interests looking out for themselves.	.60	-.70*
Many of the people running the federal government are crooked.	.54	-.68*
The federal government does not seem to care about the needs of people like me.	.56	-.71*

*Scores on the index were reversed so that high scores were trusting, low scores non-trusting.

TABLE B.1

(continued)

SOPHISTICATION	Loading on factor in varimax rotation	Item correlation with index
The energy situation is too complicated for me to understand.	.29	-.63*
The Arabs are the major cause of America's energy problems.	.48	-.63*
The unusually cold weather of last winter is the major cause of America's energy problems.	.62	-.69*
The coal strike is the major cause of America's energy problems.	.63	-.67*

*Scores on the index were reversed so that high scores reflected sophistication, low scores simplicity.

ENERGY CONSERVATION		
Being able to save electricity or gas makes me feel really good.	.29	.56
Before I will make more sacrifices to conserve energy, I want to make sure others are sacrificing too.	.47	.74
Having to sacrifice takes the fun out of life.	.45	.67

GENERAL CONSERVATION		
Sacrifice is good for people.	.36	.59
Most Americans are too comfortable.	.45	.69
I am much less wasteful than most people.	.23	.64

Political Confidence. The first index is labelled POLITICAL CONFIDENCE for confidence in the performance capabilities of government. Respondents with high scores on this index have a high level of confidence in government's ability to solve problems, energy problems specifically. On the contrary, respondents with low scores have little confidence in governmental performance. CONFIDENCE is based upon the four variables indicated in the first panel of B.1. These four variables are highly correlated with a single factor in a varimax factor analysis of all the individual attitudinal variables (not shown) indicating that they can be considered different measures of the same concept. All have loadings (in effect correlations with the reference factor) of above .40 on this factor and loadings substantially below this level on all other factors. Furthermore, the factor is a relatively clean one in that no other variables enjoy relationships to it that approach in magnitude those of the four variables discussed. We also performed a factor analysis of these four variables alone. The results of this analysis are presented in the first panel of Table B.1. They support quite unequivocally the combination of the four distinct variables into a single unidimensional index. Contained also in Table B.1 is the correlation of each item with the overall index score, and it is satisfyingly large in every case.

Political Trust. The second index is labelled POLITICAL TRUST to suggest on orientation toward the federal government which is characterized by general trust and confidence more broadly focussed than in the policy-making capabilities. Respondents with high scores on this index have high levels of trust in government, whereas those with low scores are distrusting or cynical about government. POLITICAL TRUST is formed from responses to four statements indicated in the second panel of Table B.1. These variables are all highly correlated with a single factor (different from that for CONFIDENCE) in a varimax factor analysis of all variables (not shown), indicating that they too can be thought of as measuring the same concept but a concept quite different from CONFIDENCE. All enjoy loadings in excess of .40 with this factor and loadings substantially below this level with all other factors. This factor, though, is not as clean as the POLITICAL CONFIDENCE factor, for in the general factor analysis one additional variable joins the four mentioned above in enjoying a substantial loading on the factor. The variable is measured by the statement that a major cause of the current energy situation is the attempt by oil and gas companies to increase their profits. We regard this more as an empirical correlate of POLITICAL TRUST (in a negative direction) than as a part of the cluster of variables reflecting TRUST as a concept and have excluded it from the TRUST index. Panel 2 of Table B.1 presents the four-variable solution for this factor, along with the correlations between each variable and the overall index score. These results are very supportive of the combination of the four items into an additive index.

Both the POLITICAL CONFIDENCE and POLITICAL TRUST indices measure attitudes toward the federal government. It is to be expected that these two variables will be related to one another, and they are correlated at .31. This correlation is not so high, however, as to suggest that our two indices are essentially measuring the same thing. Furthermore, the eight single items were separated into two distinct groupings in the overall factor analysis of all the attitudinal items. This indicates that we are measuring two distinct things. The one is attitudes toward government based on perceptions of its performance capabilities, while the other is a more generalized set of orientations toward government. One can be positive toward government on the first without being positive on the second, and vice versa. However, the general tendency, as the correlation between the two indices shows, is for there to be a relationship between the two attitudes. We regard this as an empirical relationship between two distinct entities and, thus, have measured them separately.

Sophistication. The third index carries the label of SOPHISTICATION, for sophisticated or non-simplistic conceptions of the cause of the energy situation in America today. Respondents with low scores report being confused by the situation and are willing to attribute the principal blame to each, in turn, of the several sources we presented to them -- indicating even more confusion about the matter. Respondents who attain high scores on this index report being not confused and are much more careful in attributing blame to any one source. These sources, it should be emphasized, may be widely publicized contributors to the energy situation in any particular year but are not underlying causes of the problem, at least as we perceive the situation. A readiness to explain the energy situation in simple terms as an effect of alternatively one, then the other of these is a distinctive mark of impoverished thinking about energy problems.

The third panel of Table B.1 contains the variables which comprise the SOPHISTICATION index, as well as the empirical results which justify the combination of these items into an index. These four variables each loaded at .40 or above on the general factor analysis we utilized (not shown here), and no other variables enjoyed loadings which approached this magnitude on the factor. Furthermore, these variables did not have very high correlations with any other factor in the general solution. Table B.1 shows how these variables loaded on a single factor when they were analyzed alone and also reports the correlation of each item with the overall index. We can be confident from these results that the four variables are measuring a single concept.

Conservation. Indices four and five are both measures of attitudes toward conservation. Seven questions in the attitudes section of the questionnaire were designed to measure conservation sentiment. Our expectation that these questions would elicit responses which were generally similar, however, was not borne out. Some of the conservation variables enjoyed relatively high correlations with others, but these relationships were not repeated across the set of items with any consistency. This was supported in the general factor analysis performed on all attitudinal items. Only two of these variables attained loadings of above .40, and these loadings appeared on different factors. Even if our criterion for loadings is relaxed to .30, no factor contains more than two of the conservation items. Finally, if we look only at the highest loading for each item, a total of five factors are involved. These findings leave no doubt that there is no general dimension of conservation.

A factor analysis of the seven conservation items taken alone, however, does reveal some patterning among the items. Two distinct factors emerge from a varimax rotation for the seven items. The first factor focusses more on energy conservation *per se*, while the second factor focusses more on conservation in general. The loadings on these two factors are not as high as they were for the factors discussed above. This indicates that, even if two meaningful concepts of energy and general conservation can be identified, these variables are only crude indicators of those concepts. Nonetheless, there is some justification for speaking of these two distinct kinds of conservation (which are not highly interrelated), what can be called ENERGY CONSERVATION and GENERAL CONSERVATION. Table B.1 contains the variables which comprise each index, along with the results of the second factor analysis (for the two separate item clusters) and the correlations of the items with the appropriate index.

Pessimism. Two additional attitudinal indices were formed by combining the responses in additive fashion to a pair of questions each. ENERGY PESSIMISM reflected responses to questions about whether scientists would find solutions to energy problems and whether America would run out of energy. Respondents answering "yes" to the first question and "no" to the second were coded as optimists, and the simple number of optimistic responses was counted. The scores were then reversed to give pessimists the largest number. Pittsburghers responded similarly to these two questions more often than not, thus justifying empirically the combination of these two answers. The first panel of Table B.2 contains the questions which entered into this index, as well as the correlation between the two items.

Cost Consciousness. This was an index formed from responses to two questions about the importance of cost saving in respondents' non-energy related consumer behavior. Those who valued cost saving in response to both questions were assigned the highest score on the index; those who did not were given the lowest score; and those with mixed answers were assigned a middle score. Again Pittsburghers tended to respond similarly to these questions more often than not, providing empirical justification for combining answers to the two. The second panel of Table B.2 contains the two questions used in constructing this index, and the correlation between answers to them.

Non-Materialism. One other index was constructed by using the responses to two questions. We asked our respondents whether they defined success in material terms and whether material possessions were more important to them than intellectual/healthful pursuits. While there was substantial variation in response to the first question, virtually no one (only 4 per cent of the respondents) chose material goods over the less tangible pursuits in response to the second.

TABLE B.2

Construction of Bivariate Attitudinal Indices and Single Item Measures

	Inter-correlations	Item correlation with index
ENERGY PESSIMISM		
Scientists will find solutions to our energy problems before any serious shortages occur.	.21	-.78*
America will never run out of energy resources.		-.77*
*Scores on the index were reversed so that high scores reflected pessimism, low scores optimism.		
COST CONSCIOUSNESS		
I usually go to several stores to find the lowest prices for things I buy.	.13	.82
The cost of something I am buying is more important to me than its other qualities.		.67
NON-MATERIALISM		
A person is a success if he is able to buy a big house, a big car and travel when he wants to.	.00	.78
Improving your mind and maintaining health are more important than having things like a fancy house and car.		.61
ENERGY CONCERN		
The energy situation in America today worries me a great deal.		
INNOVATIVENESS		
I like to try out new things before other people do.		

