

# **Trends in Public Perceptions and Preferences on Energy and Environmental Policy**

## **Executive Summary**

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National Renewable Energy Laboratory  
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Golden, CO 80401-3393

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This work is dedicated to energy and environmental policymakers and analysts everywhere.

## Abstract

This report presents selected results from a secondary analysis of public opinion surveys, taken at the national and state/local levels, relevant to energy and environmental policy choices. The data base used in the analysis includes some 2000 items from nearly 600 separate surveys conducted between 1979 and 1992. Answers to word-for-word questions were traced over time, permitting trend analysis. Patterns of response were also identified for findings from similarly worded survey items. The analysis identifies changes in public opinion concerning energy during the past 10 to 15 years.

Among the many questions the report addresses are the following:

1. What are the public's perceptions about the link between energy consumption and environmental problems such as global climate change?
2. How much is the public willing to pay to protect and improve the environment? To change the energy production infrastructure? To change patterns of energy consumption in buildings and in transportation? Under what circumstances are they willing to pay it?
3. Does the public link externalities such as environmental damage and the Gulf war with energy policy?
4. How actively involved in recycling is the public? What are their preferences regarding municipal solid waste facilities?
5. How has the public's definition of the energy situation changed over the last 15 years? "Energy situation" includes perceived severity of the energy problem, its salience, future expectations, and perceived impacts.
6. What is the reputation of the major energy institutions in the United States—oil companies, utility companies, automobile manufacturers, and the U.S. Department of Energy? How credible are they?
7. What are the public's preferences about energy supply and demand alternatives? Does the public prefer policies that emphasize reducing demand or increasing supply?
8. What are public preferences regarding electricity generation, particularly using coal and nuclear energy?
9. What has the public reported doing to increase residential and transportation efficiency and the use of renewables?
10. What are the public's policy preferences about energy use in buildings? In transportation?

These and other questions are answered insofar as available public opinion data can shed light on them. Changes in perspective over the last 10 to 15 years are presented.

*Public sentiment is everything. With public sentiment, nothing  
can fail; without it, nothing can succeed.*

—Abraham Lincoln

**Polling is a form of listening.**

## Executive Summary

### Introduction

In the years since the Arab oil embargo (1973-1974), the public has been on a roller-coaster ride of energy events. On the upside, after the 1973-1980 energy crisis, much of the public seemed reassured by federal policy emphasis on free markets, falling oil and gasoline prices coupled with plentiful supplies, and stabilizing utility bills following deregulation of natural gas prices. The downside of the ride, however, has included events such as Three Mile Island (March 28, 1979), Chernobyl (April 26, 1986), the Valdez oil spill (March 24, 1989), the onset of Operation Desert Shield (August 6, 1990), and the Persian Gulf war (January-February 1991).

Policymakers and economists have long argued that the public would lose interest in energy efficiency and the use of renewable energy technologies as the price of oil stabilized at record low levels (in real dollars) and as utility costs leveled out after dramatic increases in the late 1970s. And some evidence exists that earlier gains in energy conservation in buildings and transportation are being eroded as consumers seem to relax their vigilance toward the energy situation. In the past few years, scientists have stressed the relationship between energy production (particularly the burning of fossil fuels) and potentially serious global climate change resulting from acid rain, stratospheric ozone depletion, and the greenhouse effect. And although the National Energy Strategy, released in February 1991, called for both energy supply- and demand-side actions, the extent to which the public makes any connection between its own and its leaders' energy decisions and actions on the one hand, and environmental degradation on the other hand, remains unclear.

### Purposes of the Study

This review of opinion surveys provides information to help policymakers assess the congruence of energy and environmental policy options with public preferences. It updates an earlier study, published by the National Renewable Energy Laboratory (NREL/formerly the Solar Energy Research Institute), that identified patterns of public opinion about energy published in 1979 (updated in 1980). This new study provides a framework for evaluating public acceptance of policy options such as energy price increases. It helps policymakers to design policies that have a greater potential for public acceptance. The study also provides a comprehensive body of information on public opinion polls in the light of which policymakers can assess the results from any one survey question they encounter in the future. In addition, analysts can use this information to support a variety of projects, such as market assessments.

Understanding perceptions about energy and environmental technologies, policies, and programs forms a framework against which policies that encourage the use of new technologies or pursue other government agendas can be evaluated. Information on the perceived risks of energy-supply alternatives is pertinent to fuel-cycle thinking. Knowing factors that affect consumer decisions on energy-related purchases and lifestyle behaviors can increase the accuracy of market-penetration estimates and aid in modeling the potential for energy technologies. And whether the nation's energy institutions are linked in the public's mind with environmental problems is important information for policymakers seeking to make decisions that accurately reflect the public will.

## The Study's Approach

This updated secondary analysis of public opinion on energy and environmental policy relies on more data than had been available earlier. Researchers searched the Public Opinion On-Line data base on the DIALOG Information Retrieval Service for items relating to energy, environment, transportation, buildings, and alternative fuels, as well as for specific policy alternatives, such as energy-efficient mortgages. Searches focused on the period 1979 through 1991. Simultaneously, researchers obtained some studies by contacting the 50 state energy offices for energy-related surveys conducted over the past decade. In addition, colleagues at the U.S. Department of Energy (DOE) and NREL supplied studies of which they were aware. Most of the data base of nearly 600 surveys is composed of national probability samples of adults in the United States conducted by major polling organizations. Forty of the surveys involved samplings of adults and other demographic groups or samples at the state or local levels. Some gaps in secondary analysis of survey data exist because key questions simply were not asked. Relevant survey items probably exist that were not located and included in the analysis. Nevertheless, where trends and patterns of findings were established, these would be unlikely to change, even if other data were added.

The balance of this summary, save for the last section, summarizes the results of the empirical analysis. The interpretive conclusions are summarized in the last section.

## Energy and the Environment

Public opinion data linking energy and the environment addressed the following topics: degree of concern people felt, most serious environmental problems perceived, municipal solid waste and waste-to-energy conversion, global warming and stratospheric ozone depletion, acid rain, preferred environmental trade-offs, willingness to pay for environmental protection, environmentalism and environmental activism, recycling, and general policy preferences.

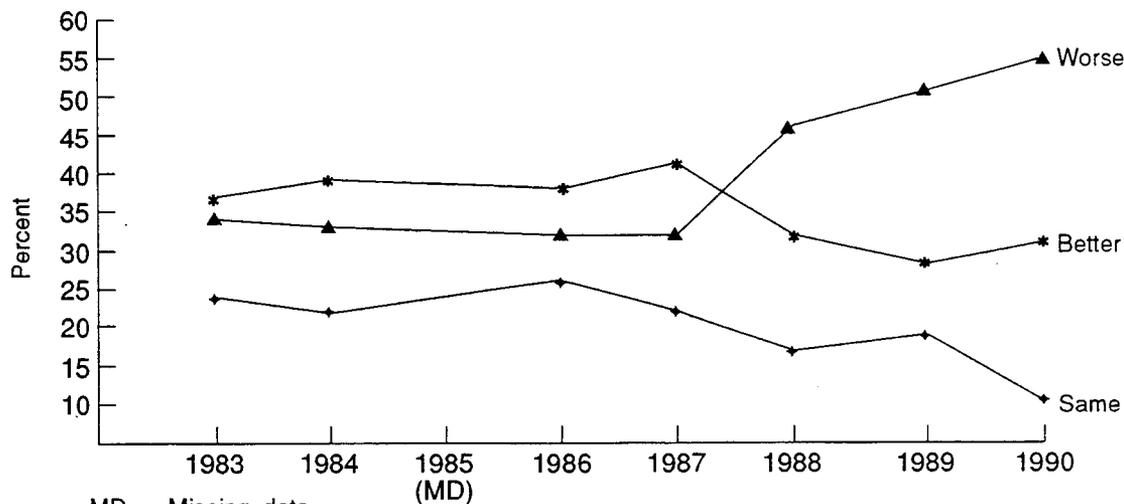
**Level of environmental concern.** Environmental concern is on the rise. The number of people believing environmental problems are getting worse has increased substantially in the past 9 years (Figure 1), although one survey reported some recent increased optimism. Opinion is that everyone should be more concerned—the federal government, business and industry, and the public. While still not one of the top three national concerns, the environment appears to be moving in that direction.

Recently, the public has begun to link energy and environmental concerns. According to survey results, environmental harm from energy production is a concern that people are beginning to feel will hurt them personally within 5 years. There is more widespread concern that individuals will be harmed by environmental problems from burning coal and oil than from nuclear power, and from war and strife over energy supplies than from environmental problems caused by the search for new sources of energy.

