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REGIONAL ASSESSMENT PROGRAM

MASTER

**Potential Social, Institutional, and
Environmental Impacts of
Selected Energy Conservation
Measures in Two Washington
Communities**

March 1980

Prepared for the
U.S. Department of Energy
Assistant Secretary for Environment
Office of Technology Impacts
under Contract DE-AC06-76RLO-1830

Davis Moses, Project Monitor

Pacific Northwest Laboratory
Operated for the U.S. Department of Energy
by Battelle Memorial Institute

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POTENTIAL SOCIAL, INSTITUTIONAL, AND
ENVIRONMENTAL IMPACTS OF SELECTED ENERGY-✓
CONSERVATION MEASURES IN TWO WASHINGTON
COMMUNITIES

MASTER

Prepared for the
U.S. Department of Energy
Assistant Secretary for Environment
Office of Technology Impacts

under Contract DE-AC06-76RLO-1830

David Moses, Project Monitor
Technology Assessments Division

Prepared by Edward Edelson
Marvin Olsen

March 1980

Pacific Northwest Laboratory
Richland, Washington 99352

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PREFACE

This report is part of a larger study titled "Exploratory Technology Assessment of Energy Conservation Measures" funded by the Technology Assessment Division, Assistant Secretary for Environment in the United States Department of Energy. The overall study was coordinated by Paul D. Moskowitz at the National Center for Analysis of Energy Systems at Brookhaven National Laboratory (BNL).

Research on the potential environmental and social impacts of energy conservation measures, similar to the impacts reported here, was also conducted in two communities in Pennsylvania. A workshop was held at which energy conservation measures were ranked to establish research priorities and an energy modeling analysis of the potential energy savings and the changes in environmental residuals from various conservation measures were also included in the overall study. Reports on the Pennsylvania study, the workshop, and the modeling analysis are all available from the National Center for Analysis of Energy Systems, Brookhaven National Laboratory, Upton, New York 11973.

For the research reported here, we are particularly indebted to all the respondents in Seattle and Yakima. They generously contributed their time, as well as their candid thoughts and beliefs, to this effort. Their wholehearted cooperation with the project is deeply appreciated.

Section 1 describes the purpose, organization, procedure, and sites for the field investigation. Section 2 reports the results of the Seattle interviews while Section 3 gives the results from Yakima. The main findings from these two communities are compared and summarized in Section 4. Section 5 discusses a number of topics concerning the impacts of conservation measures that require further research and suggests some broad guidelines for conducting that research.

The two authors of this report jointly designed and conducted most aspects of the research with the following exceptions: Olsen selected the Seattle respondents, made the arrangements for those interviews, and drafted Section 2. Edelson performed the same tasks for Yakima, and drafted Section 3. Both researchers participated in most of the interviews in both communities, however. This final report is entirely a mutual effort and responsibility.

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EXECUTIVE SUMMARY

The Preliminary Technology Assessment of Energy Conservation Measures -- of which this report is one part -- was sponsored by the Assistant Secretary for Environment in the U.S. Department of Energy to identify potential impacts of expanded energy conservation efforts. This report explores the likely environmental, social institutional impacts of selected energy conservation measures in two communities in Washington State.

The five conservation measures investigated in this study were 1) retrofitting existing buildings, 2) district heating and Integrated Community Energy Systems (ICES), 3) small automobiles and vehicle redesign, 4) land use and housing modifications, and 5) electric utility rate reform. Although these measures are not meant to be inclusive, they do cover a broad range of energy conservation measures.

Twenty potential impact areas were selected for analysis. These areas were divided into five categories of environmental impacts (air and water pollution, health and safety, etc.), economic impacts (employment, economic growth, consumption patterns, cost effectiveness, etc.), community impacts (housing, transportation, local government, social conflict, etc.), personal impacts (social equity, personal freedom, interpersonal relationships, readiness for change, etc.), and overall quality of life in the community.

The research was conducted in Seattle and Yakima, Washington. The two communities have markedly different sizes, economic bases, and experiences with energy conservation. In each location, about two dozen community leaders were asked to participate. They included public officials, government administrators, officials of business organizations and labor unions, leaders of community organizations, and representatives of relevant special-interest associations. Lengthy unstructured interviews were held with these people, during which they were asked to discuss freely, as individuals, what they saw as the most likely environmental and social impacts of energy conservation on their community and its citizens. The diverse views and perceptions expressed in these interviews are summarized in the section on the two communities in this report. All of the comments and observations included in Section 2 and 3 are

anonymous, but they represent the thought of the respondents, not the authors. In addition, the authors have deliberately avoided any statistical analysis of the participant views. The aim was to present the diversity of opinion offered in the interviews, rather than evaluate their validity.

In very broad terms, the Seattle respondents saw energy conservation as a highly desirable policy for ameliorating future energy shortages. They foresaw a number of temporary, transitional problems arising as energy conservation measures were implemented but generally agreed that the long-term consequences of conservation would be highly desirable in numerous ways. Yakima respondents, in contrast, did not expect to encounter many serious energy problems in the foreseeable future and consequently viewed energy conservation as a relatively minor community concern. Moreover, they anticipated that many conservation measures, if implemented by the government, would encounter either apathy or resistance in their community.

These two sets of data were compared by contrasting the sociocultural orientations that prevail in the two communities, by identifying several characteristics of each community that may tend to shape those orientations, and by examining the most significant differences between the environmental, economic, social structural, and personal impacts expected in the two communities. To summarize the main findings from the study and to emphasize the considerable consensus existing among these respondents, sixteen broad generalizations were made. Finally, two broad generalizations can be drawn from these interviews: 1) energy conservation will basically be beneficial for the natural environment and our society; and 2) if energy conservation does become a dominant thrust in our society, it could stimulate and reinforce a much broader process of fundamental social change.

ACKNOWLEDGEMENTS

The work reported here was conducted under the direction of and with the funding from the U.S. Department of Energy, Office of Technology Impacts, Technology Assessment Division. The authors wish to acknowledge the support of the Division and the guidance of the DOE project monitor, David Moses, under Contract DE-AC06-76RL0-1830.

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1. INTRODUCTION AND RESEARCH APPROACH

PURPOSE

The U.S. Department of Energy (DOE) is currently examining and developing numerous measures to conserve energy. These energy conservation measures, like many other new technologies and programs, can have a variety of impacts on the natural and social environment. If those impacts can be determined before the conservation measures are implemented, policy makers can 1) consider the potential desirable and undesirable impacts as they decide which conservation measures to promote, and 2) establish procedures to mitigate the undesirable impacts of the conservation measures that are implemented.

This study assesses the potential social, institutional, and environmental and social impacts of several energy conservation measures that are being seriously considered by federal, state, and local energy officials. It seeks to determine the kinds of problems and benefits that might result from the widespread implementation of these conservation measures in the United States. The scope of the study is thus the entire country. Because most conservation measures are implemented in local communities, however, their impacts are experienced primarily at that level. This study, therefore, focuses on local perceptions of the environmental and social impacts of energy conservation that would affect communities and the surrounding areas. Data for the research were collected in two communities in Washington State: Seattle and Yakima.

Because this study is the first effort that has been made to collect empirical data on the environmental and social impacts of energy conservation and because of the very limited nature of the study, it must be viewed as preliminary or exploratory research. The findings of the study should not be taken as precise or definite information about the impacts of energy conservation but rather as indications of the broad outlines of such impacts. Another way of describing this research would be to call it a scoping study of the major dimensions of both direct and indirect conservation impacts.

ORGANIZATION

Based on the recommendation of a workshop in April 1979 (Moskowitz, Le, and Pierce 1979), five conservation measures were selected for investigation in this study:

- (1) retrofitting existing buildings with insulation, weatherstripping, and storm windows;
- (2) district heating and Integrated Community Energy Systems (ICES);
- (3) small automobiles and vehicle redesign;
- (4) land use and housing modifications; and
- (5) electric utility rate reform and load management.

Each of these measures is described in some detail in Exhibit 1. These five measures do not cover the full range of energy conservation procedures being examined by energy officials, but they are examples of the different kinds of approaches that can be taken to conserve energy in the residential and commercial sectors.

Twenty potential impact areas were identified for investigation. Some of these dealt with the natural environment, some with the local economy, some with various social and political aspects of the community, and some with personal life conditions. The identified impact areas were:

Environmental Impacts

1. Environmental pollution (air, water, etc.)
2. Protection of natural resources (land, recreational areas, etc.)
3. Personal health and safety (physical and mental)
4. Public health and safety (accidents, disasters, etc.)

Economic Impacts

5. Employment (layoffs, new job opportunities, etc.)
6. Local economy (growth, shifts, etc.)
7. Local utilities (problems, viability, etc.)
8. Personal consumption (spending, preferences, etc.)
9. Cost effectiveness of conservation (costs, payback, etc.)

EXHIBIT 1. Critical Energy Conservation Measures

1. Retrofitting Existing Buildings

Almost 20% of all the energy consumed in the United States is used to heat and cool residential and commercial buildings. Most of these buildings are not adequately insulated, and many waste as much energy as they actually use. In recent years there has been a trend toward constructing buildings with better thermal qualities, but a large proportion of all existing buildings could benefit from increased insulation and weatherization. These techniques include: caulking and weatherstripping around doors and windows; adding insulation to attics, ceilings, walls, and floors; installing storm windows and doors; insulating hot water heaters and heating and cooling ducts; installing clock thermostats; modifying heating and cooling systems; and employing energy load management procedures. Many of these techniques are relatively inexpensive, and can be applied to most kinds of buildings, including single-family houses, multi-family dwellings, mobile homes, stores, office buildings, schools, hospitals, and light industrial buildings. A national program to improve the energy efficiency of existing buildings through such retrofit techniques could reduce our annual national energy consumption by 2 quadrillion Btu's (or "quads") by 1985—which is about 3% of our current consumption. And by the year 2000 this energy saving could rise to over 10 quads.

2. District Heating and Integrated Community Energy Systems (ICES)

In a district heating system, a single heating unit serves an entire neighborhood or other cluster of buildings. Water is heated to 165°–300°F in a central furnace, and then distributed to all the buildings through a network of buried pipes. Within each building a heat exchanger produces space heating (or low-level process heat for industrial purposes), after which the water is used directly as hot water. Although it is quite popular in Europe, district heating has not been extensively implemented in the U.S., even though the cost of installing these systems is about the same per building as installing separate furnaces and hot water heaters. ICES is more complex than district heating, since it provides heating, air conditioning, electricity, hot water, and liquid and waste disposal through a single, on-site integrated system. The system might involve any of several technologies, including oil, gas, or coal fired burners and generators; solar energy devices; heat pumps; solid waste incinerators; and biological treatment of liquid wastes. In all cases, the goal is to use energy and other resources in multiple, integrated ways to achieve maximum efficiency. Potential sites for ICES include small towns, urban renewal projects, new housing developments, military bases, downtown business districts, commercial and industrial complexes, government complexes, university campuses, and similar settings. The initial cost of an ICES is higher than for district heating, but its overall cost efficiency can be much greater. It has been estimated that these two procedures could together reduce our national energy consumption by approximately 6 quads—or 8% of our current consumption—by the year 2000.

3. Small Automobiles and Vehicle Redesign

Gasoline for automobiles accounts for roughly 13% of all energy consumed in the U.S. today, and an additional large amount of energy is required to produce the steel and other materials that are used in cars. Small cars (weighing under 3000 pounds) consume much less energy than larger cars because (1) they get much greater gasoline mileage (due to less weight, fewer power options, and reduced aerodynamic drag), and (2) require less energy to manufacture. The Energy Policy and Conservation Act of 1975 requires that the average fuel efficiency of each manufacturer's new car fleet must be 19 m.p.g. for 1979 cars and must rise to 27.5 m.p.g. for 1985 cars. Several other steps could also be taken to encourage people to purchase small cars, including imposing excise taxes on all large cars, giving rebates on the price of small cars, or prohibiting the manufacture of cars over a specified weight limit. Automobile manufacturers, meanwhile, could be encouraged to make numerous design changes in cars to increase their fuel efficiency, including producing more diesel engines, introducing other types of efficient engines, reducing internal friction, improving carburetion, lowering aerodynamic drag, replacing steel with aluminum and other lightweight materials, and putting radial tires on all new cars. The current EPCA requirements are expected to reduce our national energy consumption by approximately 3.7 quads—or 5% of our current consumption—by 1985, and to save 7 quads per year by 2000.

EXHIBIT 1. (continued)

4. Land Use and Housing Modifications

The amount of energy consumed in a community is heavily influenced by numerous features of its land-use patterns and housing stock. Particularly crucial in the United States have been our pervasive urban trends toward single-family dwellings, suburbanization and urban sprawl, separation of work and residences, and land development patterns that prohibit efficient mass transit systems. Comprehensive community design and development to provide more energy-conserving land use, housing types and locations, and transportation networks would result in substantial energy savings. Such changes could be accomplished through the use of such procedures as overall community planning, zoning and building requirements, public ordinances, and other legal tools. The goals of these efforts might include constructing more multi-family dwelling units, redeveloping inner-city areas, locating industries in "industrial parks" with nearby housing for workers, introducing new forms of mass transportation such as "people movers," and organizing cities into "neighborhood clusters" containing all necessary facilities and services within easy walking distance. The cumulative effects of such actions could potentially reduce our national energy consumption by 10 to 18 quads—or 15% to 25% of current consumption—by the year 2000.

5. Electric Utility Rate Reform and Load Management

Most electric utilities charge their customers on a "declining block rate" structure. Three main features of this rate structure are that the more electricity one uses, the lower the cost per kilowatt hour; electricity used during "peak" periods of heavy demand costs no more than electricity used at other times; and the cost of electricity produced by more expensive generating facilities (such as nuclear plants) is averaged in with the cost of electricity from less expensive facilities (such as hydroelectric plants). As a result: (a) there is a financial incentive to consume rather than conserve electricity, since the smallest users pay the highest unit prices; (b) there is no incentive to reduce electricity consumption during peak hours or seasons, so that utilities must maintain costly (and often inefficient) standby generating facilities to meet peak demands, which further increases the cost of electricity; and (c) as plant construction and fuel prices continue to rise, customers are not charged the full marginal costs of adding new generating capacity and supplying additional electricity, which encourages increased consumption. The Public Utility Regulatory Policies Act of 1978 requires state regulatory authorities and utilities to consider various rate design reforms such as time-of-day rates, seasonal rates, interruptible rates, elimination of declining block rates, and marginal-cost pricing. Implementation of such rate and load management reforms could potentially reduce our national energy consumption by over half a quad—1% of current consumption by 1985.

Community Impacts

10. Housing conditions (availability, location, etc.)
11. Transportation conditions (availability, adequacy, etc.)
12. Community organization (local organizations, facilities, etc.)
13. Local government capabilities (resources, programs, etc.)
14. Control over energy supplies (local versus federal control)
15. Social and political conflicts (controversy, protests, etc.) Personal Impacts
16. Social equity (hardships based on income or ethnicity)
17. Personal freedom (restrictions, surveillance, etc.)
18. Interpersonal and family relationships (extent, quality, etc.)
19. Readiness for change (acceptance of or resistance to change) Quality of Life
20. Overall quality of life in the community

Within each impact area, several relevant problems, issues, and concerns were identified for exploration. These were expressed as the discussion questions in Exhibit 2.

PROCEDURE

The respondents in both communities were community leaders who are involved in some way in energy matters within the community. Some work in offices and agencies of city government, some are community representatives to the state legislature, and some represent business and labor organizations, local utilities, and a variety of public interest and community action organizations. These people were asked to participate in the interviews as individuals, not as spokespersons. They tended to reflect the perspectives of their positions or organizations, but most of them were quite open and candid in their remarks. Twenty-seven persons were interviewed in Seattle while twenty-four were interviewed in Yakima. The names and positions of the respondents in Seattle are listed in Section 2 and the Yakima respondents are listed in Section 3.