TABLE B.2

(continued)

COMPANIES NOT CAUSE

Attempts by oil and gas companies to increase their profits are the major cause of America's energy problems.

*Scores on this item were reversed.

Answers to this question were so skewed that no relationship emerged between it and the first question. Nonetheless, we formed an index of NON-MATERIALISM based on responses to these two items. The highest score on the index was given to respondents who gave non-materialistic answers to both questions; the lowest score to those who provided a materialistic response to the second question only, valuing material possessions more. All remaining respondents who answered both questions were assigned an index value between these two extremes. Panel three of Table B.2 contains the text of the questions used in constructing this index, as well as the zero correlation between these two items.

Finally, three questions were used directly as variables in our analysis. They were those expressing concern about the energy situation (ENERGY CONCERN), individual innovativeness (INNOVATIVENESS), and a tendency not to project blame for the energy situation onto the desires for profits by oil and gas companies (COMPANIES NOT CAUSE). These items did not combine in any meaningful way with theoretically similar items in the attitudinal set, although attitudes about oil and gas companies were found to bear more than trivial relationships with some of the confidence and trust items. Furthermore, each was felt to tap an important attitude in its own right. Thus, we left them as separate items. The three questions involved are listed in the last panels of Table B.2. Answers to the first and last were dichotomized into disagree and undecided versus agree, while the INNOVATIVENESS item was dichotomized into disagree versus undecided and agree.

The general approach taken to the measurement of attitudes for most of the variables presented in this section is based upon an assumption about the meaning of responses to questions in the survey setting. Survey questions are typically formulated to represent some concept which is deemed important. Our study is no different from usual in this respect. There is ample evidence, however, that single questions do not often do a very good job of tapping the concept. Concepts are usually richer than any single question can be, and the question can touch on only a part of them. In answering questions, furthermore, respondents don't always accurately reflect their predispositional set for a variety of reasons -- both due to the individual himself and to the nature of the stimulus. Greater reliability of response and validity of measurement are typically achieved by combining answers to questions, where the questions are simply different measurements of the same concept. We feel more confident in using our attitudinal indices, both for their greater conceptual richness and for their enhanced reliability, than in using the questions individually. This confidence is supported in our later analysis: for we find that the attitudinal indices bear much stronger relationships to conservation activities than do the individual items. While we have no adequate tests of reliability or validity for the attitudinal variables, these results give us confidence that our measures of attitudes are more valid and reliable than answers to individual questions. We believe it to be imperative that future studies of energy conservation move away, as we have done, from earlier approaches to the measurement of attitudinal variables which attempted to represent an attitude, sometimes one of substantial complexity, by a single item or question. Indeed, in our future work, we hope to improve our measurement of the attitudinal concepts used here by adding more indicators of each -- particularly where we were forced to rely on a one or two-item indicator.

APPENDIX C

PROJECT MONITOR

HOUSEHOLD QUESTIONNAIRE:

WINTER STUDY

0	1	5	9	3	0				0	1									78									

1. In what ways, if at all, have you been affected by the recent coal strike and coal shortages? How?

   ☐ No, have not been affected (Go to Q1a)

   ____

   ____

   ____

   ____

1a. Have you been affected by other energy problems? How? (RECORD VERBATIM. PROBE FOR DETAIL.)

   ☐ No, have not been affected (Go to Q2)

   ____

   ____

   ____

   ____

2. Have any groups or organizations that you or other members of your household belong to encouraged you to save energy, or been involved in any way that you know of with programs for energy saving?

   0 ☐ NA 1 ☐ Yes 2 ☐ No 8 ☐ DK 9 ☐ NR

   2a. (IF "YES") Which group or groups were these? Please give us their exact names.

   2b. (IF "YES") What specific activities were involved?

GROUPS	ACTIVITIES
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________

3. Do you recognize any of the following as community programs in the Pittsburgh area mainly associated with energy conservation? If you have not heard of a program, please feel free to tell me. (READ PROGRAMS.)

	1 Yes	2 No (Not Heard)	3 Not Sure	9 DK/NR
a. Project ACTION.......	☐	☐	☐	☐
b. Project PACESETTER....	☐	☐	☐	☐
c. Project SAVE.........	☐	☐	☐	☐
d. Project CONSERVE.....	☐	☐	☐	☐

3a. (IF "YES" TO PACESETTER): What do you understand Project PACESETTER to be?

   ____

   ____

3b. (IF "YES" TO PACESETTER): Have you or people you know been involved in carrying out Project PACESETTER activities in any way? (IF "YES"): Who? CHECK ALL THAT APPLY

   0 ☐ NA
   1 ☐ Yes, Respondent
   2 ☐ Yes, Other Family Member
   3 ☐ Yes, Others Not In Family
   5 ☐ No
   9 ☐ DK/NR

3c. (IF "YES" TO 3b): Would you describe the activities which were involved? (RECORD VERBATIM)

   ____

   ____

4. I'd like to read to you some things that people have said in talking about the energy situation in America today. Please think over each statement and then tell me whether you agree or disagree with it and how strongly you feel about that. I realize it will often be hard for you to choose a single answer which represents your opinion on the matter. But please try to select the answer which comes the closest to your true opinion. There are, of course, no right or wrong answers. (PLACE CARD WITH RESPONSE CATEGORIES IN FRONT OF R. REPEAT RESPONSE OPTIONS WITH FIRST FEW STATEMENTS UNTIL R IS COMFORTABLE WITH THEM. MARK UNDECIDED ONLY IF R REALLY CAN'T MAKE UP MIND.)

		Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	No Opinion
a.	A person is a success if he is able to buy a big house, a big car and travel when he wants to	1	2	3	4	5	9
b.	Being able to save electricity or gas makes me feel really good	1	2	3	4	5	9
c.	Sacrifice is good for people	1	2	3	4	5	9
d.	Congress can be trusted to do what is necessary to deal with any energy problems	1	2	3	4	5	9
e.	The Federal government wastes most of the money we pay in taxes	1	2	3	4	5	9
f.	Scientists will find solutions to our energy problems before any serious shortages occur	1	2	3	4	5	9
g.	Attempts by oil and gas companies to increase their profits are the major cause of America's energy problems	1	2	3	4	5	9
h.	Before I will make more sacrifices to conserve energy, I want to make sure others are sacrificing too	1	2	3	4	5	9
i.	We can trust the Federal government to do what is right most of the time	1	2	3	4	5	9
j.	The energy situation is too complicated for me to understand	1	2	3	4	5	9
k.	Most Americans are too comfortable	1	2	3	4	5	9
l.	The Federal government is run by a few big interests looking out for themselves	1	2	3	4	5	9
m.	I am much less wasteful than most people	1	2	3	4	5	9
n.	Having to sacrifice takes the fun out of life	1	2	3	4	5	9
o.	I usually go to several stores to find the lowest price for things I buy	1	2	3	4	5	9
p.	Many of the people running the Federal government are crooked	1	2	3	4	5	9
q.	President Carter can be trusted to do what is necessary to deal with any energy problems	1	2	3	4	5	9
r.	Improving your mind and maintaining health are more important than having things like a fancy house and car	1	2	3	4	5	9
s.	The energy situation in America today worries me a great deal	1	2	3	4	5	9
t.	The Arabs are the major cause of America's energy problems	1	2	3	4	5	9
u.	A person should always try to plan carefully for the future	1	2	3	4	5	9
v.	America will never run out of energy resources	1	2	3	4	5	9
w.	People should be willing to do whatever the President asks to save energy	1	2	3	4	5	9
x.	The Federal government does not seem to care about the needs of people like me	1	2	3	4	5	9
y.	The unusually cold weather of the winter of 1976-1977 (that is, last year) is the major cause of America's energy problems	1	2	3	4	5	9
z.	I like to try out new things before other people do	1	2	3	4	5	9
aa.	The cost of something I am buying is more important to me than its other qualities	1	2	3	4	5	9
ab.	The coal strike is the major cause of America's energy problem	1	2	3	4	5	9

Now, I'd like to learn a bit about you and your place of residence and your family.

5. What is the approximate age of this residence? (OR IF AGE NOT KNOWN, "In what year was this residence built?")

_______ Years _________ Year (CODE LATER) 9☐ DK/NR

5a. Do you own or rent this housing?