**Most serious environmental problems.** The U.S. Environmental Protection Agency lists stratospheric ozone depletion, air pollution from vehicles and industrial plants, and the greenhouse effect and global warming as some of the worst environmental problems. The concerns of the U.S. public mirror this list, although the ranking of importance varies by survey, probably because of differences in item wording. The most important concerns are: air pollution, water pollution, ozone depletion, waste disposal, hazardous waste sites, exposure to toxic chemicals, oil spills, and global climate change. Public concern about oil spills, the greenhouse effect, and ozone depletion increased dramatically between 1988 and 1990.

**Municipal solid waste.** Most of the public is aware of waste disposal problems, and a rapidly increasing proportion believes that the problems are "very serious." Many people believe that disposable diapers, plastic packaging, styrofoam, aerosol containers, and plastic bottles constitute disposal problems, although

"How would you rate the overall quality of the environment compared to how it was 5 years ago?" [1425]



Source: Constructed by author using data from Cambridge Reports/Research International.

**Figure 1. Trends in perceived environmental quality**

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paper products are the most ubiquitous form of solid waste. Disposition of waste through recycling and through waste-to-energy facilities are both favored options, although recycling is the option of choice.

**Waste-to-energy.** Although majorities of the public favor burning solid waste to produce electricity, the NIMBY<sup>1</sup> syndrome could be an impediment to siting waste-to-energy conversion facilities. Despite offers to lower property taxes if a waste-to-energy plant were sited within 10 miles, opinion is still divided about it. Concerns about aesthetics, odors, increased truck traffic and noise, a decline in property values, and negative health effects (in this order) were paramount.

**Global warming.** Most people have heard about global warming, and awareness is increasing. However, understanding of its causes and effects is limited; misconceptions are apparent. The public also does not have a solid understanding of the chlorofluorocarbon problem. The public believes that global warming is a serious environmental threat, and many believe that the ozone hole over the North American continent is certain or very likely to cause skin cancer and other health problems.

**Acid rain.** A majority of the public appears to be aware of the problem; however, global warming seems to have superseded acid rain as a more pressing environmental concern.

<sup>1</sup>NIMBY = the "not-in-my-backyard" syndrome of resistance to local siting of many types of facilities.

**Environmental trade-offs.** In the late seventies, questions about environmental trade-offs were posed. Currently, the trade-offs seem to be taking three major forms:

1. Environment versus economic development or protection against economic losses
2. Environment versus adequate energy supplies
3. Environment versus national security concerns (dependence on foreign oil).

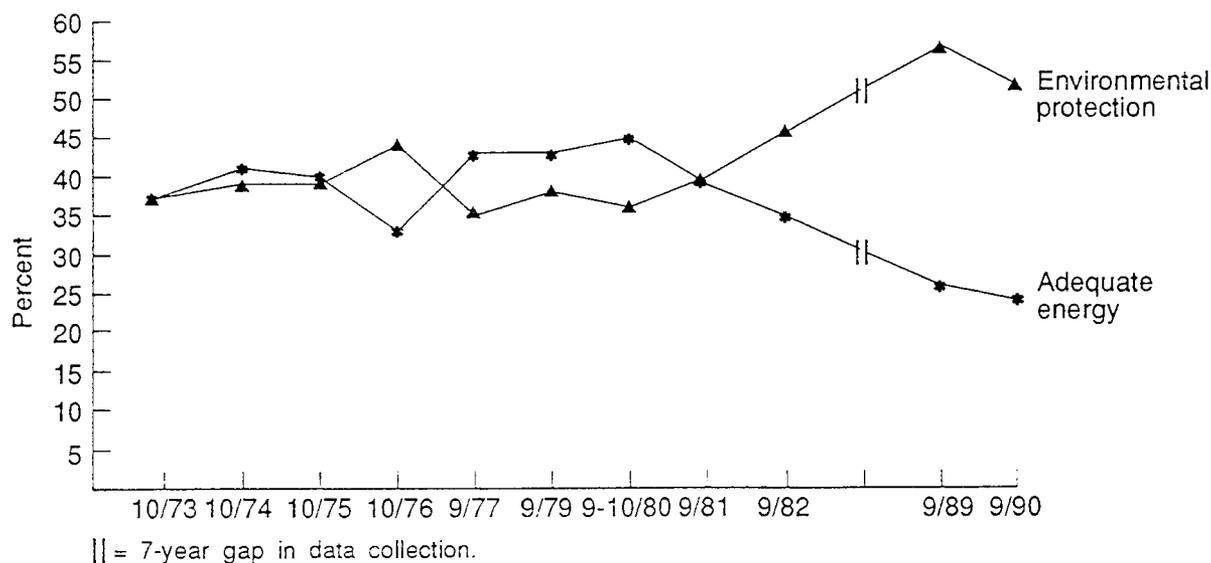
The proportion favoring environmental protection over adequate energy supplies has been increasing over time; definite majorities now say they favor environmental protection (Figure 2). Majorities in 20 of 22 countries polled, including the United States, now choose protecting the environment over economic growth, although a few of the U.S. respondents stated that such a trade-off is unnecessary. This minority believes that environmental protection and economic development go together—the concept of "sustainable development" (although this term itself has not yet appeared in poll questions). Also, majorities indicate that they would like to see a balance between economic growth and preserving nature, with the emphasis on environmental protection (Figure 3).

Even though majorities now select environmental protection over adequate energy supplies, opinion is more divided on the question of environmental protection versus national security—pluralities tend to favor each side. The pattern of evidence indicates that slightly larger percentages favor environmental protection and see global environmental problems themselves as a security threat.

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*"Some people say that the progress of this nation depends on an adequate supply of energy and that we have to have it even though it means taking some risks with the environment. Others say the important thing is the environment, and that it is better to risk not having enough energy than to risk spoiling our environment. Are you more on the side of adequate energy or more on the side of protecting the environment?" [1554]*

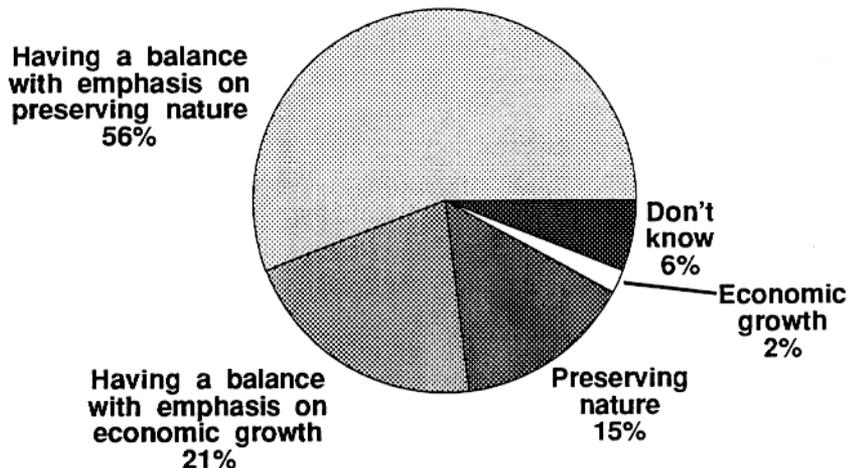
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Source: Constructed by the author using data from the Roper Organization [1554].

**Figure 2. Trends in preferences for environmental protection versus adequate energy**

"Sometimes there is a conflict between economic growth and preserving nature. (Card shown). Here is a list of different views about these two things—economic growth on the one hand and preserving nature on the other. Would you please tell me which one comes closest to your own opinion?" [1552]



Source: Constructed by author using data from the Roper Organization.

Figure 3. Preferred balance between economic growth and preserving nature, 1990

**Willingness to pay for environmental protection.** Many survey items asked about people's willingness to pay more for goods and service to protect and improve the environment. The public says that it is willing to pay more—more for oil and gasoline, more for electricity, and more for automobiles to protect the environment—up to a point. People may want to believe that any extra costs they incur are actually used for environmental cleanup and protection. The low levels of credibility of today's energy institutions on environmental issues could, in practice, constitute a major barrier to the public's willingness to pay more.

However, when viewed strictly from people's point of view who say they would be willing to pay, the findings consistently support the environment. Majorities have stated they are willing to pay 15% more taxes (type unspecified) or \$50 in more taxes (type and length of time unspecified); proportions of those saying they are willing to pay more are increasing.