EXHIBIT 2. Energy Conservation Discussion Questions

1. Environmental pollution
 - a. Would any of these energy conservation measures either increase or decrease air pollution in this community to a significant extent?
 - b. Would any of these measures affect water quality in the community to a significant extent?
 - c. Are any of these measures likely to have either undesirable or desirable aesthetic or noise consequences for the community?
2. Protection of natural resources
 - a. Would any of these conservation measures help to protect valuable natural resources such as woodlands, streams and rivers, prime agricultural land, or recreational facilities?
 - b. Would any of the measures harm such natural resources in any serious way?
3. Personal health and safety
 - a. Are any of these measures likely to create health problems for their users, such as exposing them to toxic materials?
 - b. Are any of these measures likely to expose their users to higher accident risks?
 - c. Might any of these measures create serious mental health problems for their users?
4. Public health and safety
 - a. Are any of these measures likely to create public health problems, such as facilitating the spread of communicable diseases?
 - b. Are any of the measures likely to submit large numbers of people to dangerous conditions?
5. Employment
 - a. Would any of these conservation measures contribute to layoffs or unemployment in the community?
 - b. If that should occur, what kinds of workers would most likely be affected?
 - c. Would any of these measures provide new or expanding employment opportunities in the community?
 - d. If that should occur, in what fields would those new jobs most likely occur?
6. Local economy
 - a. Are any of these measures likely to stimulate or retard economic growth in the community?
 - b. How might business profits in the community be affected by these energy conservation measures?
 - c. Might any of these measures increase the rate of inflation?
 - d. Would any of the measures have serious economic consequences—either harmful or beneficial—for specific businesses or industries in the community?
7. Local utilities and fuel companies
 - a. If these conservaton measures significantly reduced the demand for energy, what economic consequences might this have for local utilities and fuel companies?
 - b. If local utilities or fuel companies did experienced serious problems as a result of these measures, how might this affect their stance toward energy conservation?

EXHIBIT 2. (continued)

8. Cost effectiveness of conservation
 - a. Might any of these measures significantly affect energy prices in this community?
 - b. Are any of these measures so expensive that they will never be cost effective?
 - c. Are adequate financing arrangements available in the community to enable consumers to purchase these conservation measures?
 - d. Does the city government have adequate financial resources to promote these conservation measures?
9. Personal consumption patterns
 - a. Would any of these measures produce significant changes in people's consumption patterns or levels?
 - b. Are there any specific goods or services that these measures might encourage consumers to purchase or not purchase?
 - c. What effects might these conservation measures have on people's levels of personal savings or investment?
 - d. If people save money as a result of these measures, are they more likely to spend it on goods and services that are energy intensive (a new car) or nonintensive (eating out)?
10. Individual privacy and freedom
 - a. Would any of these conservation measures infringe seriously on people's privacy or personal freedom?
 - b. Are people likely to feel that any of these measures are threatening their privacy or freedom, regardless of the actual situation?
 - c. Might any of these measures significantly constrict the range of options available to people in such areas as housing, employment, or transportation?
 - d. Might any of the measures expand the range of options available to people in any of those areas?
11. Family life
 - a. Would any of these measures alter family routines or other aspects of family life in any significant ways?
 - b. Might any of the measures create serious problems for family life?
 - c. Are marital relationships likely to be either positively or negatively affected by any of these measures?
 - d. Could any of the measures help to strengthen marriage ties or family stability?
12. Housing conditions
 - a. Would the availability of housing in this community be significantly altered by any of these conservation measures?
 - b. Would the quality of housing in the community be affected by any of the measures?
 - c. What changes might any of these measures produce in people's choices of housing type, size, or location?
 - d. If these measures tended to increase housing density, how would people respond to this situation?
13. Transportation conditions
 - a. Might any of these measures create serious transportation problems in this community?
 - b. Would the adequacy or availability of public transportation in the community be altered by any of these measures?
 - c. Would large numbers of people change their transportation modes or patterns as a result of any of these measures?

EXHIBIT 2. (continued)

14. Community organization
 - a. What effects might any of these conservation measures have on community or neighborhood associations in this city?
 - d. Would the structure of influence and power in the community be altered by any of these measures?
 - c. Would any of these measures tend to affect the overall cohesion or solidarity of the community and its neighborhoods?
 - d. Might people's perceptions of the community as a desirable or undesirable place to live be altered by any of these conservation measures?
15. Local government capabilities
 - a. Would any additional public services or programs be needed in the community as a result of these conservation measures?
 - b. Would any additional public facilities be needed as a result of these measures?
 - c. Does the local government have the capability to provide those needed services and facilities?
 - d. Is the local government capable of dealing with other problems that might develop in the community as a result of any of these conservation measures?
16. Control over energy systems
 - a. Do people in this community have strong feelings about keeping control of energy policies and systems at the city or even the neighborhood level, as compared to the state or national level?
 - b. Would any of these conservation measures tend to significantly alter the level of control over energy policies and systems?
17. Social equity
 - a. Are any of these measures likely to impose undue hardships or costs on specific categories of people, such as those with low incomes, the elderly, nonwhites or women?
 - b. If that were the case, how might those inequitable consequences be avoided?
18. Social and political conflicts
 - a. Are any of these conservation measures likely to be particularly controversial in this community?
 - b. Would any particular types of people or organizations be strongly opposed to any of these measures?
 - c. Might any of these measures arouse political protests or movements in the community?
19. Public readiness for change
 - a. How readily would the public accept each of these conservation measures if it were strongly advocated by the government?
 - b. Would any of these measures require people to make significant changes in their lifestyles or patterns of living?
 - c. If so, how ready are most people to make those changes?
20. Overall quality of life
 - a. What effects—either desirable or undesirable—might each of these conservation measures have on the overall quality of life in this community?
 - b. To what extent would the public be aware of these consequences for the quality of their lives, and view them as important?

In each community, potential respondents were identified by examining recent energy issues and activities and by talking with people who were directly involved in energy conservation work. A letter was sent to each of these people, explaining the study and inviting them to participate in it as respondents. A copy of the letter sent to the Seattle respondents is included as Exhibit 3; the letter to the Yakima respondents differed only in the name of the community and other minor details. The description of the conservation measures given in Exhibit 1 and the list of 20 impact areas were included with this invitation letter. All of the people invited to participate agreed to do so or, if they could not, suggested a replacement from their office or organization.

The interviewing procedure used in both communities was unique to this study. Because we wanted the interviews to be as open, spontaneous, and wide-ranging as possible, they were organized as four-person discussions. Respondents were paired together on the basis of similar perspectives and interests, and then (in most cases) both of the researchers met with each pair of respondents. To initiate the discussion, the researchers reviewed the purpose of the study, the five conservation measures, and the 20 impact areas. The impact discussion questions listed in Exhibit 2 were given to the respondents at this time. We explained that the questions were intended to suggest relevant topics for discussion but that we would not attempt to specifically cover all the questions. The respondents were then asked to select an impact area in which they were particularly interested and to begin talking about the five conservation measures in relation to that impact area.

The discussions that followed were entirely unstructured and free-flowing. During the discussion, the researchers asked questions to clarify points made by the respondents, challenged statements made by the respondents to encourage them to explain or expand those statements, kept track of which impact areas had been discussed and which remained to be covered, and moved the discussion on to different impact areas when necessary. The four-person procedure was extremely effective in promoting conversation in all cases since the respondents often stimulated each other to mention ideas that otherwise they might not have thought about. The researchers had to ask relatively few direct

EXHIBIT 3.

June 1, 1979

Human Affairs Research Centers
4000 N E 41st Street
P.O. Box C-5395
Seattle, Washington 98105
Telephone (206) 525-3130
CABLE HARCSEA

Name and Address

Dear :

The Assistant Secretary for Environment in the U.S. Department of Energy is sponsoring a study of the possible social, economic, political, and environmental impacts of various energy conservation measures. The purpose of the study is to determine the kinds of problems and benefits that might result from the widespread implementation of these conservation measures in the United States:

Seattle is one of four communities in which the study is currently being conducted. The Battelle Institute is responsible for carrying out the research in this region.

During this initial phase of the project, we are interviewing a select group of community leaders and officials who are concerned about energy conservation. We want to explore their concerns and expectations about the potential impacts of energy conservation measures, in order to obtain a broader understanding of the issues involved.

Your name has been recommended to us as a person who is concerned about the energy problem. We are therefore writing to ask if you would be willing to participate in this study?

The study deals with five conservation measures that could likely save large amounts of energy in the near future:
(1) retrofitting existing buildings to increase their thermal efficiency; (2) installing district heating and integrated community energy systems; (3) promoting small automobiles and other vehicle design changes; (4) encouraging modifications in land use and housing patterns; and (5) instituting electric utility rate reform and load management practices. These measures are described in more detail on Attachment 1. We do not expect the participants in the study to have any technical knowledge about these conservation measures, since the research is concerned with their impacts on the community and individuals, not with their technical feasibility.

EXHIBIT 3. (continued)

Addressee
Page 2
June 1, 1979

In the interviews, we want to examine both the positive and negative consequences of each of these conservation measures for a wide range of issue areas, as listed on Attachment 2. We realize that people will tend to be more familiar with some of these areas than with others, so the interviews will focus on those areas with which the participants are most familiar.

The interviews will have two novel features: (1) They will be four-person discussions among two community leaders or officials with similar concerns (they may already know each other) and two of us from Battelle, in order to promote a lively exchange of ideas. (2) The discussions will not follow a rigid format, but will be relatively free-flowing so as to encourage the participants to share whatever thoughts they have on the topic. This procedure will necessitate our tape-recording the discussions to give us a record of all that is said, but no one's comments will be personally identified in the final report. Each interview will be scheduled for a time and place that is convenient for the two respondents. We expect these interviews typically to last about an hour and a half, although the length could vary considerably depending on the involvement of the participants.

We think you will find the interview stimulating and rewarding, both personally and professionally, in addition to providing an opportunity to influence the formation of national policy on energy conservation. We therefore sincerely hope that you will be willing to take part in this study.

Would you please let us know your decision within a day or two? A prompt reply will be greatly appreciated, since we need to complete this scheduling within a week. Either return the enclosed post card or call Dr. Marvin Olsen at 525-3130, ext. 416. (If he is not in when you call, please leave a message with the secretary.)

We look forward to hearing from you.

Yours very truly,

Marvin Olsen and Edward Edelson
Research Scientists

MO/js

Enclosures

questions; their most common problem was not eliciting comments but rather moving the respondents on from one topic to another. Most of the interviews were concluded after approximately an hour and a half, although some of the respondents said they could have talked for several more hours on the topic of energy conservation. Virtually all the respondents commented afterwards that the experience was both stimulating and rewarding for them.

The interviews were taped (with the permission of the respondents) so that the researchers did not have to take notes and could give their full attention to participating in the discussion. All of the respondents understood that they would not be directly quoted in the final report. As soon as possible after each interview, one of the researchers listened to the tape and dictated, as the discussion went along, an extensive set of notes, comments, paraphrases, and other information that summarized the main points expressed by the respondents. These notes were then transcribed. Because of the unstructured nature of the discussions, there was no common organization to the transcribed notes. The next step was to "cut and paste" all of the notes so that they followed a standard outline. These materials were then used to write the final report. Our objective in this report is to present the range of comments made in the interviews but not to evaluate their validity. The views presented here are not necessarily those of the authors or DOE.

THE TWO COMMUNITIES

An initial methodological issue confronted in this research was whether to make several relatively superficial examinations in a variety of different communities or to conduct more in-depth investigations in a few communities. The latter course of action was chosen on the grounds that it would yield much richer and more useful data. To compensate for the small number of communities involved, two communities were selected that provided clear contrasts on a number of relevant dimensions, including size, economic base, and experience with energy conservation.

Seattle is the largest urban center in the Pacific Northwest. Its climate is mild with few extremes in temperature and considerable rainfall. The population of the legal city is about 500,000 while the total Standard Metropolitan

Statistical Area is approximately 1,200,000 at the present time. These population figures have remained rather stable since 1970. The economic base of the community rests on the aerospace industry (the Boeing Company), lumber products (Weyerhaeuser Corporation is the largest firm), and international shipping (the largest volume on the West Coast). The economy is relatively diversified, however, since Seattle also serves as a trade, financial, communication, transportation, and political center for the entire region.

Seattle was a very appropriate site for this study because of one key feature: it has one of the most extensive and vigorous energy conservation programs of any major city in the country. In 1976, the City Council mandated Seattle City Light (the public electric utility) to reduce its projected energy growth requirements by 20% by 1990 rather than construct any additional generating facilities. To attain that goal, City Light established an Office of Conservation that presently operates over 40 different conservation projects directed toward various user groups. Both the city and the county governments have active energy offices that administer numerous conservation programs. The Seattle office of the Washington Energy Extension Service (WEES) has been conducting a wide variety of grass-roots conservation activities in two neighborhoods for more than a year. Washington Natural Gas Company, which services the Seattle areas, is recognized as a pioneer among private utilities in promoting home insulation. A large number of private organizations in Seattle are also conducting a wide variety of energy conservation efforts.

To provide a sharp contrast with Seattle, we sought a community that differed in climate, that had a relatively small but growing population, whose economy was centered on agriculture and retail trade, and that had an investor-owned electric utility. Yakima met all of these criteria. It lies in the south-central part of Washington on the eastern side of the Cascade Mountains about 125 miles from Seattle. Its climate is desert-like with harsh winters and hot summers. The city has a current population of about 50,000 while the population of the total county is approximately 150,000. Since 1970, Yakima's population has been growing at about 1% per year while the surrounding county has experienced no growth during that period. Yakima is the economic center of one of the nation's most productive agricultural areas; apples, hops,

mint, and fruit trees are the major crops. It provides wholesale, retail, financial, and transportation functions for an area of several hundred square miles. The city is served by Pacific Power and Light Company and Cascade Natural Gas Company, both investor-owned. PP&L provides several household energy conservation services including Operation Insulation, which is recognized nationwide for its financial innovativeness. The WEES also operates an office in the community, although it has not been very active.

2. POTENTIAL IMPACTS OF ENERGY CONSERVATION IN SEATTLE

The information obtained through interviews with community leaders in Seattle is reported in this section. The respondents are listed in Exhibit 4. Potential environmental and social impacts of energy conservation measures are discussed under five broad headings: environmental impacts, economic impacts, community impacts, personal impacts, and overall considerations. Since, most of the comments made by these respondents treat energy conservation as a general policy that could be enacted in numerous ways, much of the material in this chapter does not pertain to any specific conservation measure, although linkages between particular measures and impacts are noted whenever they were mentioned by respondents. In addition, many of the comments pertain to the impacts of an energy constrained society in which conservation measures might or might not be applied.

Because this is an exploratory impacts assessment and not a quantitative survey, no figures are given here concerning the number of respondents who mentioned any particular type of impact. Our goal in this study is to identify the major dimensions of energy conservation impacts; further research will be required to assign numerical weights and probabilities to those impacts.

When appropriate, statements from the interviews are included in this report. These are not literal quotations, but rather condensations or paraphrases of statements by respondents that have been edited to be as concise and meaningful as possible. These statements are shown in italics throughout this report.

ENVIRONMENTAL IMPACTS

Many of the Seattle respondents did not foresee any serious negative impacts on the natural environment from any of these energy conservation measures. These people tended to view energy conservation as environmentally benign and possibly even beneficial in terms of reducing pollution and protecting scarce resources.