1☐ Own 3☐ Other ____________________
2☐ Rent 9☐ DK/NR

6. How many rooms are in this residence (not counting bathrooms or basements)?

Number of Rooms ____________ 9☐ DK/NR

7. I am going to read a series of age groups. Please tell me how many of your household are in each. Include yourself, all other adults, children and infants, but only those living at home. (AFTER R ANSWERS, ASK IF SELF INCLUDED.)

Under 1 Year	_______	25 - 29 Years	_______	9☐ DK/NR
1 - 5 Years	_______	30 - 34 Years	_______	
6 - 11 Years	_______	35 - 44 Years	_______	
12 - 17 Years	_______	45 - 54 Years	_______	
18 - 19 Years	_______	55 - 64 Years	_______	
20 - 24 Years	_______	65 - 74 Years	_______	
		75 and Older	_______	

7a. (IF R HAS CHILDREN BETWEEN 6 AND 17): Have your children (Has your child) given you ideas for energy conservation or encouraged conservation in your home or auto?

0☐ NA 1☐ Yes 2☐ No 9☐ DK/NR

7b. (IF "YES"): Could you give me some details? What was the conservation idea or incident? Where did the child learn it? (RECORD VERBATIM UNDER APPROPRIATE CATEGORY.)

7b. Idea	7c. Where Learned
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________
____________________	____________________

8. What energy sources are used to:

	0 NA	1 Gas	2 Electric	3 Oil	4 Coal	5 Propane/ Kerosene	6 Other	9 DK/NR
Heat your residence..............	☐	☐	☐	☐	☐	☐	☐	☐
Provide hot water................	☐	☐	☐	☐	☐	☐	☐	☐
Heat your oven...................	☐	☐	☐	☐	☐	☐	☐	☐
Heat your clothes dryer..........	☐	☐	☐	☐	☐	☐	☐	☐
Air condition your home..........	☐	☐	☐	☐	☐	☐	☐	☐

8a. (IF GAS IS USED): Which company supplies your gas?

0☐ NA 1☐ People's 2☐ Equitable 3☐ Columbia 4☐ Other 9☐ DK/NR

8b. For which of your utilities do you pay the bills? ("X" AS MANY AS APPLY)

☐ None ☐ Electric ☐ Gas ☐ Cooking Gas ☐ Oil ☐ Coal ☐ Other ☐ DK/NR

9. What is your normal daytime thermostat setting during the winter months? (IF R GIVES A RANGE, CODE MIDDLE POINT OF RANGE)

00 ☐ No thermostat   _____ °F 98 ☐ DK/Unsure 99 ☐ NR

9a. (IF HOME HAS A THERMOSTAT) Who in your household usually makes the decisions about the temperature setting on the thermostat?

0 ☐ NA, No Thermostat
1 ☐ Mainly Male Adult (Husband)
2 ☐ Mainly Female Adult (Wife)
3 ☐ Husband and Wife Equally
4 ☐ Child
5 ☐ Whole Family
6 ☐ Landlord
7 ☐ Other (specify) ____________
9 ☐ DK/NR

10. We would like to know which of the following appliances you have in your residence as well as some details about these appliances. (READ APPLIANCES FROM TOP. ENTER SIZE FOR REFRIGERATORS AND FREEZERS AND NUMBER OF A/C UNITS, TV'S, AND GAS LIGHTS)

	Does Not Have 0	Compact 0-9cuft* 1	Apartment 10-13cuft 2	Average 14-16cuft 3	Large 17-19cuft 4	Giant 19+cuft 5	DK/NR Size 9
Refrigerator							
Frost Free	☐	☐	☐	☐	☐	☐	☐
Manual Defrost	☐	☐	☐	☐	☐	☐	☐
Freezer							
Frost Free	☐	☐	☐	☐	☐	☐	☐
Manual Defrost	☐	☐	☐	☐	☐	☐	☐

	Does Not Have	Number Owned (CIRCLE NUMBER)								DK/NR
Washing Machine	0	1	DO NOT ASK NUMBER OF THESE APPLIANCES							9
Clothes Dryer	0	1								9
Air Conditioner										
Central/Whole House	0	1								9
Room Units	0	1	2	3	4	5	6	7	8 (or more)	9
Televisions										
Color	0	1	2	3	4	5	6	7	8 (or more)	9
Black & White	0	1	2	3	4	5	6	7	8 (or more)	9
Gas Post-Lights	0	1	2	3	4	5	6	7	8 (or more)	9

11. Now I would like to show you two cards which list a number of appliances. Would you take each card and count the number of appliances you use in your household. If you have more than one appliance of a particular type (for example, 2 radios), count as many as you use in arriving at your total. Please give me your total count for Card A (HAND R CARD A). Now for Card B (HAND R CARD B).

11a. CARD A _____ TOTAL 9 ☐ DK/NR

11b. CARD B _____ TOTAL 9 ☐ DK/NR

12. Now we would like to get some information about cars and trucks owned (leased) by people in your household. What is the make, the model, the year, the approximate number of miles driven per year, and the average miles per gallon of each (city or highway). Please try to provide us with your best judgement. (ENCOURAGE R TO GUESS IF NECESSARY. LEAVE BLANK WHERE INFORMATION NOT PROVIDED.)

☐ No Car

Make	Model	Year	Average Miles Driven	Average Miles Per Gallon	
				City	Highway
Main or First Car					
Second Car					
Third Car					

13. How many of the adults in your household normally travel to work in each of the following ways? (READ EACH MODE OF TRAVEL AND CIRCLE APPROPRIATE NUMBER. USE NA IF NO ONE IN FAMILY WORKS. IF R WANTS TO EXPAND ON PARTICULAR CASE, CODE COMMENTS IN SPACE PROVIDED BELOW.)

	None		Number of Adults						NA	DK/NR
Drive alone in car	0	1	2	3	4	5	6	7	8	9
Share a ride with others or carpool (even with others in family)	0	1	2	3	4	5	6	7	8	9
Take Public Transportation (including cabs)	0	1	2	3	4	5	6	7	8	9
Walk/Bicycle	0	1	2	3	4	5	6	7	8	9
Motorcycle	0	1	2	3	4	5	6	7	8	9

13a. EXPANDED COMMENTS: ______________________

____

14. In your household, who usually makes the decision about the kind of car you buy?

0 ☐ NA, Never Buy
1 ☐ Mainly Male Adult (Husband)
2 ☐ Mainly Female Adult (Wife)
3 ☐ Husband and Wife Equally
4 ☐ Child
5 ☐ Whole Family Together
6 ☐ Other (specify) ______________
9 ☐ DK/NR

15. How would you rate the insulation in the roof or attic of your residence? (READ CATEGORIES IF R ASKS FOR MORE INFORMATION ABOUT THE CATEGORIES, YOU MAY SAY POOR IS R1-R18 OR 1-5 INCHES: ADEQUATE IS R19-R28 OR 6-8 INCHES: EXCELLENT IS OVER R28 OR OVER 8 INCHES.

0 ☐ None
1 ☐ Poor
2 ☐ Adequate
3 ☐ Excellent
4 ☐ Other
8 ☐ DK
9 ☐ NR

15a. How would you rate the insulation in the walls of your residence? (READ CATEGORIES IF R ASKS FOR MORE INFORMATION ABOUT THE CATEGORIES, YOU MAY SAY POOR IS BELOW R6 OR 1 INCH: ADEQUATE IS R7-R19 OR 1-3 INCHES: EXCELLENT IS OVER R19 OR 3 INCHES.)

0 ☐ None
1 ☐ Poor
2 ☐ Adequate
3 ☐ Excellent
4 ☐ Other
8 ☐ DK
9 ☐ NR

15b. (IF EITHER WALL OR ROOF OR ATTIC INSULATION IS REPORTED): What is the major kind of material used to insulate your roof/attic? Your walls?

	NA	Fiber-glass	Cellu-lose	Rock Wool	Styro-foam	Urea foam	Other (specify)	DK	NR
Roof/ Attic	0	1	2	3	4	5	6 ________	8	9
Wall	0	1	2	3	4	5	6 ________	8	9

16. In your household, who would make the decision to purchase insulation or storm windows?

0 ☐ NA
1 ☐ Mainly Male Adult (Husband)
2 ☐ Mainly Female Adult (Wife)
3 ☐ Husband and Wife Equally
4 ☐ Child
5 ☐ Whole Family Together
6 ☐ Landlord
9 ☐ DK/NR
☐ Other (specify)__________

---

17. I would now like to ask you some questions about your current energy usage and how likely you might be to change some of your present activities. Here are 20 cards. (SHOW DECK TO R). Each has a different activity involving energy usage typed on it. (READ 2 OR 3 CARDS TO GIVE R SOME EXAMPLES). I would like to have you sort through these cards, placing each card in one of four different piles. The piles are:

1. Those you are doing or have done and intend to continue or would do again.
2. Those you are doing or have done but will not continue or do again.
3. Those you have not done but might consider doing.
4. Those you have not done and would not consider doing.