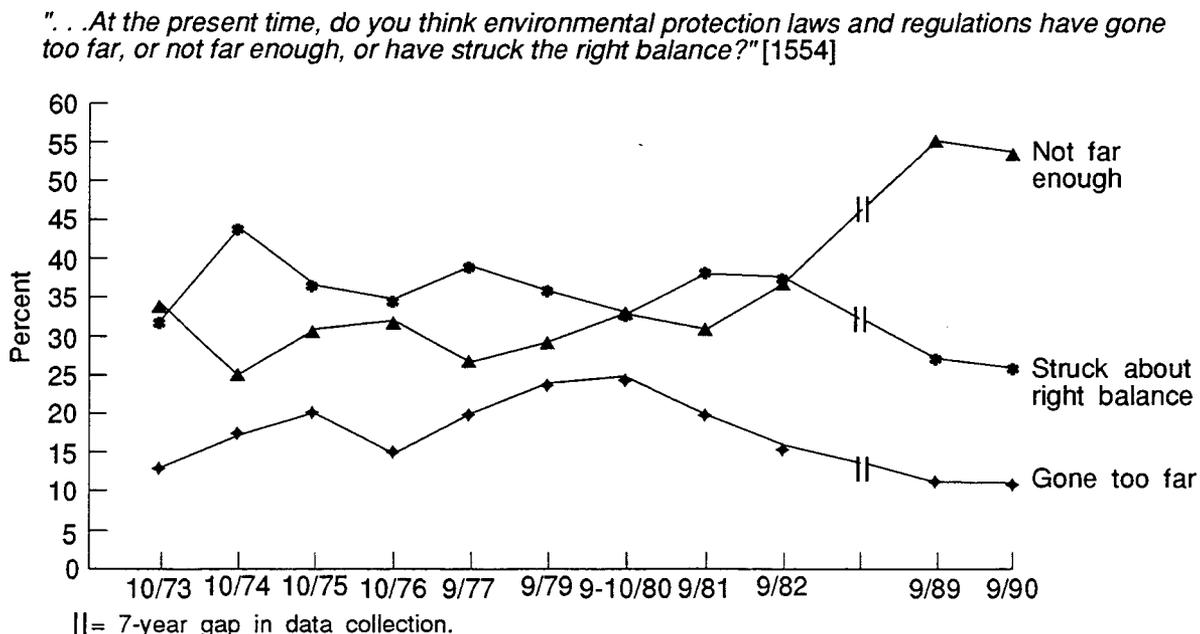
Increasing percentages state that they are willing to pay more for electricity if it is produced in a cleaner way that reduces air pollution ("green pricing"). Majorities are willing to pay amounts on the order of \$6 to \$25 more per month. When the suggested price increase reaches \$50 per month, majorities state they are unwilling to pay that much, but around 40% say that are willing to pay even that much more. Majorities are willing to pay for "stricter air quality regulations" or to "require electrical companies to cut back drastically on sulphur dioxide emissions." And most are also willing to pay more for "the things you buy" if business and industry increased its efforts to improve environmental quality.

Other trade-offs the public are willing to make to protect the environment include accepting a lower standard of living; almost two-thirds responded positively to this idea. Protecting wilderness areas from energy development is another accepted trade-off. Most believe that environmental cleanup will not harm, or will benefit, the economy.

**Environmentalism and activism.** Majorities report that they are sympathetic to the environmental movement; about 1 in 10 reports being active in an environmental group. And most of those polled believe that, while regulation is necessary, environmental protection means lifestyle changes and changes in household spending patterns.

Perceived health effects of environmental degradation are a motivating factor in the swing toward environmental awareness. To protect the environment, majorities report that they recycle, buy "green products," avoid products that they believe are harmful to the environment, and conserve their use of energy. The public strongly supports recycling efforts and policies; large majorities favor recycling programs and strict regulations on recycling cans, glass, and newspapers. This is evidenced by the increasing proportions of the public who have recycled and are recycling.

Government is seen as having the most responsibility for environmental protection in the United States; also, citizens' groups and business and industry are seen as having roles to play. However, only about 1 in 10 of those polled believes that the federal government is doing its job as well as it should in environmental protection and pollution cleanup. Two-thirds believe more regulation will be required (Figure 4).



Source: Constructed by the author using data from the Roper Organization [1554].

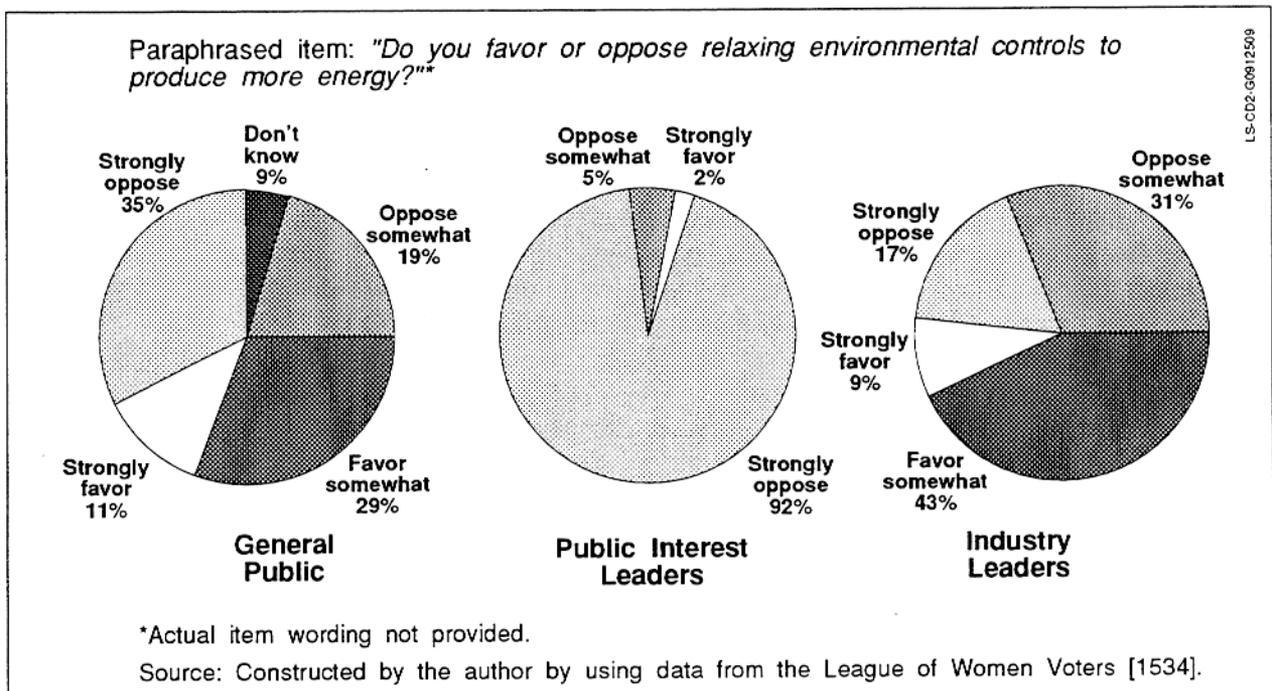
Figure 4. Trends in preferences for amount of environmental regulation, 1973-1990

Belief that technology will solve environmental problems has declined over the past 10 years. Indeed, approximately one-third believe future scientific research is more likely to cause than to solve environmental problems.

**Recycling.** Public opinion and action support recycling of an array of materials, including aluminum, glass, plastic, and oil, as an effective means of dealing with solid waste disposal problems. Majorities favor mandatory recycling of certain materials. Recycling generally prevents facility-siting problems (by reducing the need for landfills). Waste-to-energy facilities are also favored and could possibly enjoy even greater public acceptance if coupled with recycling programs. Facility-siting issues would need to be sensitively dealt with to realize the full potential of municipal solid waste (MSW) in dealing with both solid waste disposal and energy needs.

**Summary.** Despite the public's favorable attitudes toward environmental protection, it has reported relatively little direct action to protect and improve the environment. However, the public is beginning to connect energy use and environmental concern. The problem of energy and the environment is better defined; the public is still working out its thinking on how to approach the solution.

Many say that the United States has spent too little on environmental protection. Some evidence shows that, as late as 1988, public interest and energy industry leaders opposed each others' views on environmental controls to foster energy development. Public interest leaders opposed relaxing such controls; industry leaders were divided, but a majority favored relaxing controls. A majority of the public opposed relaxing environmental controls in favor of energy production (Figure 5).