EXHIBIT 4. Seattle Respondents

Tony Angell	State Supervisor for the Northwest Section of the Washington State Office of Environmental Education
Nancy Bagley	Energy Chair for the League of Women Voters of Seattle
James Blomquist	Assistant Northwest Representative of the Sierra Club
Emory Bundy	Director of Public Affairs for KING Broadcasting Company
Robin Calhoun	Director of Conservation for Seattle City Light
Donn Charnley	Member of the Washington State House of Representatives from Seattle and a member of the House Energy and Utilities Committee
William Croake	Executive Secretary of the Seattle Building and Construction Trades Council
Thomas Eckman	Director of the Washington Environmental Council
John Gibson	Urban Economist with the Seattle City Office of Policy Planning
John Gilmore	Executive Vice President of the Downtown Seattle Development Association
Robert Halloran	Nuclear Engineer and Chairman of the Seattle City Light Citizen's Committee on Conservation
William Justin	Superintendent of Buildings for Seattle
Edward Lopic	Citizen Activist with the Municipal League of Seattle
William Larson	Manager of International and Regional Business Development for the Seattle Chamber of Commerce
Donald Navarre	Vice President of Washington Natural Gas Company
Priscilla Newton	Program Planner in the Seattle City Department of Human Resources
Nancy Osler	Project Coordinator with the Washington Public Interest Research Group
Randy Revell	Member of the Seattle City Council and Chairman of its Energy Committee
Joseph Ricche	Deputy Superintendent of Seattle City Light
John Rickhard	Secretary-Treasurer of Retail Store Employees Union Local 1001
Robert Royer	Deputy Mayor of Seattle
Roger Soder	Coordinator for Policy Research Communication for the Seattle Urban League
Samuel Sperry	Director of the Seattle City Energy Office
Arlis Stewart	Director of the People Power Coalition of Seattle
David Turney	Administrative Assistant to the Superintendent of the Seattle Public Schools
Al Williams	Washington State Senator from Seattle and Vice Chairman of the Senate Energy and Utilities Committee

Some respondents mentioned the fact that district heating and ICES might possibly increase urban air pollution by bringing fuel-burning plants into urban areas. All of them, however, went on, to make the two related points that: 1) we do not presently have adequate data to make definite decisions on this matter; and 2) in any case, the amount of pollution generated by these kinds of systems would certainly be much less than the pollution and other forms of environmental degradation created by large power-generating facilities such as coal or nuclear plants.

At the same time, a number of perceived environmental benefits that could result from energy conservation were also identified. For example:

- 1) Electric cars would reduce noise pollution in urban areas.
- 2) Urban redesign programs that decrease the total amount of automobile traffic would reduce both air and water pollution (much of which comes from particles left on highways and then washed into the drainage system).
- 3) Smaller automobiles require less iron and other scarce resources than do larger vehicles.
- 4) District heating and ICES would reduce thermal pollution since excess heat would be used within these systems rather than being vented into the atmosphere.
- 5) Increased density of living would help preserve open spaces, natural areas, and agricultural land, both within cities and in the surrounding regions.

In more general terms, most of the respondents realized that in the short run it would undoubtedly be necessary to make some temporary trade-offs between energy conservation measures and environmental standards. Representatives of environmental organizations, in particular, were quite aware of the necessity of such trade-offs. They stressed that their organizations were not opposed to district heating or other conservation measures that would produce some environmental pollution since they viewed the environmental costs of energy conservation as much less damaging than the impacts of building and operating new generating plants. Moreover, there was consensus among all the respondents

that the environmental benefits of energy conservation would far outweigh whatever costs were incurred, especially in the long run.

The point was made, on the basis of that conviction, that it would be a serious mistake to delay implementation of energy conservation measures until thorough environmental impact studies had been conducted on each measure. In the words of one respondent:^(a)

Any time you reduce the consumption of energy, you save natural resources. Energy conservation is therefore one of the best ways of mitigating environmental destruction. Although we lack precise data on the impacts of energy conservation measures on the natural environment, there is absolutely no question of the fact that conservation measures are much more environmentally benign than are energy production measures. It would therefore be a grave mistake to delay conservation actions until detailed impact studies have been conducted. We may not know at this point the precise outcome of such studies, but there is no question that in the overall balance energy conservation is much more desirable than energy production for protecting the natural environment.

A number of potential benefits of energy conservation were also identified in the related area of health and safety. For instance: 1) The tighter a dwelling unit is constructed, the more comfortable and healthy it will be for its occupants. 2) A reduction in automobile driving, as a result of denser living patterns, would both decrease automobile accidents and reduce the amount of toxic fumes in the air. As expressed by one person: *Anything we can do to get people out of their cars will benefit public health and safety.*

A few respondents mentioned the possibility of more serious injuries and more fatalities occurring in automobile accidents involving small cars, but they also observed that this possibility would decline as more and more people drove small cars.

(a) As noted before, these are not literal quotations but rather condensations or paraphrases of statements by respondents that have been edited to be as concise and meaningful as possible.

One respondent was concerned that industrial accident rates might increase if lighting levels in work places were reduced. He noted that during the 1977 electricity shortage in the Pacific Northwest the industrial accident rate rose dramatically.

The most frequently mentioned potential health and safety problem was the inadequacy of current product testing procedures and product safety standards for retrofitting materials such as insulation. Of particular concern were possible fire hazards and toxic effects of chemicals used in manufacturing those materials. Much additional research and regulation is needed in this area.

Finally, one respondent argued very forcefully that we often fail to apply the same rigorous public safety standards to energy conservation measures that we now apply to energy generating facilities, such as nuclear plants. His main point was that although the health and safety hazards associated with conservation may seem rather trivial in nature--such as falling off a ladder and breaking a leg while installing insulation in one's house--these dangers must be multiplied by very large numbers, representing the total number of people exposed to them. Although he readily admitted that we do not presently have adequate knowledge about the health and safety problems associated with most energy conservation measures, he speculated that, when the number of people exposed to them was taken into account, the resulting risk rates might be considerably greater than we currently assume.

ECONOMIC IMPACTS

Most of the people interviewed in Seattle believed that, in general, energy conservation would produce a great many new jobs. This would be particularly true of retrofitting programs, installation of district heating and ICES, and housing and land-use modifications. Many of these new jobs would employ relatively low-skilled, low-income people, and hence would be especially desirable for the economic health of communities. In contrast, large thermal generating plants--especially nuclear reactors--employ relatively few people, most of whom are highly trained engineers and technicians who have numerous job opportunities. In short, *the employment possibilities of conservation are prodigious in comparison to energy production.*

As an aside, one respondent also noted that the national goal of conducting energy audits in 35 million homes, as specified by the National Energy Act, would create a vast number of new jobs, most of which could be filled by unskilled or low-skilled persons who might otherwise be unemployed.

At the same time, a major national conservation effort would quite likely reduce or eliminate some kinds of jobs and create short-term unemployment. The problem would not be a lack of jobs since conservation programs would be opening up many new employment opportunities. Rather, the problem would be that many of the people thrown out of work by the energy crisis and the conservation effort would not possess the skills necessary for employment in conservation-related jobs. Many of the needed skills would not be difficult to acquire. Nevertheless, as several respondents commented, there would be a great need for extensive retraining programs. These programs should, in their view, be a joint responsibility of the federal government, state governments, and private businesses. Even with adequate retraining programs, however, workers, especially older people near retirement, might resist the idea of learning new skills. Because of this, the programs will have to include sufficient economic and other incentives to attract displaced workers. In addition, if the training programs are to be effective, they must prepare people for skills and jobs that are in short-supply and not train people for nonexistent positions.

In sum, the respondents felt that a national commitment to energy conservation would produce a short-term employment transition period that would require retraining programs, but in the long run *energy conservation will unquestionably be far better for employment than will continued high levels of energy production and consumption.*

To balance this rather optimistic view of future employment trends, one respondent voiced the concern that the overall energy crisis (although not necessarily any conservation measures) might lower wage rates. His argument was that as the costs of energy and other resources rise in the future, they will come to be considerably more important in the economy than labor. As a result, the value of labor, and hence wages, might decline. This would be particularly true of labor that provides human services in contrast to labor that performs technical tasks. Organized labor would protest vigorously if

this happened. He believed that this problem could be largely avoided, however, if labor leaders were fully involved in planning conservation programs that would provide new well-paying jobs for many workers. Another respondent observed that some labor unions have opposed retrofitting programs because they feared that much of the work would be done by homeowners themselves or by small businessmen employing nonunion labor. This could become a serious problem in the future, in his opinion, but again it could be avoided by fully involving unions in the development of relevant conservation programs.

Several respondents made the point that our economic well-being, from a broader economic perspective, is not dependent on continual energy growth and might, in fact, be better promoted through energy conservation efforts. If conservation can make available the same amount of energy as a central generating plant can produce at perhaps one-fourth or even one-half of the cost of that plant, then a tremendous amount of capital is available for use in many other socially beneficial ways. In other words, there can be direct economic benefits from investing in conservation rather than investing in tremendously expensive production facilities. At the same time, such conservation efforts as retrofitting, district heating, and housing and land-use redesign would be carried out largely by local businesses, which would stimulate local economic growth.

The energy conservation building code presently being drafted for all new construction and building renovation in Seattle will not seriously impede business development or economic growth in the view of the businessmen in this study. Moreover, even relatively small expenditures on conservation will typically provide much greater benefits for the local economy than will spending huge sums of money to build centralized power plants for three reasons: 1) conservation efforts are located within communities while power plants are often far away from urban areas; 2) the economic benefits of conservation would be distributed throughout the entire local business community rather than being concentrated in a few construction companies, unions, and utilities; and 3) conservation would have the economic consequence of keeping the cost of energy relatively low compared to the energy produced by central power plants, particularly nuclear reactors. Several respondents argued that the additional

nuclear plants under consideration for construction in Washington State could eventually cost every citizen of the state \$12,000 in capital costs and would triple or quadruple existing energy costs. The capital costs of most conservation measures would be only a fraction of this amount, and these measures would reduce many people's total energy costs.

Because of these kinds of considerations, some respondents noted that the business community in Seattle has shifted during the past year to a strong position in favor of energy conservation. In particular, it fully supports the enactment of the new energy conservation building code for new buildings, it generally favors retrofitting programs, and it is even becoming increasingly supportive of land-use redesign. The main reason for this shift in the business community appears to be self-interested economic considerations. Business people are realizing that they must cut their energy consumption to keep their operating costs within limits and stay in business. Many local businessmen have even become staunch advocates of energy conservation. As stated by one person: *There is little or no resistance in the business community to conservation measures that are seen as cost effective. Most businessmen are well aware of the benefits of conservation. If there is any resistance, it is likely to come from small businessmen who have neither the necessary knowledge of energy conservation nor the resources to invest in conservation materials. In general, the business community in Seattle does not believe that conservation will limit local economic growth.*

There may, however, be some temporary boom-and-bust effects from some conservation measures. Some respondents felt that extensive implementation of a particular measure might result in a rapid buildup of local business activity, beyond the level that could be sustained in the community, with a resulting decline in business activity until a satisfactory equilibrium could be achieved. An example would be the sales of insulation materials. If increased insulation were to become mandatory in all buildings, many firms would undoubtedly rush into the insulation business to the point where the field would be seriously overcrowded and some of the less successful firms would go out of business, but eventually the situation would level out. These economic disruptions would create some problems for communities, but none of the respondents felt that they would constitute serious economic impacts.

Two of the respondents expressed the belief that our society is presently entering a serious economic downturn that may last for many years. This trend is not caused by the energy situation, but energy shortages and rising energy prices are contributing to this trend and will have an increasingly greater influence on it in the future. Perhaps the only way for us to return to a simpler, less consumption-oriented economy, in their view, is to suffer through a complete collapse of the economic system, which appears to be increasingly likely. Energy conservation cannot prevent this economic catastrophe, but it can considerably lessen its impacts on communities and individuals. Consequently: *The demand and the need for conservation are going to become more and more severe in the future.*

The overall relationship between energy consumption/conservation and economic well-being was expressed by one respondent in the following manner:

Many people seem to be locked into the idea that it is necessary to keep increasing our use of energy in order to keep raising continual mindless expansion of energy production, without any consideration of its cost vis-a-vis the cost of conservation. If we mean by conservation the efficient use of energy, there is no more intelligent course of action than practicing conservation. What we must do is to begin thinking of conservation as another means of producing energy. We should therefore emphasize those conservation strategies that are equivalent to the production of energy and that fit in with our current energy systems. Because this view of conservation is not widespread, however, many people are locked into traditional ways of thinking, in which the only approach they can consider is producing more and more energy rather than using it efficiently by practicing conservation.

The reference to standard of living in the above statement led to the observation, made by several respondents, that conservation would result in much lower energy costs than would construction of new production facilities, that which would lower energy prices. This would in turn increase the disposable money that consumers could spend for things other than energy. Consequently, the purchasing power and standard of living of many people could improve as a result of conservation. A national conservation effort could also alter our basic consumption patterns. As noted by one person, we have become a *throwaway society*, and many people are convinced that obsolescence

must be built in to our goods in order to create jobs and keep the economy growing. Energy conservation is part of a broad set of values that reject this whole throw-away view of life. This conservation ethic seeks to obtain maximum use from goods, stresses thrift and reuse, and argues that this approach will produce a much healthier economy than our present throw-away system. People might likely have to make numerous small alterations or adjustments in their consumption patterns as a result of energy conservation, but conservation would not require people to make fundamental changes in their basic lifestyles. In fact, several respondents argued that failure to practice conservation could ultimately result in much more severe changes in standards of living and consumption patterns than would any conservation measure presently being considered.

Many of the respondents believed that energy--especially electricity--is presently underpriced in Seattle so consumers are not receiving accurate price signals regarding the true costs of energy. All of them agreed, however, that this situation would change in the near future since energy prices will undoubtedly continue to rise rapidly. Some of these people placed considerable faith in the price elasticity of energy, arguing that as prices rose people would respond by adopting conservation measures in order to reduce their energy consumption. As one of them said: *If it makes economic sense to practice conservation, people will do it; if it doesn't, people won't.*

Other respondents seriously questioned the validity of this assumption, however. They argued that 1) most consumers are insensitive to slowly rising energy prices that appear to be merely part of the general process of inflation; 2) to the extent that businesses can pass increased energy costs on to their customers, they have no incentive to reduce their energy consumption; and 3) most people will go to great lengths to preserve the lifestyle to which they are accustomed (or to which they would like to be accustomed) and will pay whatever it takes to maintain current energy consumption levels, which completely negates price elasticity effects. In the words of one respondent: *Much of the public is not very responsive to price increases. When prices go up, people may initially reduce their consumption of energy somewhat, but they adjust rather quickly to the higher prices and go right back to their usual*

patterns of consumption. In addition, previous experience with electricity rate increases in Seattle, even temporary surcharges to cover unexpected supply costs, indicates that a portion of the public reacts very vocally and angrily to all price increases. These protesters can exert considerable influence on city government.

Apart from this debate over the effects of price elasticity, everyone agreed that present utility rate structures often discourage rather than encourage energy conservation. One example of this is the fact that only the capital invested in production facilities counts in the rate base of the utilities, so that it is in the economic self-interest of utilities to promote energy consumption rather than conservation. Another example is declining block rates, which were enacted at a time when each additional unit of electricity generated cost less than the previous unit. Thus by offering cheaper rates per kilowatt-hour, the utility encouraged more consumption and reduced its cost of production. In Seattle, this situation was reversed in 1971 so that each new unit of electricity now costs more. Therefore, declining block rates make no sense in terms of economics or energy conservation, yet we tend to cling to these established institutional arrangements--which one respondent labeled the *baggage of history*--and find it very difficult to change them.

Several alternatives to declining block rates were discussed by the respondents. They included 1) level rates; 2) increasing block rates, 3) different rates for various categories of consumers, depending on the amount of energy used, so that the largest consumers would pay the highest rates since they contribute the most toward the need for increased generation; and 4) marginal cost pricing in which all electricity consumption beyond a fixed base amount would be priced at the actual cost of building new generating facilities. In general, the feeling among the respondents was that moderate rate increases would not have serious social impacts on individuals, except for low-income people, as discussed under Community Impacts. Most businesses could pass these additional energy costs on to their customers through higher prices. Nonprofit organizations, such as schools, churches, community organizations, and special-interest associations, might experience financial difficulties, however. Radical rate increases, such as full marginal-cost pricing, would

undoubtedly have numerous social consequences, however. These might include public protests, economic hardships for middle-income as well as low-income families, and financial disaster for many nonprofit organizations. In addition, since the electric utility is publicly owned in Seattle, the city government would be faced with the question of what to do with several million dollars of surplus income. Should that money be invested in new generating facilities, used for conservation programs, put into general revenues, or returned to consumers as an energy rebate? That topic has been discussed by the Seattle City Council and Seattle City Light, but no policy has been adopted on future electricity rates. With private utilities, a comparable issue would be what proportion of these "windfall profits" they would be allowed to retain for dividends or investment in new facilities.