Here are four cards which contain the categories I have just read. (PLACE CATEGORY CARDS ON THE TABLE). Would you please sort the activity cards into piles on top of the category card which is appropriate for each. (HAND ACTIVITY DECK TO R) For example, for (THE FIRST ACTIVITY LISTED), in which category would you place it? If a particular activity is not possible in your situation (for example, you can't share a ride to work if you do not work) or if you do not understand an activity, please tell me and we can go on to the next activity. (WHEN R MENTIONS THAT AN ACTIVITY IS INAPPLICABLE OR THAT IT IS NOT UNDERSTOOD, MAKE THE APPROPRIATE ENTRY IN THE TALLY SHEET FOR THAT ACTIVITY: "0" FOR INAP OR NA, AND "9" FOR NOT UNDERSTOOD)

Now would you pick up the cards you have sorted into pile 3 (would consider doing) and indicate how likely you might be to perform that activity within the next year by sorting the cards into four more piles:

1. Very likely (chances above 8 of 10)
2. Likely (chances about 50-50 to 8 of 10)
3. Unlikely (chances over 2 out of 10 but below 50-50)
4. Very unlikely (chances below 2 out of 10)

Here are four cards for the categories I have just read. (PLACE CATEGORY CARDS ON TABLE) Would you please sort the activity cards in your hand into piles on top of the category card which is appropriate for each. If you don't know how likely you would be to perform an activity, please tell me and we can go on to the next activity. (WHEN R SAYS HE DOESN'T KNOW, ENTER AN "8" ON THE TALLY SHEET FOR THAT ACTIVITY) MAKE SURE R IS SATISIFIED WITH SORTING. (BAND PILES FOR RECORDING DURING THE NEXT PHASE OF THE INTERVIEW — BY SIMPLY PLACING A RUBBER BAND AROUND THE CATEGORY CARD AND THE ACTIVITY CARDS STACKED ON TOP OF IT. INTERVIEWER SHOULD ALREADY HAVE THE NOT APPLICABLE, DON'T UNDERSTAND AND DON'T KNOW ACTIVITY CARDS AND HAVE CHECKED THE APPROPRIATE ANSWERS FOR THEN ON THE TALLY SHEETS.

BE SURE TO SHUFFLE ACTIVITY CARDS AFTER THEY HAVE BEEN TALLIED.

INTERVIEWER TALLY SHEET FOR QUESTION 17

To be completed from the banded deck of cards after the interview.

	Have Done/Would Again	Have Done/Not Again	Very Likely	Likely	Unlikely	Very Unlikely	Would Not Consider	No Opinion	Unsure/No Understand	N/A -- DK/NR
1. Regularly share a ride (or carpool) in going to work.	1	2	3	4	5	6	7	8	9	0
2. Have insulation blown into the walls of your home.	1	2	3	4	5	6	7	8	9	0
3. Regularly set thermostat at or below 68F during winter days.	1	2	3	4	5	6	7	8	9	0
4. Repair or replace worn weatherstripping before each winter.	1	2	3	4	5	6	7	8	9	0
5. Usually drive your car on trips of a half mile or less in good weather.	1	2	3	4	5	6	7	8	9	0
6. Take your vacation largly by bus or train.	1	2	3	4	5	6	7	8	9	0
7. Regularly take public transportation to work.	1	2	3	4	5	6	7	8	9	0
8. Use storm windows or thermopane in most windows in your home.	1	2	3	4	5	6	7	8	9	0
9. Leave water heater at highest temperature setting.	1	2	3	4	5	6	7	8	9	0
10. Regularly lower your thermostat before going to bed at night during the winter.	1	2	3	4	5	6	7	8	9	0
11. Increase your attic or roof insulation to manufacturers' recommended levels.	1	2	3	4	5	6	7	8	9	0
12. Shut off heat in rooms not in use during the winter.	1	2	3	4	5	6	7	8	9	0
13. Run clothes washer or dryer only when you have a full load.	1	2	3	4	5	6	7	8	9	0
14. Purchase an economy or compact car.	1	2	3	4	5	6	7	8	9	0
15. Use fans to cool your home in the summer.	1	2	3	4	5	6	7	8	9	0
16. Run air conditioning all the time during hot summer days and nights.	1	2	3	4	5	6	7	8	9	0
17. Air condition your home at 72F (cool) during hot summer days and nights.	1	2	3	4	5	6	7	8	9	0
18. Take newspapers or aluminum cans to a recycling center.	1	2	3	4	5	6	7	8	9	0
19. Purchase a frost-free refrigerator.	1	2	3	4	5	6	7	8	9	0
20. Regularly drive your car at or above 60 m.p.h. on the highway.	1	2	3	4	5	6	7	8	9	0

18. Now I would like to ask you a different sort of question -- about how you might feel if you did one activity rather than another. (READ FIRST ACTIVITY COMPARISON AS AN EXAMPLE.) I am interested what this would mean to you. If you have already made the change, of course, you will know much be-ter what is involved. But even if you have not made the change, you probably will have a pretty good idea about what it would mean. If you really have no idea at all about what might be involved in making this change, though, please tell me and we can skip that question. Remember, I am asking that you put yourself in the position of someone who has changed from one kind of activity to another.

(HAND R A PENCIL AND THE FIRST ACTIVITY SHEET. READ THROUGH FIRST SHEET WITH R, READING THE ACTIVITY AND THEN EACH OF THE RATING DIMENSIONS, AND ASK R TO MAKE APPROPRIATE ANSWER. DO THIS UNTIL R UNDERSTANDS THE PROCEDURE. FOR EACH SUBSEQUENT ACTIVITY. AFTER THAT, YOU MAY SIMPLY HAND THE SHEETS TO R ONE AT A TIME, READING ONLY THE ACTIVITY COMPARISON AT THE TOP AND THE PHRASE "If you had done this". BE SURE THAT EACH R HAS HAD THE OPPORTUNITY TO RESPOND TO 10 ACTIVITIES. WHERE R REQUESTS TO SKIP AN ACTIVITY, WRITE SKIPPED ACROSS TOP OF SHEET. WHERE R CAN'T RESPOND TO A PARTICULAR DIMENSION, LEAVE IT BLANK.)

18a. We are also interested in knowing whether you have done the following, since the beginning of January?

Have you recently reduced:

a. The lighting used in your home? How much?

1. ☐ a lot
2. ☐ some
3. ☐ a little
4. ☐ not at all
9. ☐ DK/NA

b. Your usage of outdoor lighting? How much?

1. ☐ a lot
2. ☐ some
3. ☐ a little
4. ☐ not at all
9. ☐ DK/NA

c. Your television viewing, or stereo/hi-fi listening? How much?

1. ☐ a lot
2. ☐ some
3. ☐ a little
4. ☐ not at all
9. ☐ DK/NA

d. Your usage of electric home appliances? How much?

1. ☐ a lot
2. ☐ some
3. ☐ a little
4. ☐ not at all
9. ☐ DK/NA

In order to better understand your answers, I would like to ask you a few questions about yourself and the other members of your household.

19. Are you single, married, or widowed/divorced/separated?

1 ☐ Single
2 ☐ Married
3 ☐ Widowed
4 ☐ Divorced/Separated
5 ☐ Other
9 ☐ NR

20. Who is the principal wage earner in your household?

1 ☐ Husband (Male)
2 ☐ Wife (Female)
3 ☐ Both/No Principal
4 ☐ Father, Mother
5 ☐ Son, Daughter
6 ☐ Retired
7 ☐ Unemployed
8 ☐ Student
☐ Other ____________
9 ☐ DK/NR

.......Ask Questions 21 thru 21c for respondent and spouse. (IF APPLICABLE)

MALE	FEMALE
21. Employment Status:	
1 ☐ Employed 2 ☐ Self-Employed 3 ☐ Unemployed 4 ☐ Retired 5 ☐ Student 6 ☐ Other 9 ☐ DK/NR	1 ☐ Employed 2 ☐ Self-Employed 3 ☐ Unemployed 4 ☐ Retired 5 ☐ Student 6 ☐ Other 9 ☐ DK/NR

21a. In what type of business, industry or prefession are (were - if now retired) you engaged? What about your spouse?