**Figure 5. Comparison of general public and public interest and energy industry leader preferences on environmental trade-offs**

The polls asked about numerous policy actions that could be taken to protect and improve the environment. The types of actions that would receive the most public support are:

- Reforestation (a very popular option)
- Recycling programs and policies (these receive broad support)
- Power plant emissions controls and enforcement
- Reduced pollution from automobile emissions even if automobile costs rise
- New safety rules and emergency cleanup teams at oil facilities
- Development of new energy-efficiency measures and solar and wind energy resources
- No drilling in the Alaska National Wildlife Refuge
- Strict controls or limits on nuclear power
- A number of actions on the part of utility companies to protect and improve the environment.

Some environmental protection proposals are less popular. Creating more subcompact cars was not widely favored. Closing polluting factories resulting in job losses was not desired. Emissions trading was probably not well understood, and it was not particularly well liked.<sup>2</sup> Although a majority in one study favored a "special tax on carbon dioxide" (or a carbon tax), increased gasoline taxes have consistently been opposed. People might oppose paying a carbon tax if they understood that it meant higher gasoline costs; or they might be willing to pay the higher cost if they believed the extra money would be used directly for environmental protection. The U.S. public also opposes the idea of international law overriding U.S. domestic law in dealing with global environmental problems.

### The Persian Gulf War

Relations between the United States and some Middle Eastern countries became tense through problems with Libya, the Iran-U.S. hostage situation, and the Iran-Iraq war. When Iraq invaded Kuwait on August 2, 1990, the U.S. public feared a repeat of the oil shortages of 1973-1974. Many polls monitored public opinion about the Persian Gulf war.

**Prior to the war.** Before the war, extensive support existed for protecting an uninterrupted supply of oil to the United States and the world, even if military action was required. However, prior to the conflict starting, opinion was divided on the necessity of actually going to war.

After the Iraqi invasion, the primary reasons majorities saw for our troops' presence in the Middle East was to protect U.S. oil sources and to deter Iraqi aggression. Other reasons mentioned during this time were neutralizing Iraq's chemical and nuclear weapons capabilities, overthrowing Saddam Hussein (the Iraqi dictator), and protecting Israel. By and large, the public judged protecting oil supplies as a "good reason" for U.S. military involvement.

Before the war began, although the public feared another gasoline shortage, opinion was somewhat divided on how serious a threat to the nation's oil supply the situation in Kuwait actually was. Majorities expected, and saw, gasoline price increases, which it blamed on oil company greed. Most were also concerned or "upset" about environmental impacts from oil spills and refinery fires set by Iraq in Kuwait. During the war itself, primary justification for the military action shifted toward the moral principle of stopping Iraqi aggression; protecting oil supplies became secondary.

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<sup>2</sup>Under the Clean Air Act, a utility can emit an amount of pollutants, such as sulfur dioxide, as long as another utility has decreased its sulfur dioxide pollution by the same amount. These "rights to pollute" or allowances can be bought and sold on the open market.

**Avoiding the war.** When asked how the nation could have avoided going to war, the majority agreed that increased research and development (R&D) on energy sources other than oil and waging a campaign for energy efficiency and conservation "in autos, homes, offices, and factories" would have helped avoid the war. During the war, 60% attributed U.S. involvement in the war to "not having a conservation or alternative energy policy in the United States" [1502]. The war polarized those who favored and opposed drilling for oil in protected wilderness areas, even when environmental risks were considered. Many called for peacemaking efforts, but a majority agreed that the United States should not settle for a compromise that would give Iraq any concessions on disputed oil fields.

**After the war.** After the war, opinion was divided on whether the war made the world's access to Middle East oil more secure. Opinion was also divided on whether the nation should maintain a military presence in the Middle East. Most were aware that the nation's dependence on foreign oil resulted in a military conflict costly in both human lives and monetary resources. Whether the public factors this awareness into its thinking about domestic energy policies, and its energy-use behavior, remains to be seen.

### The Energy Situation

Most people in the late 1970s did not believe there was an energy "crisis," but instead perceived a serious national energy problem. Inflation, unemployment, and crime were the primary public concerns at that time. The nation's energy problem was considered of middling importance, although majorities foresaw future energy shortages and rising energy costs. In fact, many consumers believed the energy situation had been contrived by oil companies for their own benefit.

**Perceived severity.** Several surveys asked respondents to gauge the seriousness of the nation's energy situation, although there was a gap in the data between 1980 and 1986. The surprising feature of the data on this question is its consistency. Although the perception of seriousness declined somewhat between 1979 and 1991, it appears to have increased during 1990 and 1991, the period leading up to the Persian Gulf war (Figure 6). In 1991, Gallup reported that 84% judged the energy situation as "very" or "fairly serious." The energy "roller coaster" seems to have caused people to remain cautious in their assessment of the seriousness of the energy situation. This caution is in evidence despite low gasoline and oil prices, stable utility costs, and plentiful supplies. It may be related to the perception of difficulties that could ensue from heavy U.S. reliance on imported oil.

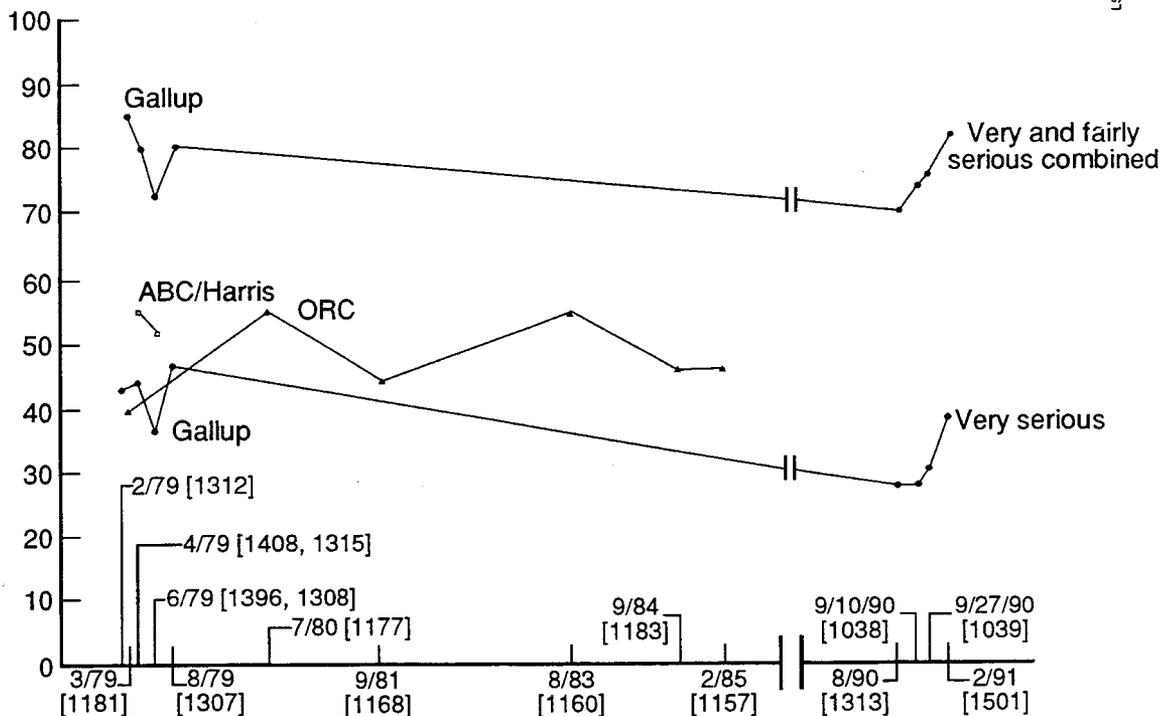
**Energy security.** How confident is the public about future energy security? The pattern that emerged from the data was that people were more confident about the adequacy of energy supplies in the relatively short term and less confident about energy security 20 to 50 years out (Figure 7). Confidence in near-term energy security has been increasing. While half of the respondents in 1979 thought that a severe energy shortage was "very likely" within a year, the number dropped from 79% to 51% between 1979 and 1989. The proportion increased 17 percentage points, however, between March 1989 and September 1990, probably because of activities in the Persian Gulf at the time.

Conviction that energy will continue to be a long-range problem appears to be increasing. When Research/Strategy/Management (RSM) asked: "Some people say the 'energy crisis' like the United States experienced in the 1970s—things like gasoline shortages, sharply higher prices, and oil supply disruptions—will not happen again. Other people say we will once again have periods of energy crisis, just as we did in the 1970s. Which view is closer to your own?" In 1981, 60% said it will happen again; in 1988 and in 1990, two-thirds said it will happen again. The likelihood that the public will perceive a serious future energy problem seems to increase as the time lengthens.

**Salience.** The public's ranking in importance of national problems has changed somewhat in the last decade. Currently emerging as the most significant problems are: (1) the state of the U.S. and local

Prototypical item wording: "How serious would you say the energy situation is in the United States — very serious, fairly serious, or not at all serious?"