The final economic question investigated in this study was the cost effectiveness of conservation measures. Since most of these measures require a moderate to substantial initial capital investment before they begin yielding any energy savings, can those investment costs be recovered through reduced energy consumption within a reasonable period of time? The respondent's noted that the answer to that question depends very heavily on the prevailing price of energy. Since Seattle's present electricity price is approximately 1 cent per kilowatt hour, only a few residential retrofitting actions are cost effective, and more complicated measures, such as district heating or land-use redesign could require 30 to 40 years to pay for themselves. Smaller cars are obviously cost effective with gasoline now costing about \$1 a gallon, even if they are no longer cheaper than standard size cars.

Several respondents mentioned interesting aspects of the question of cost-effectiveness:

- 1) If a homeowner can do the retrofitting work himself, many more of those actions become cost effective since the largest cost here is for labor, not materials.
- 2) If retrofitting increases the market value of a house, that amount should also be taken into account when calculating cost effectiveness. This increase could bring many more actions within the realm of acceptability.

- 3) Seattle's new conservation building code will have a pay-back period of only 3 to 5 years for the additional required costs, which is highly cost effective. This is primarily because the additional costs for extra conservation materials will be largely offset by less need for heating and cooling capabilities.
- 4) No matter what the potential energy savings, some people may be unwilling to increase their capital investment in their house because of current high interest rates and skyrocketing housing costs.
- 5) Other people, however, might be delighted to retrofit their homes for conservation if these costs could be added directly to their current mortgage and thus paid for over a long period of time.

All of the preceding considerations about cost effectiveness focus on individual or organizational consumers. It is also possible to inquire into the cost effectiveness of energy conservation for the public as a whole. As one respondent pointed out, virtually all conservation measures are cost effective for the total community or society since they are much less expensive than the capital costs of new production facilities. The current capital cost of new electricity generation facilities, for instance, is about \$1000 per kilowatt and can go as high as \$2000 for nuclear plants, so any conservation measure that can save a kilowatt of electricity on a permanent basis for less than \$1000 is cost effective for the community. In addition, a utility saves money by investing in conservation rather than generation, this will result in lower electricity rates and benefit all consumers.

More and more conservation measures will become highly cost effective as energy prices rise in the future. As many respondents observed, if each increase in energy consumption were charged the full marginal cost, rather than the current average cost, most conservation actions would unquestionably be cost effective. One respondent used Seattle City Light as an example. Seattle City Light currently pays 2 mills per kilowatt hour for electricity and sells it at 12 mills. With full marginal pricing, it would have to pay about 32 mills and sell electricity to the public at approximately 45 mills. If we were to jump immediately to full marginal cost pricing, it would create severe hardships for many consumers, especially low-income families, as discussed in

Community Impacts. Seattle City Light is prohibited by law from charging marginal-cost rates, but it is seeking authorization to "buy" electricity back from customers by subsidizing retrofitting and other conservation actions that save electricity for less than the marginal cost of 32 mills per kilowatt hour. The Seattle City Council has taken the position that energy conservation is equivalent to energy generation and has established a vigorous and comprehensive community energy conservation program, although it has not yet approved City Light's "buy back" request. One major difficulty in implementing such a policy is that we frequently do not have exact data on the amount of energy that can be saved by particular conservation actions, whereas we know quite accurately the generating capacity of an electric power plant. Nevertheless, in the minds of Seattle public officials there is little doubt that a vast array of energy conservation measures are cost effective for the city and will be beneficial for most citizens.

COMMUNITY IMPACTS

In Seattle at the present time, housing is a critical situation. As a result of a variety of factors that are not unique to Seattle, housing is in very short supply (less than 1% vacancy) and has recently skyrocketed in price. There is great emphasis on single-family dwellings as part of the "Northwest lifestyle," and many respondents mentioned the high proportion of single-family dwellings in Seattle as an example of this lifestyle. In the past few years, there has been a noticeable increase in the construction of multifamily housing (especially condominiums) to meet housing needs at affordable prices. During the same period, the number of separate households has risen steadily despite a stable population, caused primarily by the increase in single-adult households. Another significant trend is that 42% of the households change residences each year. These conditions provide the context in which the respondents considered the potential impacts of energy conservation on housing.

The respondents noted that the principal social consequence of a large-scale residential retrofitting program would be to raise housing costs even higher, unless the work was paid for by a utility as a means of "buying" energy from households, as Seattle City Light has proposed. This financial burden

would fall heaviest on low-income people, but everyone would be affected by it. One likely outcome would be that even more people would be driven into multifamily dwelling units despite the strong emphasis in Seattle on single-family housing. In addition, multifamily housing would almost certainly be emphasized in any housing redesign plan for the community since it is much more energy efficient than single-family housing. As the demand for multifamily housing increased, however, the prices of those units would quickly escalate, which is already occurring in Seattle. In addition to these financial considerations, the energy-saving benefits of multifamily housing could be entirely negated if an increasingly large proportion of these units were occupied by only one or two people, which is the trend in Seattle. One way of resolving this dilemma, mentioned by several respondents, would be to promote shared living arrangements involving a number of people, which is another growing trend in Seattle. That would clearly involve a major lifestyle change for the participants, however.

Several respondents emphasized that multifamily housing and other forms of denser living need not detract from the quality of housing. There is no necessary linkage between housing density and quality. *The quality of housing is determined largely by its design and the quality of its construction, not by its density,* commented one respondent who is a professional architect. Critical design and construction features include adequate provision for personal privacy, noise insulation between units, sufficient open spaces around buildings, and access to transportation routes. Greater density of housing would also enable people to live within easy access, even walking distance, of their jobs, shopping, recreational activities, and other community facilities.

Housing location is closely linked to transportation patterns. The present patterns of urban land in Seattle was seen as tending to lock people into depending on private autos without any real alternatives to traveling long distances to and from work and shopping. This trend is being exacerbated in Seattle by the fact that most new housing units, especially moderately priced housing, are located far out in the surrounding county, many miles from most employment opportunities and bus routes. The development of more fuel-efficient cars will enable people to continue to live in these outlying areas

and commute to work and shopping, but none of the respondents believed that more efficient cars would further increase outward migration. More efficient cars would simply enable people to break even financially in spite of continually rising gasoline prices.

Meanwhile, four other trends were identified that encouraged people toward greater use of mass transit in Seattle: 1) the rapidly rising cost of gasoline; 2) the construction of large numbers of condominiums in areas immediately outside the central business district that have excellent bus service; 3) the extension of bus routes further out into the county and the tendency of new housing developments to cluster along these transit routes, which several respondents believe will become much more prevalent in the near future because of gasoline shortages; 4) the move to prevent further construction on surrounding agricultural land, which forces people to look for housing closer to the central city. In the opposite direction, many businesses are currently moving their offices from downtown to the surrounding suburbs, which reduces the distances that their suburban-dwelling (but not urban-dwelling) employees must travel to work. All of these trends reduce gasoline consumption.

Production of more efficient cars would probably impede these trends somewhat for a few years and encourage people to continue commuting long distances in private vehicles. To the extent that happened, this conservation measure might prove to be counter-productive. As one respondent remarked: *The American people are strongly wedded to their automobiles and are not going to easily or quickly give them up. More efficient cars will simply enable people to afford to continue driving.* However, a critical distinction must be drawn between the effects of rising gasoline prices and gasoline shortages. More efficient cars may compensate for higher gasoline prices, but as gasoline becomes less and less available, people will be unable to drive any distance regardless of the efficiency of their car. Consequently, several respondents argued that the production of more fuel-efficient cars is a necessary short-term conservation measure that must be emphasized as long as our land-use patterns and cultural values encourage people to drive private automobiles. At the same time, in their view, we must vigorously pursue the development of more extensive mass transit systems and the land-use redesigns that will reduce

the distances people must travel within the community. Although more efficient cars and urban land redesign are sometimes viewed as contradictory measures, other respondents felt that they are actually complementary. One is a short-term measure while the other is a more permanent change. In combination, they can ensure that Seattle residents have adequate means of transportation for all their needs while at the same time considerably reducing their consumption of gasoline.

A final thought on the topic of transportation was offered by one respondent. He observed that transportation generally has more influence on land-use patterns than any other factor. Consequently, land-use redesign might be accomplished much more effectively, with less opposition, through the indirect route of transportation development than through such direct means as zoning and ordinances.

A number of potential community conflicts were mentioned by the respondents as outcomes of conservation measures: 1) Mandatory retrofitting and other regulatory strategies would almost certainly arouse a certain amount of public protest at first. They tended to believe that with time most people would come to understand and accept the necessity of mandatory regulation, however, so that this would not be a continuing point of conflict. 2) Similarly, building contractors are likely to complain about the additional costs for new buildings imposed upon them by Seattle's new energy conservation building code, but this situation is not unique to conservation since builders typically complain about all new building code requirements. 3) There has been conflict in Seattle over the recently adopted requirement that master electricity meters in existing apartment buildings be converted to individual unit meters, but building owners are complying with this requirement. 4) More generally, any conservation measure would certainly create some hardships for particular private businesses or other organizations that could lead them to initiate conflict. Most of these conflicts could be avoided with careful planning and management, however.

Land use redesign was seen by most of these respondents as the conservation measure with by far the greatest potential for serious conflict. *Growth management is already a dynamite issue, and land use redesign will create even*

more fireworks. Developers will be threatened economically and will actively oppose land use management efforts. Growth management and land use design fly in the face of many traditional values, but we are paying an awfully heavy price for those values. As another respondent pointed out, in a fundamental sense, land use management rejects the prevailing belief among many people that the land they own is theirs to do with as they please. This conservation measure rests ultimately on the position that land is not owned by any individuals but rather belongs to the entire community or society and should be used wisely for the greatest benefit of all.

Although all conservation measures are likely to arouse some conflict, land use management was considered the one that will elicit many more emotional and fewer pragmatic responses than the other measures. It will not be possible to promote extensive land use alterations with the rational argument that they will lower energy costs. Paradoxically, the conservation measure that has the greatest potential for energy savings is also likely to encounter the greatest emotional resistance. To a large extent, argued several respondents, our success in dealing with these conflicts will depend on our ability to bring all of the affected parties into the entire planning and development process so that all parties feel that they are part of the process rather than just being pushed around or told how to use their land. If we bring all of these affected parties into the process from the beginning and allow them to take an active part in formulating and implementing it, they can, in time, become the strongest advocates for energy conservation in the community.

The realization that the energy problem in general, and energy conservation in particular, will inevitably place severe burdens on local governments is implicit in the preceding argument. This point was mentioned by several of the respondents. People look to local government to provide solutions to the energy situation and yet may well resent and resist government programs that require people to alter their accustomed living patterns. Some local officials who make strong efforts to promote energy conservation may be turned out of office--at least in the short run--by a public that does not understand or accept their efforts. In the long run, however, if local governments can

successfully reduce the amount of energy consumed in the community, most citizens will likely come to appreciate what the government has done for them, which will strengthen local government and overall community cohesion. *I see energy conservation as providing opportunities to create strong community cohesion as well as energy savings*, said one respondent. Several others pointed out that the short-term problems experienced by local governments in promoting energy conservation will certainly be much less severe than the problems that communities and local governments would face without conservation efforts.

At the neighborhood level, retrofitting programs could have highly desirable social consequences, according to a number of respondents. They pointed to programs presently being conducted in two Seattle neighborhoods as part of the Energy Extension Service. In these programs, neighbors come together to exchange information about conservation techniques, attend neighborhood conservation workshops, borrow tools for retrofitting their homes, and so on. These activities have the side benefit of strengthening neighborhood solidarity by creating a sense of mutual cooperation. District heating and ICES will also require viable neighborhood organizations for their operation. Numerous administrative, financial, and cooperation problems will likely be raised as these organizations are established, but this process could result in the creation of strong and effective neighborhood councils and other forms of neighborhood self-government.

A final point in this realm of community impacts that most of the respondents stressed was that most energy conservation measures can most effectively be carried out at the local community or neighborhood level, not the state or federal level. Communities differ greatly in their potential for conservation, depending on numerous factors such as available energy sources, the economic base of the community, its weather conditions, housing stock, the ownership and policies of local utilities, and the interest of citizens in conservation. Seattle has a variety of conditions that are conducive to promoting energy conservation, but many other communities do not have similar conditions. Each community must develop and implement conservation programs that are appropriate for its local conditions and that will enable local residents to participate

fully in designing and conducting those programs. Federal and state governments have a vital role to play in establishing broad goals and standards and in providing funding to assist conservation programs, but standardized national policies and programs cannot deal effectively with countless local variations across the country. Ultimately, energy conservation must be the responsibility of local governments and communities. One of the respondents in this study expressed that point quite forcefully:

Local government is where energy management is going to happen; it is not going to happen anywhere else. Local government is capable of managing energy conservation programs because all its experience is with the provision and management of public services to individuals and because it is more responsive to local needs and conditions than any other level of government. The role of the federal government in this area is to provide impetus for change through incentives or penalties or other activities, but the programs themselves must be developed and implemented at the local level. There may be considerable variation among communities in their ability to do this, but in general, local governments are much more capable than either federal or state governments of effectively carrying out energy conservation programs.

PERSONAL IMPACTS

Almost all the respondents were concerned about the potential socioeconomic inequities that might fall on particular categories of individuals as a result of energy conservation. For instance, mandatory retrofitting programs could place serious financial strains on low-income people unless the capital investment costs were covered by a utility or government. Similarly, utility rate increases in an effort to stimulate conservation would create severe hardships for people with low or fixed incomes. These people are not only the least able to afford higher energy prices, but they also have few opportunities for reducing their energy consumption. Their homes are poorly constructed; they are frequently renters with no control over their residences; they own few major household appliances, etc. They would be caught in a squeeze between rising energy prices that they could not afford and a lack of any opportunities for reducing their energy consumption. This would leave them nowhere to go but further in debt.

A parallel situation will likely occur with automobiles. As we produce more small fuel-efficient cars, they tend to rise in price while large used gas-guzzling cars become much cheaper. Low-income people cannot afford to buy new small cars but are forced to buy old large cars that they cannot afford to operate. Moreover, these large cars will lose their value as symbols of success and status, which in the past has been quite important to upwardly mobile low-income and ethnic people.

The trend toward multifamily housing, especially new condominiums, is another conservation measure that hurts low-income people. In Seattle, many of these units are being constructed in areas near the central business district that have been occupied by low-income people. Since the prices of the condominiums are far above the means of the former residents of these areas, they are forced to move farther out into the surrounding county, where lower cost housing is available. Two inequities occur here: 1) this low-cost housing (including mobile homes) typically has low thermal efficiency, so that the people have very high heating costs; and 2) since many of them work in plants near downtown (or at Boeing, which is located south of the city), they must drive long distances to work.

These concerns about inequities for low-income persons are balanced by the observations offered by several other respondents. Their main point was that if federal or other funds are made available to cover initial investment costs of conservation actions and if utility rates for minimal consumption levels are not raised, then energy conservation can benefit low-income people. Retrofitting homes, installing district heating systems, and providing adequate multifamily housing near work locations would all enable these people to reduce their energy consumption and save money. In other words, these respondents felt that conservation under these conditions would act to redress the inequities that presently exist in the cost of energy. Production of more efficient cars will also eventually help low-income people as these vehicles become older and pass through the used-car market, but that will require a few years. Meanwhile, the expansion of mass transit systems would clearly assist low-income and elderly people, many of whom do not own cars and rely totally on mass transit.

Several respondents also noted that all renters, regardless of their income level, were disadvantaged in regard to the retrofitting programs since normally they can do very little to improve the thermal efficiency of their residences. Those actions are the responsibility of the property owner, but the owner has little or no incentive to invest in retrofitting for energy conservation if the tenant is paying the utility bills. Consequently, in the view of these respondents, retrofitting programs will be effective with rental properties only if they are mandatory.