____________ ____________

21b. Describe the kind of work you do (did) - be specific. What about your spouse?

____________ ____________

______ (Code)	______ (Code)

21c. What educational level has been completed by you? By your spouse?

1 ☐ Grade School or Less (0-8 Years) 2 ☐ Some High School 3 ☐ Graduated High School (incl. any special - non college) 4 ☐ Some College 5 ☐ Graduated College 6 ☐ Post-Graduate Degree 9 ☐ DK/NR	1 ☐ Grade School or Less (0-8 Years) 2 ☐ Some High School 3 ☐ Graduated High School (incl. any special - non college) 4 ☐ Some College 5 ☐ Graduated College 6 ☐ Post-Graduate Degree 9 ☐ DK/NR

22. What is your date and year of birth? (FOR R ONLY. ASK FOR AGE IF BIRTH DATE NOT PROVIDED.

________19 ______ (AGE: ____)	______19 ____ (AGE: ____)

23. Which newspapers (daily, weekly, Sunday) do you, and members of your family read on a regular basis? ("X" AS MANY AS APPLY)

☐ None
☐ Pittsburgh Post-Gazette
☐ Daily Pittsburgh Press
☐ Sunday Pittsburgh Press
☐ McKeesport Daily News
☐ Others ____________
____
____
☐ DK/NR

24. Counting the yearly income of the head of the household and all other members of the household in total, into which of the following categories did your household's income fall in 1977?

1 ☐ Under $5,000
2 ☐ $ 5,000 - $ 9,999
3 ☐ $10,000 - $14,999
4 ☐ $15,000 - $19,999
5 ☐ $20,000 - $24,999
6 ☐ $25,000 - $29,999
7 ☐ $30,000 or More
8 ☐ DK
9 ☐ NR

24a. How do you expect your family income to change over the next few years - will it increase faster than inflation, about keep up with inflation, or fall behind with inflation? (ASK EVEN IF ACTUAL INCOME NOT PROVIDED ABOVE.)

1 ☐ Increase 2 ☐ Keep up 3 ☐ Fall behind 8 ☐ DK 9 ☐ NR

24b. How likely is it that you will change your residence in the next few years?

0 ☐ NA
1 ☐ Trying to Change Now
2 ☐ Very Likely to Change
3 ☐ May Change
4 ☐ Not Likely to Change
8 ☐ DK
9 ☐ NR

We are interested in the settings and accuracy of thermostats people have in their homes. Would you mind showing us yours so we may complete our interview?

25. Thermostat Settings: CODE

25a. _____°F Regular (daytime) setting (enter 00 for no setting on thermostat) _____

25b. _____°F Night setting (enter 00 for no separate night setting on thermostat _____

25c. _____°F Temperature indicated by thermostat (enter 00 for no indication) _____

25d. _____°F Temperature in home at time of interview (from interviewer's thermometer) _____

26. In order to compare your energy costs with those of households like yours in other areas, we would like to get copies of your bills from your gas and/or electric companies. This information will be used in our research only and will not be shown to anyone else. We can not gather this information without your permission. Here is a written permission form. Would you read it carefully and sign it for us. (TRY TO OBTAIN A SIGNATURE NOW, IF POSSIBLE. IF NOT POSSIBLE, LEAVE FORM WITH ADDRESSED AND STAMPED ENVELOPE. IF R STILL REFUSES, ASK IF R WOULD FILL OUT FORM FOR US FROM OWN RECORDS. WE'LL SEND FORM LATER.)

0 ☐ NA (Do not pay utilities)
1 ☐ Signed Form
2 ☐ Will Discuss with Others (Mail Later)
3 ☐ Will Provide only from Household Records
9 ☐ DK/NR

27. How interesting did you find this interview? (READ CATEGORIES)

1 ☐ Not at all of interest
2 ☐ Was, but lost interest
3 ☐ Somewhat interesting
4 ☐ Very interesting
9 ☐ DK/NR

* *

CONCLUDING COMMENT:

I am very grateful for the time you have given to discuss your energy usage and your thoughts about energy problems. With this kind of co-operation from people like you, researchers may be able to understand better how the energy situation in America today affects people. Again, let me repeat my personal (as well as my organizations's professional) guarantee that your name will not be used in any of our reports.

INTERVIEWER DETERMINATIONS: From observation and examination "X" the box that best describes the home, heating, clothing, etc. of the household you have just interviewed.

28. What is the temperature outdoors? (RECORD FROM FACE SHEET)

_____°F ☐ Can't Judge

29. Dress of Occupants:

☐ All very light, summer clothes
☐ All medium weight clothes (long sleeves)
☐ All sweaters and heavy clothes
☐ Some light, some medium weight clothes
☐ Some light, some heavy weight clothes
☐ Some medium, some heavy weight clothes
☐ Other (specify) ____________
☐ Can't Judge

30. Lighting of house:

☐ Lights on only when in use
☐ Some unused lights on
☐ Many unused lights on
☐ All lights on
☐ Can't Judge

31. Approximate footage of residence: TO BE MEASURED FROM OUTSIDE DWELLING. MEASURE ONLY RESIDENCE OCCUPIED BY RESPONDENT. GAUGE HEIGHT OF CEILING FROM INSIDE.)

	First Floor	Second Floor	Third Floor
Length	_____ft.	_____ft.	_____ft.
Width	_____ft.	_____ft.	_____ft.
Height of Ceilings	_____ft.	_____ft.	_____ft.

32. Percentage (%) of windows covered with storm windows/thermopane/plastic:

☐ None
☐ Less than 25%
☐ 26 - 50%
☐ 51 - 75%
☐ 76-99%
☐ All (100%)
☐ Can't Judge

33. Number of entry doors having storm doors/coverings:

_____ out of _____ doors observed ☐ Can't Judge

33a. Number of entry doors with weatherstripping:

_____ out of _____ doors observed ☐ Can't Judge

34. Race of Respondent: ☐ White ☐ Black ☐ Other

35. Sex of Respondent: ☐ Male ☐ Female

36. Type of Housing Unit:

☐ Single Family Dwelling
☐ Duplex
☐ Condominium/Townhouse
☐ Row House
☐ Apartment House
☐ Mobile Home
☐ Other (specify) ____________

37. Type of Dwelling:

☐ Single story
☐ Two story
☐ Three or more stories
☐ Other (specify) ____________

37a. ☐ Free Standing ☐ Attached

37b. ☐ Brick ☐ Stone ☐ Other (specify) ____________
☐ Stucco ☐ Wood ☐ Can't Judge

38. How honest do you feel the respondent was in answering the questions?

- ☐ Very dishonest
- ☐ Somewhat dishonest
- ☐ Somewhat honest
- ☐ Very honest
- ☐ Can't Judge

39. How much do you think they knew about energy usage?

- ☐ Very little
- ☐ Some
- ☐ A great deal
- ☐ Exceptional amount
- ☐ Can't Judge

PROJECT MONITOR

HOUSEHOLD QUESTIONNAIRE:

SUMMER STUDY

CARD NO.		STUDY		CASE ID			INT. ID			DAY		MO		YR		TBEGIN				TENDED				CENSUS				I

1. In what ways, if at all, have you been affected by the energy situation in America today? (RECORD RESPONSES VERBATIM. PROBE BY SAYING "anything else" UNTIL RESPONDENT CAN THINK OF NOTHING ELSE TO ADD.)

   NA, Not Affected 0

   ____

   ____

   ____

   ____

2. I have a list of some types of organizations to which people belong. As I read each type, would you please tell me whether you are an active member of a group or organization of that type and, if so, of how many? (CODE THE NUMBER OF MEMBERSHIPS IN BOX PROVIDED; CODE "7" FOR 7 OR MORE; CODE "0" FOR NO MEMBERSHIP; CODE "8" FOR DK AND "9" FOR NR.)

   a. Fraternal
   b. Business or Professional
   c. Church or Religious
   d. Neighborhood
   e. Civic
   f. Political
   g. Welfare or Charity
   h. Veterans
   i. Ethnic, Racial or Nationality
   j. Labor
   k. Social or Recreational
   l. Conservation
   m. Other types - Please Specify ______________________________

a	☐	g	☐
b	☐	h	☐
c	☐	i	☐
d	☐	j	☐
e	☐	k	☐
f	☐	l	☐
		m	☐

4. Do you recognize any of the following as community programs <u>in the Pittsburgh area</u> mainly associated with energy conservation? If you have not heard of a program, Please feel free to tell me. (READ PROGRAMS ONE BY ONE.)