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Source: Constructed by author using data from Gallup, Opinion Research Corporation, and ABC News/Harris.

Notes: —||— represents a significant break in time.

Study numbers are in brackets.

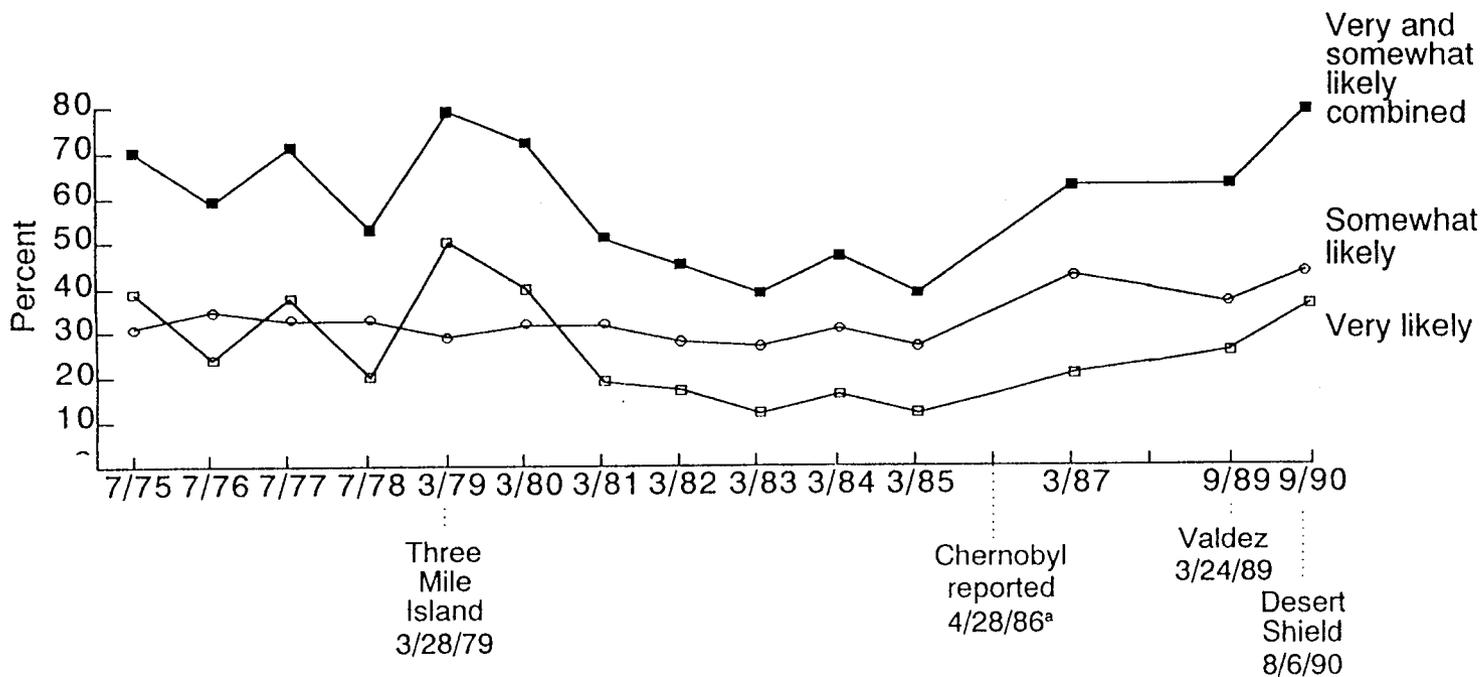
Gallup: "How serious would you say the energy situation is in the United States — very serious, fairly serious, or not at all serious?" [1312; 1315; 1308; 1307; 1313; 1038; 1039; 1501]

Opinion Research Company: "From what you have heard or read, how serious would you say the need is to save energy — would you say it was very serious, somewhat serious, or not serious at all?" [1157; 1160; 1168; 1177; 1181; 1183]

ABC News/Harris: "How serious do you think the basic energy problem is in the country today — very serious, only somewhat serious, or hardly serious at all?" [1396; 1408]

Figure 6. Trends in perceived severity of the U.S. energy situation, 1979-1991

*"A few years ago, there was an energy shortage in this country, with gasoline, oil, and electricity in short supply. What do you think the chances are that in the next year this country will have another severe energy shortage like the one a few years ago—very likely, somewhat likely, somewhat unlikely, or very unlikely?" [1554]*



Source: Constructed by author based on data from the Roper Organization.

<sup>a</sup>Accident occurred 4/26/86.

P67-G0886201

Figure 7. Trends in anticipated near-term energy shortages

economies (including the federal deficit, government spending, unemployment, poverty, and homelessness); (2) the state of education in the country, particularly at the primary and secondary levels; (3) crime, drugs, and their interrelationships; (4) health care and health care costs; and (5) the environment. Energy problems have declined in significance. However, since evidence shows that the environment is an increasingly prominent national concern, it would appear that most of the public has yet to fully link energy production and consumption with their environmental impacts. Energy choices seem to be increasingly environmentally driven.

### Energy Institutions

In general, energy institutions do not enjoy high levels of public trust. The seeds for this mistrust seem to have been planted during the mid- to late-1970s when the Arab oil embargo strained the adaptive capacity of the nation's oil production and delivery infrastructure. The legacy of that period seems to be an ongoing distrust. The oil industry is one of the least-favored industries in the United States. Nevertheless, a majority views the oil industry as essential to the nation.

**Attribution of responsibility.** During the late 1970s, the oil companies and the federal government were viewed as most responsible for the energy situation. The most recent data show that oil companies and Iraq were most blamed for energy difficulties; also blamed by some were Congress, any administration then in office, American consumers, utilities, and environmentalists.

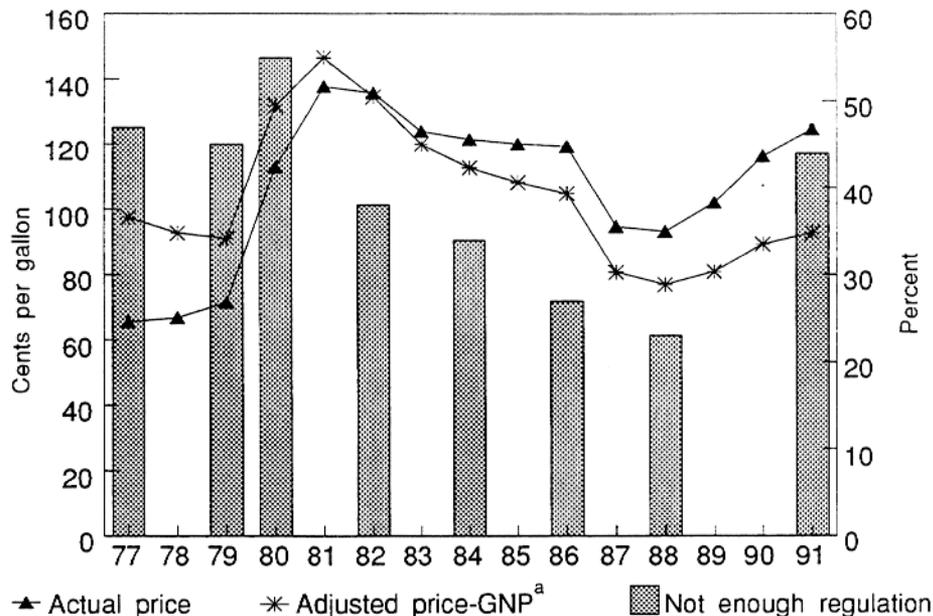
**The oil industry.** Securing adequate energy supplies is seen as the central responsibility of oil companies, almost regardless of the cost. While 8.5 out of 10 want oil companies to search for new oil, only 6 out of 10 believe oil companies are actually doing this. Two-thirds want oil companies to develop new products, but only about half think oil companies actually do so. Eight out of ten want oil companies to develop alternative fuels; only one in three thinks they are.

A major reason for the oil industry's lack of popularity is public perception of oil-company profiteering. Virtually everyone blamed the oil companies for unfairly taking excess profits during the 1990 Iraqi invasion of Kuwait and the ensuing crisis in the Middle East. However, the public incorrectly estimates oil company profits at 10 to 20 times their actual amounts, according to the most recent data available. Thus believing profits are too high, many think the oil industry is inadequately regulated. The proportions of those calling for more oil industry regulation appear to rise and fall with the price of gasoline (Figure 8).