Many middle-income people may also experience financial hardships under some conservation policies. Continually rising energy costs would eventually create serious problems for many of these people, and land-use redesign programs that emphasized multifamily housing located near the city center might result in a significant decline in the market value of suburban single-family houses.

The loss of individual freedom is another potential consequence of energy conservation programs that worries many people. Would mandatory retrofitting requirements or community land-use planning and development deprive people of significant freedom of action? The consensus among most of the respondents in this study was that energy conservation will undoubtedly require additional regulation of various aspects of people's lives, but that none of the measures being examined here would pose serious threats to individual freedom. They pointed out that we already regulate all kinds of activities for the public good and prohibit individuals from doing certain things for the benefit of the general public. Energy is simply one more area in which such regulation will become increasingly necessary. Some people may resist conservation programs as invasions of personal freedoms, but with time most people will accept this kind of regulation as they realize that it is serving the welfare of the whole society.

Conversely, if a person is allowed to use as much energy as he or she desires, that person is actually infringing upon the freedom of others since it denies them the use of a scarce resource. The goal of all regulatory programs for conservation should, therefore, be to achieve as equitable a distribution of the available energy as possible. Moreover, these respondents felt

that failure to practice conservation could, in the long run, result in much greater loss of personal freedom than would be necessary with any currently proposed conservation measure. Several respondents believed that our present energy consumption practices will inevitably lead to serious energy crises that could likely lead to the imposition of an autocratic government. *A broadly based conservation ethic could ultimately strengthen political democracy and promote personal freedom in the broadest sense*, stated one respondent. Another remarked that: *The real problem is not loss of personal freedom if we continue to consume energy at our present rate and become increasingly dependent on foreign countries for this oil and increasingly committed to investing all available capital into large generating plants. These trends are what really threaten personal freedom in our society today.*

Nevertheless, serious invasion of personal freedoms is always a potential threat with conservation programs and must be carefully guarded against. For instance, one person cited the current requirements of DOE in conjunction with home retrofitting programs. DOE requests such items as detailed sketches of people's homes, copies of private contracts they have made for installation of retrofitting, and other kinds of personal information. These requirements might be viewed as a serious invasion of personal privacy.

This question of loss of personal freedom is clouded by the fact that what might be a crucial issue of personal freedom for one person would be seen by another person as merely a matter of personal lifestyle. Lifestyles are valued, however, and most people are typically quite reluctant to make major changes in their accustomed lifestyles, particularly if those changes are seen as personal sacrifices. Some respondents noted that a large number of people, for a long time to come, will probably be willing to spend increasing amounts of money or energy in order to preserve their current lifestyle. To illustrate this point, two utility executives in the study mentioned that many people increase their total electricity or natural gas consumption after adding insulation to their house. These people say, in effect: "Now that I've insulated my house, I can afford to keep the temperature as warm as I want to be comfortable." In some cases, energy consumption for household heating has risen as much as 50% after retrofitting. Both of these respondents felt that

the government and the utilities have a responsibility to tell the public in a straightforward manner that: *Energy conservation will require you to make a number of alterations in your daily living habits.* They believed that the public would accept this requirement if it were fairly and equitably applied to all people so that no particular segment of the population suffered inequitable burdens or hardships.

If necessary, conservation actions can be defined as minor lifestyle changes rather than as a loss of personal freedom or a decline in the quality of one's life, the respondents felt that most people will consider making the change if they believe that it will benefit them in some way. Monetary savings are one such benefit, but their effectiveness is rather limited. More intangible benefits, such as personal convenience or social esteem, are often of greater importance to individuals. With other people, it is just a matter of breaking out of routine patterns of behavior and realizing that new ways of doing things can be personally rewarding.

Another type of benefit that many people might experience as a result of changing their lifestyles to conserve energy would be the enrichment of their interpersonal relationships and family life. Several respondents in the study mentioned various ways in which this could occur:

- 1) Conservation efforts aimed at reducing the amount of travel may have the effect of encouraging people to stay home more and spend more time with friends and family instead of going off to commercial recreation activities. The outcome could be stronger family and friend relationships.
- 2) Denser living arrangements enable individuals to interact with more people on a daily basis. People tend to know each other better, see one another more frequently, watch out for each other, care for each other's children, and have a greater sense of shared community.
- 3) Denser housing can be particularly beneficial for children because they can relate to many more adults and are not so dependent on their parents for everything they want. This gives children a richer social environment and can also strengthen family life by giving parents more free time and personal privacy.

- 4) *If we move from being a highly energy intensive society to being a more labor intensive society, people will spend more time in productive work, which is good for children, good for adults, and good for families. Family members will spend more time together and become more interdependent on each other, which would have the effect of strengthening the family.*
- 5) *The major problem with current apartment living is not loss of privacy, but rather anonymity, which results primarily from the way in which many multifamily dwellings are designed. The worst situation in which people can live is one of anonymity, in which there aren't shared relationships and mutual caring. Multifamily housing can provide these relationships and this caring in a way that single-family housing does not.*

On the opposite side of this question, none of the respondents could foresee any undesirable consequences for interpersonal relationships or family life as a result of any of the conservation measures under consideration.

Although the issues of equity, freedom, and lifestyles are all critically important in assessing the potential social impacts of energy conservation, the ultimate outcome of any conservation effort will depend on the willingness of the public to accept it and incorporate it into their lives. How ready is the general public to accept energy conservation measures such as those included in this study? Some respondents were rather pessimistic about the readiness of the public to accept energy conservation: 1) *Middle-income people spend only perhaps 2% of their income for direct energy consumption so it is going to be very difficult to convince them that they must change their standard of living in order to reduce their energy bills when they are such a small part of their total expenditures.* 2) *Even when people are well aware of the energy problem and know what needs to be done to help alleviate it, they are often slow to take conservation actions in their own homes and their own lives.* Other respondents believed that with time, most people would come to accept the necessity of conservation. 3) *Many people are in a state of virtual shock right now over the whole energy situation, but they will get used to changes and will eventually accept them when these changes are seen as absolutely necessary to maintain our basic way of life.* 4) *The public is not very accepting of conservation measures at the present time, but this is likely to change,*

probably in the next year, because of rising electricity rates, rising gasoline prices, unavailability of gasoline, and similar trends.

A majority of the respondents in this study maintained, however, that the public was generally far ahead of the government in its readiness for serious conservation measures. Typical comments to this effect were the following:

- 1) Most people want to practice conservation and would be very willing to do it if given adequate guidelines. The public is far ahead of most elected officials in terms of understanding the need for conservation and being willing to practice it. This is particularly true in Seattle because of the vast array of conservation programs that are being conducted here.*
- 2) The public is clearly far ahead of the government in terms of readiness to accept energy conservation at this time. A recent national poll showed that over 80% of the American people said they would be willing to accept a lower material standard of living in order to improve the quality of their lives and save energy.*
- 3) Seattle is a much more energy conscious community than most other communities. People here tend to understand quite well that conservation is both necessary and beneficial.*

OVERALL CONSIDERATIONS

All of the possible environmental and social impacts explored in this study could affect the quality of people's lives. At the end of each interview, as a means of summarizing the main thrust of their remarks, the respondents were asked to make a global assessment of the potential effects of energy conservation on the total quality of life in their community. One respondent was somewhat worried that the trend toward multifamily housing could lower the quality of life in Seattle, with its strong emphasis on single-family housing. Two other respondents stated that energy conservation would certainly produce numerous changes in our way of life but whether these changes would be beneficial or harmful for our quality of life could not be predicted at this time. They did note, however, that human beings have a remarkable capacity to adjust to change and to keep their lives and their society going despite severe disruptive changes.

All the rest of the respondents concluded that from an overall perspective, energy conservation would definitely improve the quality of our lives in the long run. Their reasons for drawing that conclusion are evident throughout this chapter, but perhaps the most important of all was the belief that with conservation our society would de-emphasize the importance of material possessions and would begin to find more meaning and satisfaction in other realms of life, would live in closer harmony with our natural environment, and would avoid the severe crises to which our current high-energy-consumption lifestyle will inevitably lead.

Viewed in this manner, energy conservation is not a matter of just developing new technologies or using technology more efficiently, it involves the adoption of a whole new set of values, ways of perceiving the world, and living our daily lives. *Energy conservation is thus part of the broader ethic of resource conservation.* Another respondent drew a contrast between our current "selfish" orientation which says "I won't start conserving until you do," and the kind of "sacrificing" orientation required for effective conservation, which says "I will conserve because it's good for the welfare of our society and for future generations." This conservation ethic would differ in numerous critical ways from our contemporary mass consumption ethic, but as noted by several respondents, it would actually be a return to our traditional American values of thrift and hard work.

The kind of fundamental social change perceived to be necessary for full-scale energy conservation will not occur spontaneously. It will require a concerted national effort, with strong governmental leadership. The critical need for decisive national leadership in promoting energy conservation was voiced by many respondents in this study. Their own words speak for themselves:

A great number of people are aware of the energy problem and the need for conservation. But they are not organized in any way and are not taking unified action. That is our responsibility in government. The basic problem here is inertia--getting people to change. The action necessary to promote this change should come from leaders--governmental and institutional.

The largest problem preventing conservation is the government. This is because the government has thus far avoided actively promoting conservation.

Although much of the public does not presently take the energy situation very seriously, and although many people are very distrustful of government, if the federal government were to provide strong leadership toward conservation goals, large numbers of people would be willing to accept and follow that leadership.

The country needs strong leadership on the energy conservation problem.

We desperately need a thorough, rational, consistent national energy policy that will take into account not only energy itself but also the environmental conditions, economic conditions, and quality of life in the broadest sense.

3. POTENTIAL IMPACTS OF ENERGY CONSERVATION IN YAKIMA

The information obtained through the Yakima interviews is reported in this chapter. The twenty-four respondents are listed in Exhibit 5. They represent a wide variety of community activities, including governmental policy formation, governmental administration, local utilities, the business community, and a wide array of community organizations. In the interviews however, they were speaking as individuals, not as spokespersons for their position or organization. As in Section 3, the potential impacts of energy conservation measures are discussed under these headings: environmental impacts, economic impacts, community impacts, personal impacts, and overall considerations. Most of the respondents in Yakima, as in Seattle, treated energy conservation as a general policy so that much of the discussion did not pertain to any specific conservation measure. Linkages between particular measures and impacts are noted whenever they were mentioned, however. Many of the comments describe the impacts of an energy constrained society in which conservation measures would be applied.

Section 3 uses the same reporting procedure as Section 2. No figures are given concerning the number of respondents who mentioned any particular type of impact since our goal is only to delineate the major dimensions of energy conservation impacts. The statements from the interviews given here are not literal quotations, but as before, edited condensations or paraphrases of statements made by the respondents. These statements are shown in italics.

ENVIRONMENTAL IMPACTS

As a small community in the middle of a large agricultural area, Yakima has very few environmental concerns. However, it has not always been this way. It was not too long ago that the skies of Yakima were always dark from such sources as seasonal agricultural burning to prevent late frosts from damaging crops, coal burning power plants including a downtown district heating system, and forest fires that were much harder to control when roads into the national forests were scarce. The annual agricultural burning was probably the most obnoxious, although of short duration. Farmers would burn anything, including tires, in uncontrolled smudge pots. All of these sources are now controlled or eliminated.

EXHIBIT 5. Yakima Respondents

Donald Chaplin	Washington Energy Extension Service
Les Conrad	Commissioner, Yakima County
Kenneth Crawford	Housing Services Center, City of Yakima
Robert Crossland	Yakima County Clean Air Authority
Thomas Culpepper	Architect
Carol Darby	Planner, City of Yakima
Alex Deccio	State Representative
Lou DeLuca	Pacific Power and Light Company
Betty Edmondson	Mayor, City of Yakima
Richard Faith	Planner, Yakima County Planning Department
Daryl Griek	Housing Services Center, City of Yakima
Thomas Hargis	Architect
Ron Hufstader	Cascade Natural Gas Company
Carolyn Lagergren	Audubon Society of Yakima Valley
Patty Negle	League of Women Voters
Robert Pratt	Economic Consultant
Allen Pruett	Pacific National Bank of Washington
John Shaw	Citizens for Solar Washington
Tom Thomas	Yakima Herald-Republic
Graham Tollefson	Commissioner, Yakima County
Gary Webster	Greater Yakima Chamber of Commerce
Fred Westburg	Audubon Society
James Whiteside	State Representative
Richard Zars	City Manager, City of Yakima

With this historical setting in mind, it was understandable that the people interviewed were unanimous in their desire not to return to such environmental degradation. However, because of the excellent environmental quality they now perceive, they felt that some reduction for the sake of local economic well-being would be acceptable.

Few of those interviewed felt that they could say anything very insightful about environmental impacts. The usual response to the questions about environmental impacts was that conservation meant "using less." To them this implied that there would be environmental benefits. However, for many, it seemed to be a new question that they had not yet considered.

The major concerns were raised with respect to Utility Rate Reform (URR) and Integrated Community Energy Systems (ICES). Many respondents noted that increased prices for electricity and heating oil had already caused widespread use of wood in fireplaces and wood stoves. One long term resident felt that it was only a matter of time before the inefficiencies of collecting and burning wood would be identified and that people would begin to burn coal in their homes. Others disagreed with this belief. Regardless, most felt that the air above Yakima (which is on the borderline of attaining primary particulate ambient air standards) would probably experience increased particulate emissions next winter. Historically, the air quality in Yakima is worse in the winter when air inversions are more likely. In addition, the respondents were concerned about damage to the productivity of nearby forests as more "weekend wood guzzlers" or "wood rats" use the forests indiscriminately. The control of such use in the large forest area to the west of Yakima was seen as a potential management problem.

Similar concerns about local air quality were raised with respect to ICES since combustion would occur near residences, but again, a reasonable degradation of environmental quality to insure the availability of heat and electricity was considered to be acceptable by the community.

Safety problems were not viewed as instrumental in the consumer's evaluation of the desirability of small cars. The main points of confusion were 1) whether small cars would encourage existing land use trends of urban sprawl, and 2) whether small cars would be utilized more intensively, thus minimizing their net energy savings and exacerbating the environmental impact from automobiles. Some of the respondents felt that the small cars were not as comfortable as larger cars so people would use them even less intensely. Others felt that mobility was the principal concern and comfort was secondary. Obviously,

the first group saw the purchase of small cars as a helpful trend that would not encourage existing land use trends and would help reduce gasoline consumption and nonstationary source emissions. The second group thought that the purchase of small cars encouraged existing energy intensive land use trends and increased the emissions from nonstationary sources. Both of these arguments, however, were questioned by a banker who noted that smaller cars are not being bought as a substitute or trade-in for larger cars, but as an addition to one's "fleet." The energy savings and environmental impact of this type of purchase should be carefully examined.

None of the respondents expressed concern about the personal safety problems associated with retrofitting existing buildings. Questions on this topic were usually treated with a look of "who are you kidding?" Often, people pointed out that the risks of coal and nuclear power are so great that any concern about "someone falling off a ladder" is trivial.

Representatives of the city expressed concern about the impact of denser living patterns on the existing sewage treatment capacity and on the environmental quality of the central business district. However, these impacts must be compared to the reduced demand for converting the prime agricultural land surrounding Yakima into housing tracts and shopping centers since this land is the economic base of the community.

In summary, all the respondents felt that energy conservation meant environmental benefits, but when asked if these environmental benefits were large enough to be used in calculating the social cost effectiveness of energy conservation measures, the responses ranged from a shrug of the shoulders to questions on how this could be done. Many felt that people were only concerned with their "out-of-pocket" costs. Few were interested in seeing data on the extent of the environmental benefits.

ECONOMIC IMPACTS

Yakima has an agriculturally based economy. As a result, its economic base is somewhat insulated from the national economic factors that affect those industries that are more dependent on the business cycle and Federal fiscal

and monetary policy. Yet, the seasonal employment of agricultural industry is responsible for the high unemployment rate and welfare load in Yakima compared to the rest of the state of Washington.