		YES	NO	NOT SURE	DK	NR
a.	PROJECT ACTION	1	2	3	8	9
b.	PROJECT PACESETTER	1	2	3	8	9
c.	PROJECT SAVE	1	2	3	8	9
d.	PROJECT CONSERVE	1	2	3	8	9

4e. (IF "YES"TO PACESETTER) What do you understand project PACESETTER To be? (RECORD RESPONSE VERBATIM)

NA. 0

____

____

4f. (IF "YES" TO PACESETTER) Have you or people you know been involved in carrying out project PACESETTER activities in any way? (IF "YES") Who?

NA, No recognition of PACESETTER. . . 0
YES, Respondent 1
YES, Other family member. 2
YES, Other not in family. 3
NO. 4
DK. 8
NR. 9

4g. (IF INVOLVED) Exactly what did you or the person you know do? (RECORD EACH ANSWER VERBATIM.)

NA. 0

____

____

____

(ASK THESE QUESTIONS OF NEW RESPONDENTS ONLY)

5. I'd like to read to you some things that people have said in talking about the energy situation in America today. Please think over each statement and then tell me whether you agree or disagree with it and how strongly you feel about that. I realize it will often be hard for you to choose a single answer which represents your opinion on the matter. But please try to select the answer which comes the closest to your true opinion. There are, of course, no right or wrong answers. (PLACE CARD WITH RESPONSE CATEGORIES IN FRONT OF R. REPEAT RESPONSE OPTIONS WITH FIRST FEW STATEMENTS UNTIL R IS COMFORTABLE WITH THEM. MARK UNDECIDED ONLY IF R REALLY CAN'T MAKE UP MIND.)

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	No Opinion	
a. A person is a success if he is able to buy a big house, a big car and travel when he wants to	1	2	3	4	5	9	
b. Being able to save electricity or gas makes me feel really good	1	2	3	4	5	9	
c. Sacrifice is good for people	1	2	3	4	5	9	
d. Congress can be trusted to do what is necessary to deal with any energy problems	1	2	3	4	5	9	
e. The Federal government wastes most of the money we pay in taxes	1	2	3	4	5	9	
f. Scientists will find solutions to our energy problems before any serious shortages occur	1	2	3	4	5	9	
g. Attempts by oil and gas companies to increase their profits are the major cause of America's energy problems	1	2	3	4	5	9	
h. Before I will make more sacrifices to conserve energy, I want to make sure others are sacrificing too	1	2	3	4	5	9	
i. We can trust the Federal government to do what is right most of the time	1	2	3	4	5	9	
j. The energy situation is too complicated for me to understand	1	2	3	4	5	9	
k. Most Americans are too comfortable	1	2	3	4	5	9	

6. How do you cool your home during the summer? How many of each type of cooling unit do you use? (CHECK ALL THAT APPLY, CODE THE NUMBER OF EACH TYPE IN BOX AND CODE "O" FOR ALL NOT USED. READ LIST TO R.)

____NA, No cooling other than natural

____Central Air Conditioning

____Room Air Conditioning Units

____Attic Fan

____Room Fan

____Window Fans

____Other, Please Specify________________________

____DK

____NR

6a. (IF AIR CONDITIONING) Do you or someone in your household pay the electric or gas bill for running the air conditioning?

NA . . . 0
YES . . 1
NO . . . 2
DK . . . 8
NR . . . 9

Now I would like to have you tell me what you think about air conditioning, room air conditioning units, and fans as ways to cool your home during summer. I will give you a few characteristics and then ask you to rate each type of cooling on each characteristic. These characteristics will be read in pairs of opposites and you should select just where you would rate the type of cooling between the pairs.

(GIVE THE SHEET TO RESPONDENT.) READ TYPE OF COOLING, THEN THE PAIRED DESCRIPTORS AND ASK R TO SELECT POINT ALONG THE CONTINUUM BETWEEN THE OPPOSITES WHICH CORRESPONDS TO THE RATING R FEELS IS BEST.

IF R SAYS A PARTICULAR TYPE OF COOLING IS "IMPOSSIBLE," CIRCLE "O" AND WRITE THE REASON. CODE "O" IN BOX a.

IF R SAYS A PARTICULAR SET OF PAIRED CHARACTERISTICS IS NOT APPLICABLE, CIRCLE "8" AND CODE "8" IN THE APPROPRIATE BOX. RECORD THE POINT ON THE SCALE BY CIRCLING THE NUMBER AND CODE THE NUMBER IN APPROPRIATE BOX.)

7. Cooling your home with central air conditioning would be or is...

a.	Impossible: Reason ________								0
b.	Uncomfortable	1	2	3	4	5	6	7	8
c.	Convenient	1	2	3	4	5	6	7	8
d.	Expensive to operate	1	2	3	4	5	6	7	8
e.	Expensive to purchase	1	2	3	4	5	6	7	8
f.	Undesirable	1	2	3	4	5	6	7	8
g.	Necessary	1	2	3	4	5	6	7	8
h.	Healthy	1	2	3	4	5	6	7	8

a ☐ e ☐
b ☐ f ☐
c ☐ g ☐
d ☐ h ☐

8. Cooling your home with room air conditioning units would be or is...

a.	Impossible: Reason ________								0
b.	Uncomfortable	1	2	3	4	5	6	7	8
c.	Convenient	1	2	3	4	5	6	7	8
d.	Expensive to operate	1	2	3	4	5	6	7	8
e.	Expensive to purchase	1	2	3	4	5	6	7	8
f.	Undesirable	1	2	3	4	5	6	7	8
g.	Necessary	1	2	3	4	5	6	7	8
h.	Healthy	1	2	3	4	5	6	7	8

a ☐ e ☐
b ☐ f ☐
c ☐ g ☐
d ☐ h ☐

10. Are you planning to take, or have you already taken, a vacation away from home this year?

YES, Already taken	1
YES, Plan to take	2
NO	3
DK, or undecided	8
NR	9

10a. (IF VACATION TAKEN OR PLANNED) where will you or did you go?

NA, No vacation 0

City ______________________ State ______________________

Country ____________________ Area ______________________
(Mountains, Seaside, etc.)

10b. (IF VACATION TAKEN OR PLANNED) How will you or did you travel? (CHECK ALL THAT APPLY. CODE ALL CHECKS "1", CODE "0" FOR ALL NOT CHECKED.)

1. ____NA, No vacation
2. ____Own car
3. ____Company car
4. ____Rented car
5. ____Bus
6. ____Train
7. ____Airplane
8. ____Other, Please Specify ____ ________________
9. ____DK, Haven't Yet Decided
10. ____NR

1 2 3 4 5 6 7 8 9 10

10c. How many people will, or did go, with you on your vacation?

NA, no vacation 0

Number of people ________________

13. Taking your vacation by airplane would be or is . . .

a.	Impossible; Reason ________								0
b.	Comfortable	1	2	3	4	5	6	7	8
c.	Convenient	1	2	3	4	5	6	7	8
d.	Expensive	1	2	3	4	5	6	7	8
e.	Slow	1	2	3	4	5	6	7	8
f.	Dangerous	1	2	3	4	5	6	7	8
g.	Desirable	1	2	3	4	5	6	7	8
h.	Luxurious	1	2	3	4	5	6	7	8

a ☐ e ☐

b ☐ f ☐

c ☐ g ☐

d ☐ h ☐

(ASK THIS QUESTION OF NEW RESPONDENTS ONLY)

16. How many of the adults in your household normally travel to work in each of the following ways? (READ EACH MODE OF TRAVEL AND CIRCLE APPROPRIATE NUMBER UP TO 7, 7 = 7 or more. USE NA IF NO ONE IN THE FAMILY WORKS.)

NA - No one works 0

	Number of Adults							DK	NR
Drive alone in car	1	2	3	4	5	6	7	8	9
Share a ride with others (even others in family) or carpool	1	2	3	4	5	6	7	8	9
Take public transportation (including cabs)	1	2	3	4	5	6	7	8	9
Walk/Bicycle	1	2	3	4	5	6	7	8	9
Motorcycle	1	2	3	4	5	6	7	8	9

Now I would like to have you tell me what you think about taking the bus or trolley, going in a car pool or driving your own car to get around town on a regular basis. I will give you a few characteristics and then ask you to rate each type of transportation on each characteristic.

(GIVE SHEET TO RESPONDENT. READ TYPE OF TRANSPORTATION, THEN THE PAIRED DESCRIPTORS, AND ASK R TO SELECT POINT ALONG THE CONTINUUM WHICH CORRESPONDS TO THE RATING R FEELS IS BEST.