Other reasons for the lack of confidence in the nation's oil companies are a perception that product quality needs to be improved, service is declining, innovation is lacking, and the industry is not interested in the well-being of its customers. A very small amount of evidence suggests that oil companies may also be viewed as "environmentally incorrect." Taken one by one, individual oil company reputations tend to fare better with the public than the industry as a whole.

**Government.** In 1981, opinion was divided about President Reagan's proposal to close down the U.S. Department of Energy (DOE); pluralities both favored and opposed the idea. In 1990, however, a majority of 55% held highly or moderately favorable opinions of DOE. The public tended to see Congress and the Bush Administration as more likely to help avoid than cause an energy crisis. The preferred governmental roles appeared to be deciding which energy resources are developed and encouraging private investment. Public preferences leaned toward private industry development of alternative fuels. Most seemed to want government to avoid crises and maintain stability, and to promote and encourage private industry rather than supplant or restrict it severely.

"Now I'm going to name some things, and for each one tell me whether you think there is too much government regulation of it now, or not enough government regulation now, or about the right amount of government regulation now?" "The price of oil and gas" (February of each year) [1557].



Source: Constructed by the author using data from the Roper Organization, the Energy Information Administration's *Monthly Energy Review, National Income and Product Accounts, 1927-1982* and *Survey of Current Business, 1983-1991*.

<sup>a</sup>Inflation-adjusted price (1982=1.00)

**Figure 8. Trends in public preferences on regulating oil and gas prices of gasoline, 1977-1991**

Few data were available about preferred roles and responsibilities of government and industry in several areas, such as energy R&D, provision of incentives, information programs, and the like. No systematic data addressing these policy preferences were located. However, governmental roles in regulating energy production and consumption are clearly viewed as important. Many appear to desire that the government ensure a pleasant sufficiency of supply at reasonable cost while avoiding draconian regulation to maintain it.

**Electric utilities.** Electric power is seen as critical, and the electric power industry is viewed as essential to the country. In the late 1970s, the public had a relatively low opinion of utilities. However, based on traditional norms of performance—reliability, service restoration, and customer service—utilities have recently received relatively high marks. In newer areas of performance, such as integrated resource planning (IRP)<sup>3</sup> and protecting and improving the environment, utilities have room for improvement in public opinion. Yet, approval of electric utilities seems to be increasing, and electricity is often seen as a good value for the price. The stabilization of electricity prices following the price shocks in the late

<sup>3</sup>Formerly termed "least-cost utility planning," IRP is a process in which utility regulators require utilities to include social and environmental costs of energy alternatives in their planning.

1970s and early 1980s could be a reason people seem to be feeling better about utilities. Consumers may not understand that 67% of the electricity generated at the source is lost in conversion, transmission and distribution; only 33% reaches the site where it is used.

As is the case with oil companies, much of the public tends to overestimate utility profits considerably, by more than three to one. They thus tend to favor utility regulation. Future utility roles will emphasize environmental protection and respectful service to customers and the community if public preferences are influential.

**Automakers.** Automobile companies seem to enjoy a somewhat more favorable public image than the other energy institutions; however, they are less central energy players, as well. Favorability toward them has increased considerably in the last decade. Majorities give domestic automakers good marks for creating innovative products and for the value and quality of the products and services they provide. Thus, most believe no more regulation is desirable; one in three believes more regulation of car manufacturers is needed. Several polls show widespread support for increasing automobile fuel efficiency and some support for increasing corporate average fuel economy (CAFE) standards.

**Summary.** Although survey items elicited the public's sense of blame and outrage over the way energy problems were being handled, these items clearly touched a raw nerve. Much of the public seemed to feel betrayed by these institutions. This loss of trust in U.S. institutions is not limited to the energy arena; it seems to have permeated U.S. society during the late 1970s and 1980s. If the causes of the energy problem are perceived to be institutional, then individuals may believe they can do little to change things.

### Energy Alternatives

Energy supply preferences appear to be increasingly environmentally driven. Although U.S. citizens are concerned about the adequacy of energy supplies, they favor a national energy policy that emphasizes energy efficiency and demand reduction over energy production (Figure 9). The public does not appear to be hesitant about mandating certain types of buildings and transportation conservation options.

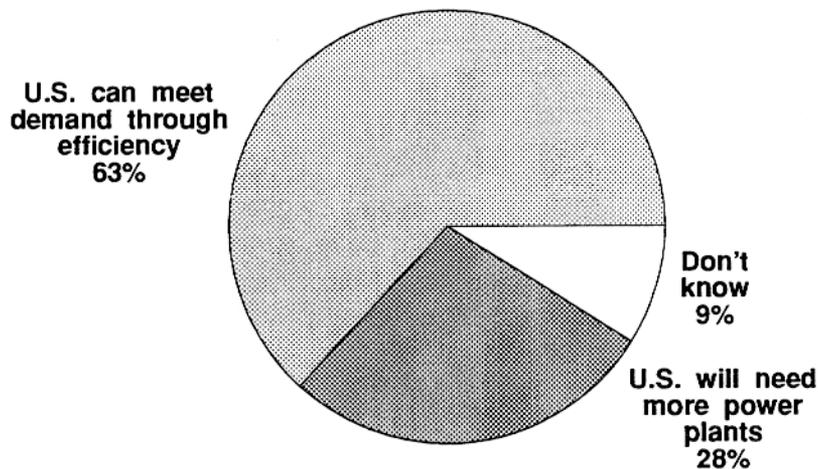
The surveys used in this analysis offer considerable evidence that, when cost or price information is not included, renewable energy and energy efficiency have been the public's preferred energy alternatives since 1977. The data on preferences toward fossil fuels and nuclear energy from some items remain ambiguous. While no survey has found that the public prefers nuclear energy, coal, or oil over energy efficiency, renewable energy, and natural gas, sizable pluralities preferred nuclear energy and coal when survey questions offered them no other options. The data appear to show, however, a decrease in public preference for fossil fuels (except for natural gas) and nuclear energy, except for the 1989 data shown in Figure 10. This is consistent with increasing environmental concern (greenhouse effect, oil spills, nuclear accidents) and the perception that U.S. participation in the Persian Gulf war was directly related to our reliance on imported oil.

A 1989 survey asked respondents: "In order to reduce carbon dioxide emissions and provide for the country's overall need for energy in the future, which do you think should be employed most—finding ways to produce more traditional energy sources like coal, gas and oil . . . or . . . finding ways to use energy more efficiently and to use renewable energy sources like solar and wind power?" Eighty-three percent selected energy efficiency and renewable energy; 12% selected greater production of fossil fuels [1072].

In 1987, when poll takers asked respondents which energy source they would like to see developed to "replace foreign oil five years from now," 54% selected solar energy, 30% selected hydropower, 22% selected wind, and 16% energy from ocean tides—all of which are renewable energy technologies. Energy

"Some people say that more power plants must be built in the next several years to meet increased demand for electricity or we will have power shortages in many areas. Other people say that we can meet increased demand by using the electricity from existing power plants more efficiently. Which point of view is closer to your own?" (March 1992) [1561]

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Source: © 1992. Used with permission of Frederick/Schneiders, Inc.