In general, respondents were confused about the economic impacts of the conservation measures considered. This confusion reflected the fact that few of them had considered the question of economic impacts before the interview. Their concerns were often contradictory. For example, a respondent might be certain that there would be changes in personal consumption patterns, and yet at the same time expect no impact on the local economy.

Employment impacts were generally seen as favorable. This probably reflects the fact that very few Yakima residents are involved with energy production. One respondent questioned whether the nature of the employment related to retrofitting buildings would be sufficiently long-term to provide benefits for the city or whether it would just increase the labor force in the area and leave them jobless in a few years after the retrofit programs were completed. This respondent felt that to improve employment, Yakima would need a large manufacturer that requires low-skilled labor, that would not use much water, and that would not emit any pollutants. The latter two criteria would be needed to make the plant environmentally acceptable to the community.

Some respondents felt that labor unions perceived energy conservation as a threat to jobs. Others said there was no such sentiment and that there was *no concern about reduced employment due to the implementation of these types of measures*. However, one person involved with conservation efforts noted that this might be due to *our ineffectiveness in the past in implementing conservation measures*.

One employment-related problem encountered by existing retrofit programs has been a shortage of qualified contractors. This was due to licensing and bonding requirements that prevent quick formation of new firms.

In general, the natural gas company and the electric utility company are perceived as having served the community well. Pacific Power and Light (PP&L) has been a national leader in the design and implementation of a residential retrofit program, "Operation Insulation." Cascade Natural Gas does not have a

similar program, although under the National Energy Conservation Policy Act (NECPA), they will have to implement a residential conservation service program. The fact that one utility has a comprehensive retrofit program and the other does not is a source of confusion that has increased the credibility gap in Yakima. As one utility attempts to encourage conservation measures, the other is trying to find new customers.

PP&L made it clear that "Operation Insulation" was initiated because of the supply problems they were having and not as a public relations campaign to improve the utility's image.^(a) For them, conservation was the least expensive source of a new power supply. Thus, the utility's ability to meet its demand required the implementation of a conservation program that provided the customer with information (the energy audit) and with financing (zero interest loans with payment due in ten years or at the time of the sale of the house, depending on which came first). PP&L had found that the energy audits would not encourage retrofit unless financial incentives were also provided.

Cascade Natural Gas faces a different supply picture. Most of its natural gas comes from Canada, and the existing contractual arrangement has a fixed demand charge for the purchases of natural gas. Thus, the cost per unit delivered increases as the number of units sold decreases. Cascade therefore does not want to reduce its demand to the same extent as PP&L because it would force them to increase their price.

The difference between the companies can best be seen in the case of an ICES that is not part of either utility's system. PP&L felt that such projects would assist their ability to meet future demand at the lowest possible cost. For Cascade, the removal of demand from its system by an ICES would imply increased prices for the remaining customers.

However, these factors only affect the relative outlooks of the two companies. Both were quite positive towards the need for conservation and did not foresee any major changes in the way their respective companies would operate.

(a) Operation Insulation is one of several conservation programs offered by the Pacific Power and Light Company, but it is the only one with financing.

Thus, they viewed conservation measures as a complement and not as a substitute for energy production technologies.

One measure was an exception. Utility rate reform (URR) was of concern to the utility respondents because of the high number of noninvestor-owned electric utility companies in the state. A decision by the Washington Utilities and Transportation Commission to implement utility rate reform would only affect the investor-owned utilities. If such rate reform included replacement cost pricing, the investor-owned utilities might find themselves at a competitive disadvantage with the publicly-owned utility companies in the state. However, the impact would probably be more indirect since business firms in the investor-owned utility service districts would have higher electricity costs than competing firms in publicly-owned utility service districts. Some respondents felt that this discrepancy would occur even if the publicly-owned utilities implemented a similar utility rate reform. Their rationale is that the increased revenue collected by the publicly-owned utility would go to the local government and thus offset other sources of tax revenue; the reduced tax burden would again provide firms located in that service area with a competitive advantage. This type of thinking was not considered appropriate in the long-term because of the rapid increase in generation costs that will affect all utility companies. Another impact of URR might be increased fuel switching. However, the implications of this were not clear because it depends on too many factors for the respondents to make any generalizations.

The possibility has been raised in the literature that the money saved due to a conservation measure in one demand category, like space heating, would be used to buy more in another demand category, like automobile transportation. Because of the nature of the present energy problem, such a change in the Northwest would imply a worsening of the present situation. The respondents were asked to consider this possibility and then to comment on possible changes in personal consumption patterns. Many agreed with the possibility; however, some felt that people's increased awareness about energy problems would make them more frugal with respect to energy consumption. That awareness could be increased by the public or private sector information programs that would accompany any efforts to promote the increased utilization of conservation

measures. None of the respondents could envision what these changes might be. Few believed that the changes in consumption patterns would show an increase in transportation-related expenditures because of the existing gasoline supply constraint. Others felt that because so many factors determine consumption patterns, it was impossible to identify conservation measures as the cause in any specific change.

Although all of the respondents agreed that conservation was cost effective, their comments on what determines cost effectiveness were quite diverse. In Yakima, where the price of electricity is still low compared to the cost of new supply facilities, what is cost effective for the electric utility company might not be cost effective for the consumer. When asked about government stimulating the use of conservation measures based on their cost-effectiveness, where forecasted higher prices have been used in the analysis, the respondents were reluctant to agree that people would accept this as showing that it was cost effective for them. This is a reflection of the disbelief in future projections and the concern about only direct out-of-pocket costs.

In general, there was a feeling that because the economic structure of Yakima was not highly dependent on energy, the economic impacts of energy conservation measures would be slight. One respondent saw it as a trade-off between capital and energy availability:

Conservation can be blended in with increased production and although the consumer will be paying more and his total capitalization will have increased, more energy will be made available. The latter is more important.(a)

Because energy plays such a small part in economic decisions in the community, none of the respondents expected the economy of Yakima to change positively or negatively as a result of energy conservation measures. The only threat posed by the energy situation is the constraint that it might place on the truck and rail transportation needed to take their agricultural

(a) As noted before, these are not literal quotation but rather condensations or paraphrases of statements by respondents that have been edited to be as concise and meaningful as possible.

products to market, but it was felt that if the five conservation measures were applied in Yakima, there would be little or no effect on the energy available for the transport of agricultural products.

COMMUNITY IMPACTS

The discussions of the impacts of energy conservation measures on the services the community provides began with a discussion about the major trends in the provision of such services. In general, there appeared to be a strong feeling that the burdens on existing organizations, from local government to volunteer organizations, could increase dramatically as a result of future energy conditions. Other areas, such as housing conditions and housing patterns were seen to be changing, although not rapidly enough to be of concern. However, two disturbing themes pervaded these discussions: 1) the feeling that strong conservation measures could not be justified now to offset potential future energy problems, and 2) the contradiction between feeling that mandatory measures were necessary but that governmental involvement must be avoided. Probably the most cogent explanation for these tensions was given by one elected official:

Energy as a local issue has not gone through the prioritization that other things like parks, courts, roads, and public services have gone through. Historically, energy has not been a local problem area. As a result, there is no local government expertise.

Another theme expressed by the respondents was that future energy constraints would generate increased social conflict. Although the interviews were conducted soon after a strike by the independent truckers, the impression seemed to be deeper than a reaction to recent newspaper headlines.

Considerable discussion centered around the capabilities of local government to either coordinate, disseminate information, regulate, or enforce energy conservation measures. However, this topic was preceded by remarks on the future of local government in an energy constrained society. There was general agreement that the *demands on local government were going to increase and get*

much worse before they get better. The present energy situation places many extreme burdens on local government in delivering established services like law enforcement and in preparing tax and budget projects. One city official pointed out that her department's monthly gasoline budget was almost completely utilized by mid-month, due to the increased price of gasoline. These problems would be compounded by demands on local government to solve community energy-related problems. Elected officials were certain that they would find themselves in public meetings where they would have to respond to questions about fuel availability in the coming months, and they were not sure how they could or would respond.

The agreement among the respondents ended with the identification of the problems that would be created for the local government. Some felt that these problems warranted active government involvement to forestall them. They either believed that it was the responsibility of local government to be involved with these problems or that local government really did not have a choice. Other respondents felt that the local government should maintain a passive role with respect to energy either because there would be no need for government involvement if the "market" was allowed to respond and provide proper signals to consumers or because the local government did not have the capability to respond to what is essentially a national problem.

Many of those who advocated an active role believed that people were not responsive to price alone.

People will not act until they cannot get gasoline or the electric company reduces their access to electricity. People will not move on energy conservation unless mandatory controls are in effect.

No politically viable price signals could be presented that would be strong enough to make people employ energy conservation measures as fast as is needed; thus, more government regulation is needed.

Other advocates of an active local government predicted that the public would soon be demanding more energy services from local government. One specific area is the provision of mass transit. The city is already working on expansion plans, but even here there was the realization that when the demand comes, it will be impossible for the city to respond quickly because of

the lead-time needed to expand a bus system without premature over capitalization. Some public officials hoped that the private sector would take the initiative for providing mass transit in Yakima.

Those who argued for a more passive role for local government in the implementation of energy conservation measures either believed that the market would provide the necessary incentives to encourage consumers and industry to utilize available energy conservation measures or they indicated that the local government did not have the capability to become involved. The latter opinion was not restricted to those who felt a passive role was appropriate. Even those who concluded that government involvement was essential were concerned about the capability of existing government structures to respond. This statement was not made as a criticism of the public officials of Yakima, but as a generalization about the ability of a small administrative structure to respond to a very diffuse problem. As one official noted, active involvement in energy conservation could require the size of existing staff to be doubled. Others noted that the "sphere of influence" of local government is quite limited with respect to energy utilization. Similarly, the point was made that the local government was too close to the problem and, therefore, only the state and federal governments could approach the problem objectively from a nonpolitical perspective.

Many of the elected officials interviewed expressed resentment about their historical role with respect to energy and especially energy conservation. They saw themselves as bearing the responsibility, but not the authority in the implementation of Federal programs.

Local government is placed in the uncomfortable role of reacting to the energy situation without being given the tools, the money, or the information to be able to deal with it. We are just rubber stamps in determining energy regulation. Energy conservation measures could undercut and, in fact, undermine local government if implemented in the way it has been done historically.

If you can't manage your program responsibly, why risk your reputation. Unfortunately, that means the local community does not get served as well as it should.

Land use planning was viewed as the only "natural" function for local government involvement. In June 1977, the county adopted a comprehensive plan for land use (Comprehensive Plan Yakima County 1977). This was a successful effort that now has windspread community support. Interestingly, energy utilization is not addressed by this plan. The major emphasis is on preserving the prime agricultural lands. Although many commended the county for exercising its leadership in initiating the planning process, there was general agreement that there be no support if such leadership was exerted to utilize land use policy to promote energy conservation. The reasons given included: 1) energy delivery is not considered to be a local government responsibility, and 2) the people of Yakima do not believe that there is a serious enough problem to warrant any government involvement. Consequently, there will be resistance to any government program that restricts people's activities in order to reduce energy consumption.

Almost all the respondents noted that the widespread belief that energy supply is not a serious problem could keep any energy conservation program from attaining full implementation. Energy programs, like those initiated by the Washington Energy Extension Service (WEES), were viewed as not successful because of public apathy. The "energy crisis" had not yet come to Yakima and, therefore, information about the coming crisis was not treated as serious enough to warrant aggressive action. (The reader should keep in mind that Pacific Power and Light's Operation Insulation was very successful at generating interest and participation. Here we are addressing more aggressive programs, like mandating such retrofit.) Many of the respondents felt that this energy credibility gap needed to be addressed before energy conservation would become significant in Yakima. However, here again there was disagreement over who should lead this information dissemination program. Some felt that local government with its knowledge of local issues and resources was the appropriate leader. Others felt that a third party, neither the government nor the energy related industries, would be more appropriate for providing objective, credible information. Still others felt that people should be responsible for educating themselves, but even these respondents agreed that energy was not a large enough part of an individual's budget to warrant such

self-initiated educational efforts. One respondent felt that the people of Yakima were aware of the energy situation but that they were unwilling to act because *the problem seems remote from them, and they feel that the problem is being manipulated by either the Federal government or the oil industry.*

This dilemma faces anyone trying to rationalize policy based on future energy problems. The respondents felt that it was especially problematic for a local elected official who sees the strong possibility that new demands will be placed on him quite suddenly as liquid fuel supplies decrease and the prices of other energy forms increase rapidly. The result could be increased social and political conflict, especially if people felt that their standard of living was threatened.

It is possible that the future could be quite anarchistic with everybody trying to get their own energy.

Violence between the energy conservative and those who appear not to be conserving energy might be a real possibility.

While some felt that the possibility and potential consequences of such conflict warranted government action today to avert such situations, others saw these as natural reactions that should not be of much concern to the public.

The conflicts will always be there, but as long as people understand the reasons they will be willing to go along with government programs. However, there are limits to how far they can be pushed in changing their time schedule for utilizing more energy conservation measures.

Some examples of recent energy related conflicts were mentioned. A recent county decision to fund an off-road recreational vehicle park was met with much public disfavor because of the implied "wasteful" use of gas. *How can we believe in the need for conservation measures when we see the wasteful use of gas for travel and recreation.* Another example provided was the anonymous phone calls received by PP&L during the winter of 1973 and 1974.

People called to tell us of other homes that appeared to be over-lighting. The callers would ask us why we, the electric utility, didn't make laws to prevent such waste.

The last anecdote raises an issue that some have asserted lies at the root of the nation's energy problems. If there was more decentralized control over energy systems, the argument goes, there would have been more emphasis on conservation and a better matching of local resources with local needs. Although a few of the respondents agreed with this notion, most of them felt that the community had been well served by the electric utility company, the natural gas company, and the fuel oil companies. *People want to stay away from such responsibilities. If the local government was to take over the utilities, it would only result in a shift of blame and no improvement in service. Even though we would all like to be independent of any utility company, as with a highly sophisticated solar system, it's not clear that many of us have the physical or technical ability to operate and maintain such systems.*

As a result, the concept of ICES or even district heating with municipal or neighborhood control was not considered desirable. Interestingly, the electric utility would welcome greater decentralization and independence from the utility grid because it would help them meet their growing demands.

The demand for public control over energy systems could be influenced by actions on utility rate reform. Washington State has many electric utility companies that are not under the regulation of the Utilities and Transportation Commission. Thus, if the commission was to insist that investor-owned utility companies to move towards marginal or replacement cost pricing, the result might be increased public pressure to create a municipal utility or a public utility district for Yakima.

The inequities created by utility rate reform if applied to investor-owned and not PUD's will increase the pressure to form a PUD in Yakima. That pressure is there already and it will increase. However, as the public becomes more aware of the increasing generating costs that faces everyone, the pressure should subside.

One area in which the local government has taken a strong role is improving housing conditions and, in general, all related urban conditions. Again, the main reason is to reduce pressure for residential development of surrounding agricultural lands, not to conserve energy. Although there was no consensus on the underlying reasons, all the respondents noted the current trend towards residents moving to the city center and at the same time moving into multifamily units. One person noted that requests for housing permits for single family detached homes declined last year.

The reason for the success of the new condominium style living is not because of the energy or even direct cost-efficiency of the unit, but more for the convenience of not having to do any of the typical household chores.

Others felt that people are looking at the location and the type of housing with energy costs in mind. These arguments were countered by the fact that *everyone who works in Yakima lives within ten miles of the downtown area, thus, the idea of offsetting long commutes is not realistic.*

One interesting reaction to the increased construction of multifamily units has been a move in one neighborhood to rezone from an R3, which allows multifamily units, to an R1, which would permit only single family detached housing. Residents of these neighborhoods felt "intruded upon" by dense housing because they associated noise, pollution, and crime with such housing patterns.