IF R SAYS TYPE IS "IMPOSSIBLE," CIRCLE "0" BELOW TYPE AND WRITE IN REASON WHY. CODE "0" IN BOX a.

IF R SAYS A PARTICULAR PAIRED SET IS "NOT APPLICABLE," CIRCLE "8" AND CODE "8" IN APPROPRIATE BOX. RECORD RATING BY CIRCLING THE NUMBER AND CODE NUMBER IN BOXES b-i.)

17. Taking the bus or trolley would be or is....

a [ ]

a.	Impossible, Reason ______								0
b.	Uncomfortable	1	2	3	4	5	6	7	8
c.	Inconvenient	1	2	3	4	5	6	7	8
d.	Inexpensive	1	2	3	4	5	6	7	8
e.	Fast	1	2	3	4	5	6	7	8
f.	Dangerous	1	2	3	4	5	6	7	8
g.	Desirable	1	2	3	4	5	6	7	8
h.	Luxurious	1	2	3	4	5	6	7	8
i.	Many friends do	1	2	3	4	5	6	7	8

b [ ] f [ ]
c [ ] g [ ]
d [ ] h [ ]
e [ ] i [ ]

18. Sharing a ride with others or car pooling would be or is...

a [ ]

a.	Impossible, Reason ______								0
b.	Uncomfortable	1	2	3	4	5	6	7	8
c.	Inconvenient	1	2	3	4	5	6	7	8
d.	Inexpensive	1	2	3	4	5	6	7	8
e.	Fast	1	2	3	4	5	6	7	8
f.	Dangerous	1	2	3	4	5	6	7	8
g.	Desirable	1	2	3	4	5	6	7	8
h.	Luxurious	1	2	3	4	5	6	7	8
I.	Many friends do	1	2	3	4	5	6	7	8

b [ ] f [ ]
c [ ] g [ ]
d [ ] h [ ]
e [ ] i [ ]

20. I am going to read a series of statements about energy usage. Please think each statement over carefully and then tell me whether you agree or disagree with it. Some statements involve matters about which most people know very little. So if you feel that you don't know or are not sure about a statement, please tell me and we can skip that one.

	Agree	Disagree	DK	NR
a. Most cars get their best gas mileage at over 60 MPH.	1	2	8	9
b. Turning down the heat at night, saves less than it costs to reheat the house to the desired temperature in the morning.	1	2	8	9
c. A frost free refrigerator uses more energy than a manual defrost model.	1	2	8	9
d. Using a toaster-oven requires more energy than using the stove oven.	1	2	8	9
e. More hot water is normally used in taking a shower than in taking a bath.	1	2	8	9
f. The greatest amount of heat loss in an uninsulated house is through the roof.	1	2	8	9
g. Less gasoline is used to restart the car than is used in letting it idle for three or four minutes.	1	2	8	9
h. Lowering the furnace thermostat by 2°F. 2°F. will save hardly any money on heating bills in winter.	1	2	8	9
i. The temperature setting can not be changed on most hot water heaters.	1	2	8	9
j. Attic insulation usually does not save enough in energy costs to be worth its price.	1	2	8	9

21. Now I am going to read you a list of activities which involve energy usage. For each one, would you tell me if you are doing it or have done it. For those activities you have not done or are not doing, would you tell me how likely you might be to do them in the future--Very Likely, Likely, Unlikely, Very Unlikely or Would Not Consider. If a particular activity is not relevant in your situation, (For example, you do not own a car or an air conditioner) please inform me and we can go on to the next activity.

	Not Relevant	Doing	Have Done	Very Likely	Likely	Unlikely	Very Unlikely	Would Not Consider	DK	NR
a. Regularly share a ride or car pool	0	1	2	3	4	5	6	7	8	9
b. Regulary take public transportation	0	1	2	3	4	5	6	7	8	9
c. Usually drive your car on trips of a half mile or less in good weather	0	1	2	3	4	5	6	7	8	9
d. Normally take your vacation by driving your own car	0	1	2	3	4	5	6	7	8	9
e. Change your summer vacation plans to save gasoline	0	1	2	3	4	5	6	7	8	9
f. Normally take your vacation by train	0	1	2	3	4	5	6	7	8	9
g. Normally take your vacation by bus	0	1	2	3	4	5	6	7	8	9
h. Purchase an economy or compact car	0	1	2	3	4	5	6	7	8	9
i. Use air conditioning in your car	0	1	2	3	4	5	6	7	8	9
j. Regularly drive no faster than 60 mph on the highway	0	1	2	3	4	5	6	7	8	9

22. Do you think that there is an energy crisis in America today? (IF "YES") How serious do you think the crisis is?

YES, Extremely Serious 1
YES, Very Serious 2
YES, Somewhat Serious 3
NO, No crisis 5
Don't know, Not sure. 8
No response 9

23. Who or what (if any one or anything) do you think is responsible, or can be blamed, for the energy crisis in America today? (RECORD RESPONSE VERBATIM. PROBE BY ASKING "ANY OTHERS" UNTIL R CAN THINK OF NOTHING ELSE TO ADD.)

NA, Does not feel there is an energy crisis 0

____

____

____

____

That concludes my substantive questions. In order to help us better understand your answers, may I please ask you--

24. In what year were you born?

_________Year Refused ..99

CONCLUDING COMMENTS

I am very grateful for the time you have given to discuss energy matters. With this kind of cooperation from people like you, researchers may be able to understand better how the energy situation in America today affects people. Again, let me repeat my personal (as well as my organization's) guarantee that your name will not be associated in any way with any of the information provided in our reports.

NAME ______________________________

TELEPHONE NO. ______________________________ TIME __________ AM/PM

DEMOGRAPHIC QUESTIONS FOR NEW RESPONDENTS ONLY

Now I would like to ask you a few questions about you and your family and your place of residence.

25. What is the approximate age of this residence? (OR IF AGE NOT KNOWN) In what year was this residence built?

Number of years old __________

Year built __________

DK 998

NR 999

26. How many rooms are in this residence (NOT COUNTING BATHROOMS OR UNFINISHED BASEMENTS)?

Number of rooms __________

DK 98

NR 99

27. Do you own or rent this housing?

Own 1

Rent 2

Other 3

DK 8

NR 9

28. What energy sources are used to:

	NA	GAS	ELECTRIC	OTHER	DK/NR
a. Heat your residence	0	1	2	6	9
b. Provide hot water	0	1	2	6	9
c. Heat your oven	0	1	2	6	9
d. Heat your clothes dryer	0	1	2	6	9
e. Air condition your home	0	1	2	6	9

30. What is your marital status ?

Single. 1	Married 4
Widowed 2	Other 5
Divorced/Separated . . . 3	NR. 9

31. What is your employment status?

Full time paid 1	Unemployed 5
Part time paid 2	Retired. 6
Student. 3	Mother/Housewife 7
Paid employment/Student. . 4	Other. 9

(IF EMPLOYED): What is your occupation?

NA 0

Industry ______________________________

Job ______________________________

____

32. What is the highest level of education you have completed?

8th grade or less 1	Some college 4
Some high school 2	College/ Univ. degree . 5
High school diploma . . . . 3 (any non college)	Post graduate degree . 6
	DK/NR 9

33. (IF OTHER THAN MARRIED): Does anyone live here besides yourself?

NO . . . . 1 - (GO DIRECTLY TO Q38. CODE NA FOR INTERVENING QUESTIONS.)
YES 2

(IF THERE IS A SPOUSE OR HOUSEMATE):

34. What is the employment status of your {Husband / Wife / Housemate} ?

NA 0	Unemployed 5
Full time paid 1	Retired 6
Part time paid 2	Mother/Housewife 7
Student. 3	Other. 8
Paid employ/Student. . 4	

38a. In what year were you born?

__________Year

(ASK ONLY IF THERE IS SUCH AN INDIVIDUAL)

38b What is the birth year (or age) of your {Husband / Wife / Housemate}?

NA 0

__________ Year

39. Which newspapers (Daily and Weekly) do you and members of your household read on a regular basis?

_______None

_______Pittsburgh Post Gazette

_______Daily Pittsburgh Press

_______Sunday Pittsburgh Press

_______McKeesport Daily News

_______Others, Please Specify ____________________

____

_______DK/NR ____________________

40. Counting the yearly income of the head of the household and all other members of the household in total, into which of the following categories did your household's income fall in 1977?