**Figure 9. Preferences for efficiency or more power plants**

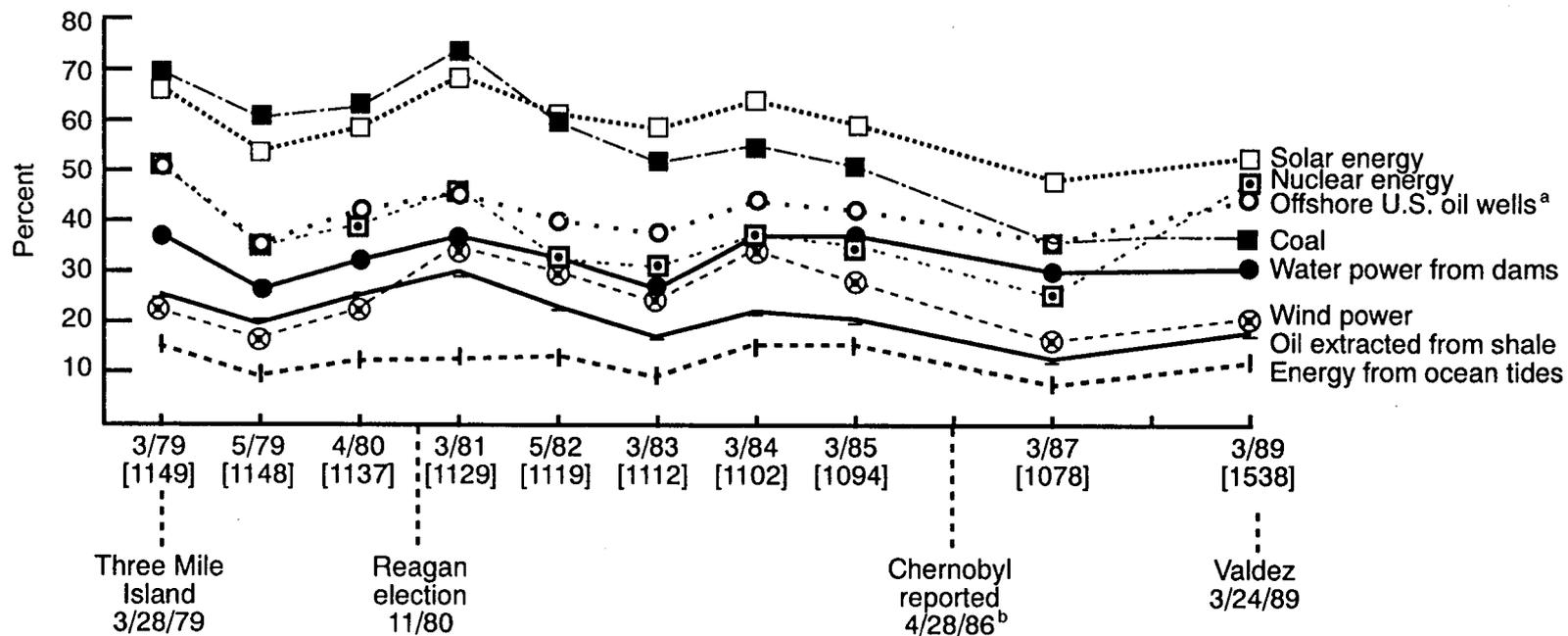
efficiency was not included in the response options. However, other recent surveys showed that most of the public selected renewables and energy conservation as the preferred areas for R&D funding. By comparison, about one-quarter selected nuclear energy and another quarter selected fossil fuels.

The persistent trend in public preferences for renewable energy supply and energy efficiency over the past 15 years should be interpreted in light of actual adoption of energy efficiency and renewable energy features in buildings and transportation. Adoption of conservation and renewables in residential buildings may have slowed, but this is not due to changes in public preferences for these energy options relative to other options.

### **Utility Electrical Energy**

Public perceptions of energy cannot be fully understood without including the traditional coal and nuclear alternatives, which together are used to produce 75% of U.S. electricity. Evidence shows that both coal and nuclear energy are perceived as offering an alternative to dependence on foreign oil, although, in fact, these fuels are used for different purposes. Only 4% of electricity is generated from oil. Electricity has a reputation for being a clean fuel at the point of end use. But in viewing electricity as "clean," many may not link electricity generation with its environmental impact. A majority of those directly polled on this question, however, indicated concern for environmental impacts caused by electricity production. Large majorities said that they would be willing to pay more than \$6 per month more for electricity that comes from sources less harmful to the environment than existing ones.

"Which of these energy sources do you think are realistically possible to use for replacing foreign oil during the next five years?"



Source: Constructed by author based on data from the Roper Organization.

Note: Study numbers are in brackets below survey date.

<sup>a</sup>1989 data collected in 1989 prior to the Valdez oil spill.

<sup>b</sup>Actual accident occurred 4/26/86.

P56-G0870501FH

Figure 10. Preferred energy alternatives, 1979-1989

**Coal.** Both coal use and nuclear power have lost favor during the last decade because of the public's environmental concerns. Even though automobile exhaust has been blamed for acid rain more frequently than coal burning, the public still regards burning coal as environmentally damaging. The public may more readily see coal burning as contributing to air pollution and global warming. While poll items have incorrectly indicated or implied that coal and oil could be traded off, a majority appear to prefer burning more coal to increasing the nation's dependence on imported oil. Few know about clean coal technologies (CCTs), and little evidence exists that CCTs would make coal seem environmentally acceptable. But most of those polled favor CCT development, and many erroneously believe that such technologies would significantly reduce U.S. dependence on oil imports.

**Nuclear energy.** No new nuclear power plants have been ordered or built in the United States in several years. Prior to the Chernobyl accident, the public seemed slightly more hopeful that the problems associated with nuclear energy could be ironed out than it has been since the accident. The evidence of significant discomfort, on the public's part, about the risk of nuclear power is extensive and compelling. The perceived problems are releases of radioactivity into the environment near nuclear power facilities and radioactive leaks at waste storage facilities. Most of the data show either a dramatic increase in the perceived risk of nuclear energy or a dramatic decrease in nuclear's favor over the past decade. This is despite scientific concern about the greenhouse effect and global warming; some scientists are calling for more nuclear- rather than coal-generated electricity.

The apparent lack of credible sources of information on nuclear energy is striking. The public appears not to believe anti-nuclear activists, the nuclear industry, or the government. However, the media were widely perceived as covering the Chernobyl accident well. Based on a lack of credible information, the situation appears to be that "the jury is still out" on nuclear energy.

With the specter of global climate change, however, more evidence will be needed before we can conclude that the public will continue to oppose nuclear energy. Insufficient evidence exists that indicates the public connects burning fossil fuels for electricity, automobiles, and home heat on the one hand, with global climate change on the other. Once this relationship is widely accepted, public opinion about nuclear energy and its perceived risks may be more accurately assessed, and the future acceptability of nuclear energy better estimated.

**Policy preferences.** Although few data were available, majorities appear to favor the following policies relative to utilities: IRP, demand-side management (DSM) programs, use of renewables to generate electricity, utility profit incentives for using and promoting efficiency and renewables, pollution controls, green pricing, and other activities to protect and improve the environment.

### **Buildings Energy**

The potential is remarkable for reducing consumption of utility-supplied energy in U.S. residential and commercial buildings by using already available cost-effective technologies. One recent study estimated buildings energy consumption could be reduced by up to one-third by 2015, when compared with "business-as-usual" projections. Many other estimates exist; they vary from 25% for existing residential buildings to 50% for new buildings, using different assumptions.

No solid trends were established from data using verbatim items replicated over time on conservation behavior. This suggests that the polling organizations and poll sponsors decided that public opinion on energy efficiency and the use of renewables was not of enough importance to continue to collect data consistently. The data that are available are based on a variety of questions asked of national, state, and local samples selected in a variety of ways. Any trend established from this data is thus approximate, at best.

**Decision factors.** Reasons to engage in energy efficiency practices and to invest in efficiency and renewables have not been systematically studied at the national level for several years. Local market-area studies might be fruitful avenues for further research. However, for national policy purposes, more information is needed concerning the factors that motivate consumers. The smattering of poll data available suggests the public's perception of conservation in buildings is one of relative unimportance. For example, a 1990 national poll found that the majority said investment in efficiency and better energy use habits would save less than 10% of their utility bills.

Barriers to efficiency and renewables use, on the other hand, are significant. A 1989 poll found that sizeable percentages said "business and industry priorities" (38%) and "decisions made by government" (29%) were "the biggest obstacle to the country using energy more efficiently." Other major barriers were the upfront cost of energy improvements and the "hassle factor" in implementing energy improvements. Responses to these and other polls seem to indicate that individuals find it costly and time consuming to overcome institutional obstacles to efficient household energy use.

**Voluntary residential conservation.** The amount of conservation behavior being practiced, as estimated through self-report—either through lifestyle changes or through investments in retrofits—appeared to increase in the late 1970s to the mid-1980s but to decrease since then. Earlier NREL reviews reported that most people said they were practicing some form of residential energy conservation. The practices mentioned most frequently were those that are more convenient and less costly, such as turning down the thermostat and turning off lights and appliances when not in use.

Taken together, data from national and state samples seem to indicate a pattern in which somewhat larger (though still low) proportions of the public during the early to mid-1980s, compared with the 1970s, invested in somewhat more costly items that would reduce a homes' use of utility-supplied energy. These items ranged from attic insulation to energy-efficient appliances, and even solar energy systems. Mentioned most frequently were the relatively less expensive measures—caulking, weatherstripping, water heater wrapping, window screening devices, and clock thermostats.

In 1990, however, self-reported conservation actions and investments were minimal. Gallup asked a national sample: "Do you happen to be doing anything to reduce your use of energy—that is, your use of gasoline, electricity, or natural gas?" Although almost two-thirds reported doing something, more than one-third reported that they were not doing anything at all. Actions being taken were the easiest to do (turning off lights and turning down the thermostat), just as in the seventies. Another survey by NBC News/*The Wall Street Journal* found that, when asked whether they took steps to reduce the use of electricity and gas in their homes, 68% said "regularly" and 22% said "occasionally." Only 5% said "never." In March 1990, Gordon S. Black/*USA Today* asked: "How much does your household cut back on heat in the winter or air conditioning in the summer to conserve energy?" More than half (52%) said they cut back "somewhat"; 30% said "a great deal"; 5% said "not at all." Clearly, the urgency to engage in conservation has decreased markedly, at least as measured by the poll data on residential conservation behavior.