A final point was made about the interaction of constrained fuel availability and a trend towards denser multiple family housing: some felt that fuel shortages would result in increased investments in houses, such as adding swimming pools and other amenities. One city official mentioned that almost all of the permits to build a home swimming pool were accompanied with an anecdote that the pool investment was made instead of a cancelled trip. If the energy shortage causes a shift in the use of leisure time from travel to home improvement and utilization, the large single family detached home might become even more desirable. And, interestingly, in this respondent's view energy

utilization in residences would increase, although overall energy consumption per capita might decrease. Once again, as tastes change, static indicators like energy consumed per household or per square foot might be misleading.

As noted above, because of the small size of Yakima, the average trip between home and work is already quite short. Thus, many agreed that any attempts to promote land use planning to reduce the energy consumed in transportation would not be productive.

Transportation costs in Yakima, including fuel, parking, and time are still too low to warrant use of alternative transportation systems.

However, the local government is developing plans to expand the public bus system in anticipation of increased demand as gasoline prices rise. It was felt that an expanded busing system was the first step toward promoting more energy efficient land use. In the meantime, the availability of more efficient automobiles will serve as a substitute for mass transit systems and land use planning. The only factor that could affect this trade-off is reduced availability of fuel.

The last area of community impacts discussed was the area of community organizations. Although no direct impacts of conservation measures were mentioned, two interesting contradictory trends were identified. On the one hand, the price and availability of gasoline were seen as a cause of reduced involvement in community organizations. People are becoming less willing to drive to the events and to provide assistance as a "me first attitude" increases and "the closeness of the community" decreases. Countering this trend was the impression that as energy availability decreases, people will look to local organizations for assistance.

When local government is not able to respond, increased burden will be placed on other more emergency-oriented community organizations, like the YMCA and the Red Cross.

Whether these organizations will be able to respond to such requests, if voluntary participation declines, is an interesting question to this analyst.

PERSONAL IMPACTS

Discussion of the personal impacts usually began with the question of public readiness for change. This area is not so much an impact area as it is a constraint on the viability of proposed conservation measures. If the measures are implemented prior to extensive public acceptance, they will likely be viewed as inequitable and coercive. In addition, the variety of opinion in response to this question is indicative of the diversity of opinions concerning the other impacts.

One group of respondents felt that the community was not ready for aggressive implementation of conservation measures. They pointed out the wasteful use of energy in new homes, the use of agricultural lands that require pumped irrigation as opposed to gravity irrigation, and the strong belief in the American dream of a large home in the country. The feeling that *if I can afford it, I might as well do it* was seen as a factor that would override any public or national welfare arguments. *People will not see the problem until it affects them personally.* Right now there is no belief that a problem exists.

The biggest problem facing the Washington Energy Extension Service in disseminating energy conservation information was the public's apathy. Most of this is probably related to the availability of cheap electricity. Energy conservation is just not a high priority item.

Another reason for this apathy could be the confusion created by the number of actors in the energy conservation game. Other respondents felt that the conservative and independent nature of most people meant that they were basically anti-government and especially anti-zoning. *People in an area like Yakima do not see the government as an extension of themselves but as another group of people.*

In contrast, another set of respondents felt strongly that the public was ready to get behind government energy conservation programs:

The public wants to get on with it, but they want to make sure that the programs are fair and equitable. Already there is trend towards prideful comparison of energy consumption between neighbors.

One person noted that people respond well to a crisis if they believe it's real. However, in the past this has usually been a reaction to a short-term change.

We are not well accustomed to seeing how people respond to long-term crises like a long-term shortage of fuel and energy.

Finally, some felt that government leadership in implementing some of these measures would heighten consumer awareness, which would then increase the demand for and legitimacy of the government programs.

These differences in opinion about the public's readiness for change determined the respondents impressions about other personal impacts. If they felt the public was not ready to change its way of living to conserve energy, it was difficult to discuss the potential impacts of conservation. As a result, these respondents felt that any aggressive conservation program would be seen as coercive and thus imply a loss of personal freedom. This was especially true for any measure intended to reduce the use of the automobile.

The people of Yakima have a car habit and that habit is going to be difficult to beat.

Those who saw the public as ready for change tended to view the potential impacts of energy conservation more favorably.

We are in an exciting era because of the challenges we face due to the lack of fossil fuels. We might find dramatic but pleasant changes in our lifestyle.

People will begin to get closer to each other as major conservation programs are implemented. As people begin to share information, it can only lead to other kinds of sharing. At the same time, the "energy pigs" will be left outside of the mainstream of society. This applies at the neighborhood and even at the city level.

Impacts from conservation measures were seen as causing changes in 1) individual responsibilities, 2) mobility and status symbols, and 3) living patterns.

In the first area, several respondents related the problems that they or their friends have had in getting reliable information to help them make energy conservation decisions. As a result, these people were reluctant to view any conservation measure as viable if it involved concerted individual responsibility.

There would have to be dire shortages before you could get groups together to take responsibility for their own heating sources.

Mobility and status associated with the automobile were of interest to all respondents.

People will be willing to give up many other things before they will give up their mobility.

One city official involved with low-income housing noted that they have seen evidence of people reducing expenditures for things like food and medical services to maintain their present use of their car. The implication was that there is no substitute for the automobile in a rural area like Yakima. Some of this resistance is related to the value of the automobile as a status symbol. Without other symbols available to replace the status represented by the automobile, it might be quite difficult to wean people from their cars.

To some respondents, the automobile represents only a means of mobility. Thus, they saw people reducing usage as fuel prices rise and willing to look to alternatives that can provide the same mobility. These respondents also felt that smaller more efficient cars could be less comfortable and, therefore, would encourage less use of the car for discretionary use like Sunday drives. One respondent noted that as the elderly become a larger proportion of the population, the demand for mobility and pleasure driving might decrease.

A question about the need for mobility raised some interesting contrasts. Some felt that travel and the ability to *get away* were extremely necessary for their mental health. Others disagreed, usually by noting that their last vacation was spent at home and that they had a more relaxing time than ever before. The latter point could have some interesting implications for the

participation in local events and utilization of local facilities. Some felt it would help make the community a more enjoyable place to live.

Living patterns, the final impact area, was considered to be one of the hardest to change. *Land use planning and zoning based on energy conservation would be intolerable.* Several anecdotes were told about people who recently bought houses on the outskirts of town, fully realizing its transportation requirements. But energy use had little influence in their decision to be on the outskirts of town, with plenty of space. *It is part of the American dream and people here aren't willing to give it up.*

Several respondents, however, noted an increased trend towards denser housing units located closer to the city center and other outlying urban centers. Several reasons were offered for the trend, but none involved energy conservation.

One reason for this trend is probably the number of smaller families in Yakima. But space is still very important to people in this area.

One obstacle to this trend has been the poor quality of high density housing in the past; it was described as *ticky-tack*.

It will probably take fifty years before this trend becomes significant.

It will take much longer to centralize than it did to have urban sprawl.

People expressed several concerns about living in denser housing. Some pointed to crime and other associated inner city problems.

As people have less of their own private property, their respect for property in general will decrease.

Others disagreed, saying that: 1) a more compact community can be safer, as shown by some recent statistics, and 2) *respect for property is more a function of upbringing, regardless of the setting.*

The issue of social equity was one of the main concerns of all of the respondents.

The poor will suffer from the energy situation. They will also be less able to take advantage of energy conservation programs. Thus, social equity issues must be factored into any energy proposal.

Others disagreed; they said that the poor did not use as much energy in comparison to the middle and upper income groups. In response, it was argued, that rising energy prices would only widen the gap between rich and poor and increase the possibility of conflict, although no one thought it would get to the point of social revolution.

OVERALL CONSIDERATIONS

The responses to the question of anticipated changes in the quality of life in Yakima ranged from "the changes will be beneficial" to *they may cause a potential reduction in the quality of life for new generations*. There was agreement, however, on the need for better indicators to measure changes as the nation goes through a transition from fossil fuels to other energy sources.

The arguments for beneficial changes revolved around the possibility that conservation measures increase community involvement and heighten awareness of the natural environment.

Energy conservation measures will make us more dependent and, therefore, more considerate of each other. That could be quite beneficial. As energy conservation measures are implemented, certain lifestyle changes will be required to make sure that the measures have a permanent impact.

Other respondents saw *no reduction in the quality of life, but some of our habits might change*.

Although minor aspects of our lifestyle will certainly change, the overall quality of life will not change.

However, other respondents saw a reduction in the quality of life.

Those who are in good economic shape will remain in good shape and will not feel forced to act. Those who cannot afford to act will be more harshly impacted. This might worsen the existing gap and decrease the overall national quality of life.

One person saw a distinction between the impacts on younger and older groups.

Although I see things improving for myself, they could become potentially worse for younger people who are dependent on the mobility that energy provides us.

In general, there was considerable concern about the implications of present energy and economic problems. However, few respondents felt that the energy conservation measures we discussed could change these trends significantly.

4. COMPARISON AND ANALYSIS OF POTENTIAL IMPACTS IN SEATTLE AND YAKIMA

The previous two sections presented the major findings that emerged from the interviews with community leaders in Seattle and Yakima. This section compares the two sets of data in three different ways: 1) by examining the basic sociocultural orientations in the two communities that partially explain why community leaders tend to view energy conservation impacts in different ways; 2) by identifying the most significant differences discovered between the two communities in the kinds of environmental and social impacts that are expected from energy conservation measures; and 3) by summarizing the major generalizations about energy conservation impacts that emerged from this study and were consistent in both communities.

SOCIOCULTURAL ORIENTATIONS

Neither the energy crisis nor energy conservation are occurring in a sociocultural vacuum. The entire energy situation is an integral part of the contemporary industrialized and urbanized world system in which we live, and it cannot be separated from the countless other features of that system. Consequently, when people assess the potential impacts of energy conservation measures, they will inevitably be highly influenced by their views concerning many other features of their community, their society, and the entire world situation. This array of views is normally integrated by the individual into a relatively consistent and unified set of sociocultural orientations that reflects the social structure and culture in which the person lives. Although each person's set of orientations is unique, broad patterns can usually be identified among the members of a community or society, especially when one community or society is contrasted with another.

In this study, it quickly became apparent that people's ideas about energy conservation impacts are affected by their orientations toward prevailing economic, political, and social conditions; by their attitudes toward social change; and by their perceptions of the overall energy situation. In addition, people may hold different views in each of these areas regarding local versus

national conditions and present versus expected future conditions. As a consequence, much of the information obtained in these interviews is a complex mixture of current sociocultural orientations, forecasts of anticipated future social trends, and assessments of the potential impacts of energy conservation measures. For example, if a person was dissatisfied with several features of contemporary society, welcomed social change as a means of improving society, and considered the energy situation to be quite serious, that person tended to view the potential impacts of energy conservation measures as highly desirable for society. Conversely, if a person was generally satisfied with current conditions in his or her community and society, saw social change as threatening to existing conditions, and considered the energy situation to be only a minor problem, that individual was very likely to believe that energy conservation would not have important desirable consequences for society. However, they would not necessarily believe that the impacts were undesirable.

Beyond these individual differences in sociocultural orientations, the study also revealed the existence of several broad patterns of orientations within each community. Moreover, there were sharp differences in these patterns between the two communities. A full charting of these contrasting patterns of orientations in the two communities is beyond the scope of this research, but we have proposed several types of orientations on which the two sets of community leaders differed. Exhibit 6 lists seven of these contrasting orientations in Yakima and Seattle pertaining to the energy problem, to energy conservation, and to social change. To the extent that these contrasting orientations prevail in the two communities, it is not at all surprising that most Yakima community leaders tend to minimize the desirability, likelihood, and impacts of energy conservation measures while most Seattle leaders see energy conservation as highly desirable, extremely likely to occur, and capable of producing many beneficial changes in social life.

Although it is possible to identify these contrasting patterns of orientations, it is a much more demanding task to explain their underlying causes. Without conducting extensive social analyses of the two communities, we can only speculate about the nature of those probable causes. Because Yakima and Seattle differ in so many identifiable ways however, a number of factors

EXHIBIT 6. Contrasting Orientations of Community Leaders

Yakima

1. National and world energy situation viewed with much skepticism.
2. Local community seen as relatively unaffected by the national and world energy situation.
3. Local energy conditions not expected to become critical in the future.
4. Energy conservation viewed as ancillary to policies that increase energy availability.
5. Implementation of energy conservation considered a private matter in which local government should not become involved.
6. Strong desire to maintain present conditions in the community and present change.
7. Energy conservation seen as not affecting the quality of life in the community.

Seattle

1. National and world energy situation viewed as extremely serious.
2. Local community seen as directly affected by the national and world energy situation.
3. Local energy conditions expected to become quite critical in the future.
4. Energy conservation viewed as a highly desirable policy, to be promoted as fully as possible.
5. Implementation of energy conservation considered a community concern in which local government should provide dynamic leadership.
6. Strong desire to change the community in the future so as to improve it.
7. Energy conservation seen as enhancing the quality of life in the community.

can be proposed that probably contribute to the observed differences in orientations toward energy conservation between the two sets of community leaders:

- Population size. Because of its much larger population, Seattle contains many more individuals and groups who are concerned about energy problems and are committed to promoting energy conservation.
- Population Growth. Because of its growing population and energy requirements, Yakima is more concerned about new sources of energy. Seattle's stable population allows it to be less concerned about growing energy requirements.

- Physical size. In Seattle, people must travel considerable distances to work and shopping while in Yakima these trips tend to be much shorter.
- Physical location. Seattle is directly linked into national and international transportation and communication networks, whereas Yakima is located outside of those networks.
- Economic base. The economy of Seattle is relatively diversified and heavily dependent on energy, in contrast to Yakima's almost complete dependence on agriculture as its economic base.
- Political leadership. The Seattle City Council has adopted a strong policy of promoting energy conservation whereas the Yakima City Council has not dealt with energy conservation.
- Utility ownership. Seattle City Light is a municipal utility that is controlled by the City Council while Pacific Power and Light in Yakima is an investor-owner utility.
- Conservation programs. Seattle City Light, the Washington Energy Extension Service (WEES), and many private organizations have conducted extensive and vigorous energy conservation programs in Seattle for the past several years. Although Yakima has a WEES office, its program is not as extensive; PP&L's "Operation Insulation" has thus far been rather limited in scope, due to the lack of advertising and staff; and there have been few other conservation efforts in Yakima to educate the citizens.

Many additional factors undoubtedly contribute to the orientations toward the energy problem and energy conservation in Yakima and Seattle. Nevertheless, these examples clearly suggest that the physical, economic, political, and social organization of a community will largely determine its prevailing sociocultural orientations and, in turn, will strongly influence the views held by community leaders concerning the potential impacts of energy conservation measures.

SIGNIFICANT IMPACT DIFFERENCES

The purpose of this discussion is not to mention every observed difference between the expected conservation impacts in the two communities, but only to

identify the differences that are likely to have important consequences for the implementation of energy conservation measures in these two contrasting types of communities.

Environmental Impacts

Leaders of both communities tended to be relatively unconcerned about any harmful environmental impacts from energy conservation measures; they viewed these effects as largely benign. In Seattle, however, many respondents went on to mention specific environmental benefits that they expected to result from conservation. This positive emphasis was largely lacking in Yakima. The only environmental benefit mentioned by several Yakima respondents was that denser living would help preserve prime agricultural lands on the outskirts of the community that are presently in danger of being converted to housing developments. (This consequence was also mentioned by some Seattle respondents, but it is more critical in Yakima because of its agricultural economic base.) In the area of health and safety impacts, no one in Yakima was concerned about possible hazards of current retrofitting materials and procedures, whereas this was a serious concern of several Seattle respondents. This discrepancy may result from the fact that Seattle presently has much more extensive retrofitting programs than does Yakima, so this issue probably has not yet had time to surface in that community.