Under $5,000 . . . 1	$20,000 - 24,999 . . 5
$5,000 - 9,999 . . . 2	25,000 - 29,999 . . 6
10,000 - 14,999 . . . 3	30,000 or more. . . 7
15,000 - 19,999 . . . 4	DK 8
	NR 9

INTERVIEWER DETERMINATIONS

(ALL QUESTIONNAIRES)

43. Sex of Respondent

Male . . . . 1 Female . . 2

44. Race of Respondent

White. . . . 1 Other 3

Black . . . 2 Can not judge. 9

45. Comfort of home

Very hot . . . . . 1 Cool 5

Somewhat hot . . 2 Very cool. 6

Warm . . . . 3 Can not judge. . . 9

Comfortable 4

45. Was there any cooling of the room in which the interview took place at the time of the interview?

NO . . . . 1 YES, Window fan. . 4

YES, Central air conditioning. . 2 YES, Room fan. . . 5

YES, Room air conditioning unit. 3 YES,Other means (Specify). 6

____

Can not judge 9

47. Were any room coolers available for use but not on during the interview?

NO. . . . . 1 YES, Window fan. . 4

YES, Central air conditioning. . 2 YES, Room fan. . . 5

YES, Room air conditioning unit. 3 YES, Other means (Specify).6

____

Can not judge 9

48. Lighting of home

Lights on only when in use. . . .1 Many unused lights on .3

Some unused lights on . . . . . .2 Can not judge 9

INTERVIEWER DETERMINATIONS

(New Respondents Only)

49. Type of Housing Unit:

Single Family House	1
Duplex (Horizontal or Vertical) . .	2
Condominium/Townhouse	3
Row House (3 or More)	4
Apartment House	5
House Converted to Apartments . . .	6
Mobile Home	7
Other, Please Specify ________ ________________	8
Cannot Judge	9

50. Type of Dwelling:

Single Story	1
Two Story (include 1½ stories) . .	2
Three or More (include 2½ stories)	3
Other, Please Specify ________ ________________	4

51. Type of Construction:

Brick	1
Stucco	2
Stone	3
Wood	4
Other, Please specify ________ ________________	5
Cannot Judge	9

APPENDIX D

MONITOR PROJECT
SELECT ANNOTATED
BIBLIOGRAPHY

Books

Berlin, Edward, Cicchetti, Charles J., and Gillen, William J. Perspective On Power. Cambridge: Ballinger Publishing Company, 1975.

The current study draws on recent work in economic theory, empirical cost and demand studies, and experience in other nations, to reach conclusions about changes in electricity pricing and regulatory policy which are economically desirable.

Boesch, Donald F., Hershner, Carl H., and Milgram, Jerome H. Oil Spills and the Marine Environment. Cambridge: Ballinger Publishing Company, 1974.

The first part of this volume describes the primitive stage of our scientific knowledge concerning oil pollution in the marine environment. In the second part, the technical aspects of the oil spill are discussed including the fact that oil spills result from human as well as technical error. Thus, solutions must address the institutional side of oil-handling procedures, including regulations, contingency plans, and personnel training.

Brannon, Gerard M. Energy Taxes and Subsidies. Cambridge: Ballinger Publishing Company, 1974.

Brannon shows that present tax structures, while indeed stimulating supply and serving to moderate prices, have a number of undesirable corollary effects. Artificially low prices of oil and gas continue to bolster demand for the extraction of scarce reserves as depletion allowances drain much of the incentive for developing energy sources from cheaper and more abundant resources, since such development requires significant investment in new technology and manufacturing processes.

________. Studies in Energy Tax Policy. Cambridge: Ballinger Publishing Company, 1975.

This collection of EPP studies provides a valuable base of data to help better understand the tax policy - energy reality relationships which foreshadow critical issues in our energy policy debates.

Campbell, Donald T., and Stanley, Julian C. Experimental and Quasi-Experimental Designs for Research. Chicago: Rand McNally, 1963.

This book serves as a basic text for illustrating experimental and quasi-experimental designs for research in the social sciences.

The Conference Board. Energy Consumption in Manufacturing. Cambridge: Ballinger Publishing Company, 1974.

This volume is a report on a study begun in 1972 to determine trends in energy use in manufacturing, to explain these trends in terms of production processes and technology in selected manufacturing industries, and to project energy use in manufacturing to 1980.

Dam, Kenneth W. Oil Resources: Who Gets What How? Chicago: University of Chicago Press, 1976.

This book focusses on petroleum resources and government policy to find a solution to the problem of allocation and development of natural resources. Compares two systems of allocation - the auction system and various discretionary systems.

Doran, Charles F. Myth, Oil and Politics: Introduction to the Political Economy of Petroleum. New York: The Free Press, 1977.

This book traces the transformation of international oil politics and commerce set off by the takeover of the world oil market by the Organization of Petroleum Exporting Countries (OPEC). The author enumerates and explains the components of myth present in the oil issue such as uncertainty, shock, lack of technical information, contrived secrecy, power, exaggeration, and heavy media involvement.

Foster Associates, Inc. Energy Prices 1960-73. Cambridge: Ballinger Publishing Company, 1974.

This book provides historical and current data on price changes over a 14-year period from 1960-1973 of the principle primary and secondary sources of energy in the United States.

Gray, John E. Energy Policy: Industry Perspectives. Cambridge: Ballinger Publishing Company, 1975.

The primary focus of this book is on case studies involving the oil, electric utility, coal, gas, and nuclear industries to determine the influences of the various interests that motivate management, and interaction between governmental policy, law and regualtion, or the lack thereof, and industry decision-making, with emphasis on how a national energy policy could be fashioned so that private industry will have both the incentive and capability to carry it out.

Gyftopoulos, Elias P., Lazaridis, Lazaros J., and Widmer, Thomas F. Potential Fuel Effectiveness in Industry. Cambridge: Ballinger Publishing Company, 1974.

The authors of this EPP study report on research by the Thermo Electron Corporation in which industrial processes were examined to determine their relative effectiveness and to isolate those improvements likely to reduce fuel consumption.

Hass, Jerome E., Mitchell, Edward J., Stone, Bernard K., and Downes, David H. Financing the Energy Industry. Cambridge: Ballinger Publishing Company, 1974.

The purpose of this book is to estimate the capital investment outlays of the energy industry and to determine how these outlays are to be financed. The main objective is to ascertain the extent to which "financing" problems might seriously threaten the ability of the energy industry to meet the demands placed upon it.

Jacoby, Neil H. Multinational Oil: A Study in Industrial Dynamics. New York: McMillan Publishing Company, Inc., 1974.

This is an economic study of the foreign oil industry. Its raw materials are the operating and financial statistics of the industry. Its methodology is analytical, utilizing the tools of economic theory and statistical inference. The basic concern is to measure changes in market structure and behavior in the world oil industry.

Lovins, Amory B. Soft Energy Paths: Toward a Durable Peace. Cambridge: Ballinger Publishing Company, 1977.

In place of the "unforgiving" technology of nuclear power, Lovins proposes a phrased, orderly transition to "soft technologies" based on "energy income." They include solar energy, wind and biomass conversion - the use of crop, wood and other organic wastes and, where suitable, perhaps also an ecologically balanced growth of trees and shrubs for conversion to liquid and gaseous fuels. He attempts to prove that the means for a less wasteful, more rational, and more humane future are not only available, they are cheaper and less difficult than the plutonium economy.

Lovins, Amory B. and Price, John H. Non-nuclear Futures: The Case for an Ethical Energy Strategy. Cambridge: Ballinger Publishing Company, 1975.

Part One - Nuclear Power: Technical Bases for Ethical Concerns. An annotated semi-technical assessment of the impact of human fallibility and malice on some highly engineered and persistently hazardous systems; a survey of social and institutional implications; and a brief discussion of certain policy problems and prospects.

Part Two - Dynamic Energy Analysis and Nuclear Power. An initial inquiry into how the net energy balance of expotential programs of energy conservation facilities varies in time; what are the energy inputs and outputs of commercial nuclear reactors, both singly and in such programs. what are the possible errors and omissions in this analysis; and what are the policy and research implications of the results.

Mitchell, Edward J. (ed.). Energy: Regional Goals and the National Interest. Washington, D.C.: American Institute for Public Policy Research, 1976.

This book contains the edited proceedings of an October, 1975 conference organized into four parts: 1) the Economics of Regional Interests in Energy; 2) Energy Self-Sufficiency for the United States; 3) Producers and Consumers; and 4) Energy Policy: A New War Between the States?

Mirray, Francis X. Energy: A National Issue. Washington, D.C.: Center for Strategic and International Studies, Georgetown University, 1976.

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