Economic Impacts

No sharp disagreements over the probable economic impacts of energy conservation measures appeared between Seattle and Yakima respondents and there were several areas of general agreement, as discussed in the next section, Major Impact Generalizations. The most noticeable difference between these two sets of respondents was simply in their degree of awareness and concern about the economic impacts of conservation. In Seattle, most of the respondents commented at length about the likely effects of conservation on the local economy and generally saw those effects as beneficial. In Yakima, however, many of the respondents had given relatively little thought to this whole topic and did not have a great deal to say about such economic impacts. Although the economic impacts they did identify were commonly viewed as benign or desirable, most of the Yakima leaders did not expect energy conservation measures to have

many major impacts on the local economy, unless those measures interfered with the availability of energy for crop irrigation or transporting produce to market.

Community Impacts

Respondents in both communities discussed the current trend toward denser living in multifamily housing that is located closer to the city center. The magnitude of this trend is much greater in Seattle than in Yakima and the divergence will undoubtedly increase in the future. Consequently, Yakima leaders do not expect their community to experience most of the secondary social impacts that can be generated by denser housing. In contrast, this is a topic of considerable concern to Seattle leaders. Related to that difference is the fact that people in Yakima do not believe mass transit will become a major form of transportation in that community while most of the Seattle respondents stressed the fact that mass transit must become the dominant mode of transportation in that city. Perhaps the most striking contrast between these two communities, however, concerns the role of local government in promoting energy conservation and dealing with its effects on the community. In Seattle, public officials want and expect to play a critical role in the effort to conserve energy and they feel that they have strong support from the public to carry out those actions. In Yakima, in contrast, public officials are rather reluctant to become greatly involved in energy conservation. They doubt the local government's capability to play an active role in that area and they believe that most citizens want the local government to have little or nothing to do with energy issues. In short, based on the respondent's interviewed, energy conservation is viewed as a major concern and responsibility of the local government in Seattle, but viewed as outside the concern and responsibility of the local government in Yakima.

Personal Impacts

Four major topics in this area--personal freedom, lifestyle changes, readiness for change, and social equity--were discussed by most of the respondents in both communities. In this case, the main contrast between the two communities was in the degree of consensus among the respondents. Most of the community leaders in Seattle felt that a large proportion of the public was

ready and anxious to begin practicing energy conservation in a serious manner, that the proposed conservation measures would not result in any major lifestyle changes or serious losses of personal freedom, but that several of the measures could impose severe financial strains on low-income people if they were not properly designed and implemented. Yakima leaders, in contrast, were consistently split on these issues. Some of them expressed views similar to those of the Seattle respondents, but a large number of the Yakima respondents took an opposite stance. They believed that most of the public was not ready to accept serious energy conservation and would probably strongly resist any mandatory conservation measures, that these measures might force people to make some major (and presumably unwanted) alterations in their lifestyles, that these measures might seriously threaten personal freedom of action, but that they would not create serious new socioeconomic inequities.

Quality of Life

Almost all of the respondents believed that energy conservation could improve the quality of our lives in various ways and give rise to a new set of cultural values that focus on resource conservation. In Yakima, many of the respondents saw this only as a distant possibility, however, and did not really expect it to occur in their community. In Seattle, in contrast, most of the respondents believed that improvements in the quality of life and the emergence of a new conservation ethic were not only desirable but extremely likely to occur and were in fact already beginning to become evident in Seattle.

MAJOR IMPACT GENERALIZATIONS

Despite the numerous differences between the two communities, the amount of agreement among all the respondents in both communities was rather surprising. The following list of broad generalizations about the environmental and social impacts of energy conservation measures would probably be accepted by a majority of all the respondents, although there would undoubtedly be some dissenters from each generalization. Most of these themes were expressed more often and more extensively in Seattle than in Yakima, so in that sense, this summary is more directly relevant to Seattle than Yakima, although all of the

themes were also expressed by a number of Yakima respondents. In addition to demonstrating the unexpected degree of consensus between the respondents of the two communities, these generalizations also summarize the main findings of this research on the potential environmental and social impacts of energy conservation.

Environmental Impacts

- Energy conservation measures are unlikely to have any serious negative impacts on the natural environment and may have a number of positive consequences for the environment, especially in comparison with the impacts likely to result from increased reliance on coal or nuclear energy sources.
- Energy conservation measures are not likely to create any health and safety problems that cannot be adequately handled, although there is a need for research and programs to deal with some potential problems, such as retrofitting quality standards and small car safety.

Economic Impacts

- Economic well-being and growth are not dependent on continually rising levels of energy consumption. Energy conservation measures could promote economic growth by freeing investment capital that would otherwise have to be invested in new energy production facilities.
- Energy conservation measures would create many new jobs that could be filled by relatively low-skilled people, although many of these workers would require some retraining in order to qualify for conservation related jobs.
- Energy conservation measures would produce many small changes in people's consumption patterns but would not lower their standard of living and could improve it by reducing energy expenses and freeing income for other purposes.
- Energy conservation measures will become increasingly cost effective for individuals in the future as energy costs continue to rise. For the community as a whole, most conservation measures are already quite cost effective compared to the cost of constructing new energy production facilities.

Community Impacts

- Current trends toward denser living in multifamily housing located close to the city center would be heightened by several energy conservation measures, but this would not result in any decline in housing quality since there is no necessary relationship between housing density and quality.
- The increased use of small cars will not produce any significant changes in urban transportation patterns but will merely enable people to continue their current practices by compensating for the rising price of gasoline. Smaller cars will only provide a short-term solution to urban transportation problems, however, and in the long run, cities must develop adequate mass transit systems.
- Energy conservation measures will likely generate numerous social and political conflicts, but most of these will not be serious. Extensive land-use and housing modifications could lead to many sharp conflicts, however, because these changes would challenge many traditional values concerning private use of property and single-family housing.
- Energy conservation measures would place numerous pressures and burdens on local governments to both implement them and deal with their social impacts, but in the long run, this challenge could strengthen local governments and overall community cohesion.

Personal Impacts

- Energy conservation measures could raise prices for energy, housing, cars, appliances, and other goods and, consequently, place severe financial burdens on low-income families. To avoid these consequences, energy conservation measures must be carefully designed and implemented.
- Energy conservation measures would require some additional regulation of people's lives to ensure that these measures were adequately enacted, but this should not result in any serious loss of personal freedom. Continued unregulated use of energy could eventually result in a greater infringement on other people's freedom than public regulation for energy conservation.

- Energy conservation measures will introduce numerous small changes into people living patterns and lifestyles but will not require most people to make any major alterations in the way they live. One likely thrust of those lifestyle changes would be a reduced emphasis on material possessions and the enrichment of people's interpersonal relationships and family life.
- A large proportion of the public is ready and anxious to begin practicing energy conservation on an extensive and serious scale if they are given adequate opportunities and incentives. In this respect, the public is far ahead of many political leaders.

Quality of Life Impacts

- Energy conservation measures would improve our quality of life in numerous ways, particularly in the long run, although numerous short-term struggles and changes will be involved in achieving those gains.
- As energy conservation measures become widely implemented, they will generate and reinforce a new set of cultural values that will emphasize resource conservation and living in harmony with the natural environment.

CONCLUSIONS

Two broad conclusions emerge from this research:

(1) Energy conservation--whether it is implemented through the five measures examined here or with other conservation measures--will basically be beneficial for the natural environment and our society. The process of implementing and adjusting to these various conservation measures will create numerous problems and tensions, but they will be manageable and we will be able to cope with them. As conservation practices and values become increasingly interwoven into our society, we will experience numerous beneficial consequences of reduced energy consumption. Several such consequences in the economic realm are described by Stobaugh and Yergin (1979) in their analysis of our energy future:

"Mounting evidence strongly suggests that energy conservation is itself a form of productive investment, yielding much more rapid and substantial real changes in the energy balance of the nation than almost any given investment in energy production. Furthermore, it can actually stimulate employment, innovation, and solidly based economic growth."

As these authors suggest, this overall positive assessment of the probable impacts of energy conservation becomes especially attractive when we contrast it with the wide array of harmful environmental and social impacts that we know would result from the alternative policy of continuing to expand energy production using coal or nuclear energy.

(2) If and when energy conservation--again in all its various measures--becomes a dominant thrust in our society, it will stimulate and reinforce a much broader process of fundamental social change throughout society. Energy conservation will be much more than just a new set of technologies to be grafted onto existing social patterns; it will be an integral part of a whole new way of life and a new set of cultural values. These new patterns may encompass family life, educational activities, work roles, consumption practices, recreational activities, community organization, the economic system, politics and government, and even religion. An example of one facet of these altered patterns can again be drawn from Stobaugh and Yergin (1979), who discuss energy decision making:

"Conservation and solar energy involve much more decision-making and action at the point of end-use energy. They involve a move away from a producer-dominated system to a more balanced one, in which consumers play an important, rather than passive, role as well. But that, in turn, means that energy decision-making becomes highly decentralized, involving millions and millions of actors, often poorly informed, without easy access to capital or to the requisite skills, and for whom energy is only one of a myriad of concerns..."

From a broader perspective, this overall process of societal transformation might well lead to the emergence of a truly post-industrial society. Willis Harman (1979), among many other contemporary writers, believes that this fundamental transformation of society may be close at hand (Harman 1979):

"These challenges to diverse aspects of the industrial-era paradigm and its institutions support the view that a societal metamorphosis could be imminent. If it is, at the core of this transmutation would be a change in our most basic views about the meaning of human existence."

This study began as a preliminary technology assessment of five specific energy conservation measures. The community leaders interviewed in both Seattle and Yakima pushed it far beyond its original boundaries, however, so that the study became an examination of some of the factors that could cause a broad societal transformation. This expansion of our focus was probably inevitable since the kinds of technical and social innovations that would be introduced by extensive energy conservation programs never occur in a vacuum. They eventually affect virtually every aspect of human life with ramifications that extend far beyond the original context of energy consumption. Broad-scale implementation of energy conservation will never occur automatically, however. As numerous respondents in this study pointed out, there is a need at the present time for strong national leadership to vigorously promote the idea and practice of energy conservation. At the same time, as most of these community leaders strongly emphasized, energy conservation programs will not successfully alter human behavior and social life unless they are implemented and strongly supported within local communities.

5. SUGGESTED RESEARCH

One of the purposes of this study was to discover those issues or topics concerning the environmental and social impacts of energy conservation that require further research. In this final section, several of these critical research needs are outlined and some broad guidelines for future research on energy conservation impacts are suggested.

SPECIFIC TOPICS

1) Several of the respondents noted that at the present time there are no adequate standards for retrofitting products and procedures. It is possible, therefore, that some of the materials currently being used are potential health or fire hazards. Alternatively, it is likely that some of the firms performing these activities may do substandard or completely inadequate work because of the absence of minimum performance standards. To meet these needs, the government could conduct tests and then establish and enforce minimum standards for household retrofitting products and procedures.

2) Many of the respondents viewed smaller cars as a substitute for larger cars. This type of substitution has been utilized in some energy modeling. However, one respondent pointed out that for many people a smaller car is not a substitute but an addition to a family's fleet of cars. The energy implications of the small car as a complement to larger cars needs to be analyzed, especially in considering those energy used to manufacture automobiles. In addition, the long-term nature of those energy savings must be analyzed. If people maintain a large car, any policy decision that tends to lower the price of gasoline might show considerable changes in consumption. People would not only drive more, but they might begin to use their larger cars more intensively. Further research is needed on the energy implications of the purchases of smaller cars as a complement to larger cars.

3) Almost all of the respondents agreed that our present knowledge about the cost effectiveness at specific localities of most energy conservation measures is quite inadequate. Limited analyses have been done on the cost

effectiveness of some conservation measures at today's comparatively low energy prices. In contrast, if energy were priced at its full marginal cost, virtually every conceivable conservation procedure would be highly cost effective. The broad middle region between those two price conditions has not been explored in detail; however, the public officials in this study stated that this was the kind of analysis that they needed to evaluate conservation programs. In particular, what happens to cost effectiveness figures when we assume different increases in future energy prices? More important, what effect do local characteristics have on cost-effectiveness? If conservation procedures increase the market value of a building or a whole neighborhood, how will this increase affect the cost effectiveness of those procedures? Much research clearly remains to be done in this area.

4) As energy conservation measures are implemented, society will change the way it uses energy. For example, as gasoline prices rise, our use of oil for recreational trips may decrease. However, as a result of this, we probably would see an increase in residential use of energy as people spend more time in home-related activities. Thus one indicator may show a marked reduction in energy consumption while another indicator may show rising energy consumption. In addition, there will be many changes in the indirect consumption of energy, an area in which little research has been done. In order to objectively evaluate energy conservation measures, a more holistic approach to the development of energy utilization indicators is needed.

5) The likelihood that low-income families might suffer serious financial hardships is potentially the most serious negative impact of energy conservation identified in this study. Although it can be argued--as some of the respondents did--that energy policy is not the proper vehicle for combatting socioeconomic inequality in society, most felt that--for both pragmatic and moral reasons--energy conservation programs should be as equitable as possible and not add to the burdens of the poor. To insure social equity, however, considerable social research is needed on the potential effects of each proposed conservation measure and of combinations of measures on individual and family finances. This research must not stop with obvious first-order impacts

since many of the most severe inequities may be unanticipated second- or third-order impacts that will only emerge over time.

6) One likely outcome of inequitable impacts of energy conservation measures would be sociopolitical conflict. No individuals or groups like to be treated inequitably and forced to assume a disproportionate share of the costs of any public program. If they are relatively powerless, these disadvantaged individuals or groups may simply suffer in silence. But as they become aware of their common plight, discover ways of making themselves heard, and acquire sufficient resources to exert influence in the public arena, they are quite likely to initiate conflicts as a means of expressing and redressing their grievances. If these conflicts are to be constructively managed and resolved, public officials and community leaders must understand their causes and be prepared to respond to them. Such knowledge and skills require considerable preparatory social research.

BROAD GUIDELINES

The kind of generic impact assessment of energy conservation conducted in this study has very limited usefulness. It does identify the major dimensions of anticipated impacts perceived by selected community leaders, but it cannot identify specific features of those impacts. To conduct more detailed impact assessments, the researcher must focus on particular programs with specified scopes, activities, locations, budgets, schedules, and other features. We suggest therefore that future research on the environmental and social impacts of energy conservation deal with fully specified conservation programs rather than loosely described measures.

At the same time, several respondents stated that the United States should not wait until that entire array of specific impact studies has been completed to begin implementing a variety of conservation measures on a broad scale. Their argument was that even if we do not presently know the full range of potential impacts of any conservation measure, virtually any imaginable measure will in the long run have far fewer negative social impacts and far more positive impacts than the alternatives of either an increasingly severe energy

shortage or total reliance on constantly expanding our energy production facilities to meet rising energy demands. In other words, they insist that we already know that energy conservation will basically benefit the nation while the longer we delay implementation of these measures, the less effective they will be in meeting the energy crisis.

If the U.S. should adopt a policy of pushing ahead with energy conservation as fast and fully as possible, another broad research guideline would become relevant. Rather than attempting to perform a series of impact assessments in advance, aimed at predicting the possible future environmental and social impacts of proposed conservation measures, a more appropriate and useful strategy would be to establish procedures to carefully monitor and evaluate the effects of ongoing programs. If done properly, this procedure would have the benefit of allowing the impact assessments to be based on actual data rather than future predictions and enabling the researcher to observe subtle second- and third-order impacts as they actually occur. At the same time, careful monitoring of ongoing projects would identify any serious impacts before they became too large to manage. Research is needed to specify the required monitoring and evaluation programs.

A final guideline was suggested by almost all of the respondents in this study. Their insistence that energy conservation programs can only be effective if implemented at the local community level implies that evaluations of the adequacy of these programs must also be conducted at the community level. A national research effort, such as those conducted in recent years on the potential impacts of increased coal and nuclear production, while important for national goal setting and policy development, could under-emphasize the critical environmental and social impacts of conservation measures that only become apparent in local communities. A difficulty here is that many community leaders are often anxious to begin a program as soon as funds are available and do not appreciate the importance of building impact assessment and evaluation research into the program from its beginning. Therefore, we suggest that all grants to communities to conduct energy conservation programs should include the requirement that the program be continually monitored and evaluated for its impacts on the natural and social environments, as well as its effectiveness in reducing energy consumption.

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