Some of this decline could be attributed to the fact that many households had already undertaken energy efficiency measures. These people would not repeatedly report that they had installed insulation, for example, in response to survey questions assessing conservation behavior. Some evidence for this can be found in the data on household energy consumption. Since 1980, per household site energy consumption<sup>4</sup> has been reduced by 16.7%; at the same time, the number of households grew by 13.5% (Morrison 1992).

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<sup>4</sup>Site energy equals 3412 Btu of direct heat produced from 1 kWh of electricity. Site energy includes only energy consumed at the site, ignoring the energy required to produce and transmit electricity.

Total U.S. household energy use at the site was 10.9 quads in 1979 and 10.2 quads in 1990, a 6.4% reduction, despite the increase in number of households (Morrison 1992). Another analysis found that energy use per household at the site dropped from 1970 to 1985 but increased slightly from 1985 to 1989 (U.S. Congress 1992, p. 18).

When residential energy use is examined from a source energy<sup>5</sup> standpoint, however, it has increased. Source energy use in residential buildings was reported at 16.8 quads in 1989 and cost \$104 billion (U.S. Congress 1992). Space heating accounted for almost half of energy use, followed by water heating, refrigerators and freezers, space cooling, and lights. Source energy use has increased at an average annual rate of 1.2% for the last 20 years; however, the increase in use accelerated to a rate of 2.1% from 1985 to 1989. This increase is attributed to a growing population, shrinking household size, and increasing demand for electricity for air conditioning and other energy-intensive services (U.S. Congress 1992, p. 15).

Some evidence suggests that the public may be willing to increase conservation activity once again should energy shortages occur. In September 1990, NBC News/*The Wall Street Journal* asked a national sample: "Let me read you a list of ways people conserve energy. For each one, please tell me if you are likely or unlikely to try to conserve in this way if there is an energy shortage." Three-quarters of the sample said they were likely to use less heating fuel and air conditioning, while 62% said they would use appliances less.

**Information sources.** State and local governments and utility companies appear to be the most used information sources about energy efficiency and renewables. Written sources (newspapers and pamphlets) are the most popular information media.

**Institutionalized inefficiency.** The voluntary practice of energy efficiency and investment in energy-conserving features and solar energy systems seems to have declined, or it may have shifted subtly in ways the polls are not capturing. The phaseout of the energy conservation and solar energy tax credits could have contributed to less conservation, as could have relatively low energy prices. However, these factors appear to be only part of the story. The other part appears to be public perception of and response to "institutionalized inefficiency."

Energy conservation and efficiency may have become a part of how U.S. households function. Current building practice has been producing homes that are more efficient than their older counterparts. Consumers are remodeling and improving existing homes and purchasing efficient appliances to replace older ones. What the polls do not recognize in their questioning is that if consumers reduce their outlay for residential energy costs, they could displace energy consumption elsewhere, to activities outside the home. Eating out, travel, and long commutes might reduce residential energy consumption, yet increase overall energy use.

Voluntary residential energy conservation practice and investment seem to have declined in the past few years, despite the persistence of concern about the energy situation and public preferences for energy efficiency and renewables. The public is supportive. Institutionalized inefficiency may be the most significant obstacle to more cost-effective adoption of efficiency and renewable energy measures. The public may insist that energy efficiency and using renewable energy be made routine, making it easier and cheaper for consumers to use them.

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<sup>5</sup>Source energy, or primary energy, equals 10240 Btu of heat from 1 kWh of electricity. Source energy accounts for energy required to produce and transmit electricity.

## Transportation Energy

As global lifestyles evolve, the demand for transportation fuels increases. Perception of and knowledge about oil is of concern to policymakers, as is information on the public's view of conservation, alternative fuels, and alternative fuel vehicles. Most transportation fuel is currently supplied by gasoline formulated from oil.

**Oil.** About one-half of the U.S. public seems aware that the United States imports some of the oil it uses. However, only about one in four can accurately estimate the proportion of U.S. domestic petroleum demand that is imported. Most do not realize that U.S. dependence on foreign oil is increasing. And overall, the public is not highly knowledgeable about oil imports.

Public enthusiasm for offshore drilling has declined, despite the perception that the United States needs to reduce its dependence on foreign oil. In fact, offshore oil drilling poses an excruciating trade-off: national security versus the environment—both deeply felt values. This trade-off seems to lead to polarization in public opinion. Large percentages both favor and oppose offshore drilling for oil. However, the majority opposes new oil drilling in the Alaska National Wildlife Refuge (ANWR).

Most people who heard about the offshore oil spill at Valdez, Alaska, on March 24, 1989, developed a negative attitude toward Exxon immediately thereafter. A public boycott of Exxon products developed by May 1989, and a majority felt that Exxon had not done enough to help clean up the spill. Public attitudes toward Exxon were still negative 2 years after the spill. This is consistent with the public's negative attitude toward oil companies in general and with its increased environmental concern.

**Voluntary transportation conservation.** Few data are available on public participation in transportation conservation behavior. Most said they have *not* been driving less, car pooling, using mass transit, bicycling, or walking to get from one place to another. No data existed on self-reported observance of lower speed limits. Buying a fuel-efficient car was reported as the most popular form of conserving gasoline. Data on car purchases and purchase intentions show that 14% fewer drivers bought full-size automobiles during the past decade. And, a sizable proportion of full-size car owners planned to buy smaller cars next. Motivations to conserve cited by members of the public seem less important than barriers. Perceived barriers to gasoline conservation—inconvenience, time costs, lack of knowledge of potential car pool partners—seemed to outweigh the advantages. For commuters, saving on the costs of parking and gasoline, especially for those traveling more than 10 miles to work, seem to be the most important reason to conserve. One could speculate that fuel-efficient behavior could also be an expression of environmental values.

The public's perception of institutionalized inefficiency marks the transportation sector as well. The transportation infrastructure was built based on the widespread availability of inexpensive gasoline and mass-produced automobiles. The national economy relies heavily on the automotive and oil industries. Most of the nation's transportation and freight hauling systems are dependent on the combustion of fossil fuels. The perseverance of this deeply entrenched system constrains individual choices in considering and using transportation alternatives. Public opinion on transportation conservation seems to reflect these realities. Change could take considerable time and be costly to achieve.

**Alternative fuels and alternative fuel vehicles.** A few national data were located on alternative fuels; those that exist suggest that most people are unfamiliar with methanol, ethanol, or other alternative fuels and additives. Only 12% of new car buyers in 1990 said they were familiar with alternative fuels. Most people in one survey said they were willing to pay 2 cents per gallon more for gasoline that produces less air pollution. Another survey found opinion divided when people were asked whether they were willing to pay 20 cents more per gallon for "cleaner-burning alternative fuel"; 48% favored the idea and 50%

opposed it. Other data showed that 43% of new car buyers in 1990 said they would be willing to pay 10% to 50% or more for fuel "that significantly reduces air pollution."

Factors identified as affecting fuel purchases suggest that gasoline remains the standard against which alternative fuels are competing in gaining consumer acceptance. When asked which form of alternative fuel they would use, a plurality of 42% said they didn't know; 17% said "solar power," 16% gas blends, 10% electricity, 7% methanol, 5% methane, and 3% said they would not use alternative fuels. Results from attribute analysis suggested that buyers of higher octane gasolines could be a market for methanol that could be targeted as a higher octane, cleaner burning, and more powerful fuel than gasoline. The target market could be as large as 10% of gasoline buyers.

The evidence also suggests that fuel operating cost is not a critical decision factor in car purchase decisions. Factors such as aesthetics, quality, image, and reliability appear to be more significant (Figure 11). Some data show that safety and performance are also important considerations. The significance of the decision factors varies by the type of car purchaser—the mass-market, sporty, family, economy-minded, or basic transportation buyers. In 1990, 56% said they would probably buy an alternative-fuel vehicle "if all the bugs were worked out."

Factors identified in local-area studies that affect alternative fuel vehicle choices were vehicle range between refueling, fuel availability, dedicated versus multiple-fuel capability, purchase price, fuel operating cost, and perceived level of emissions reduction. Range between refueling is especially important to those who refuel more frequently than once a week.

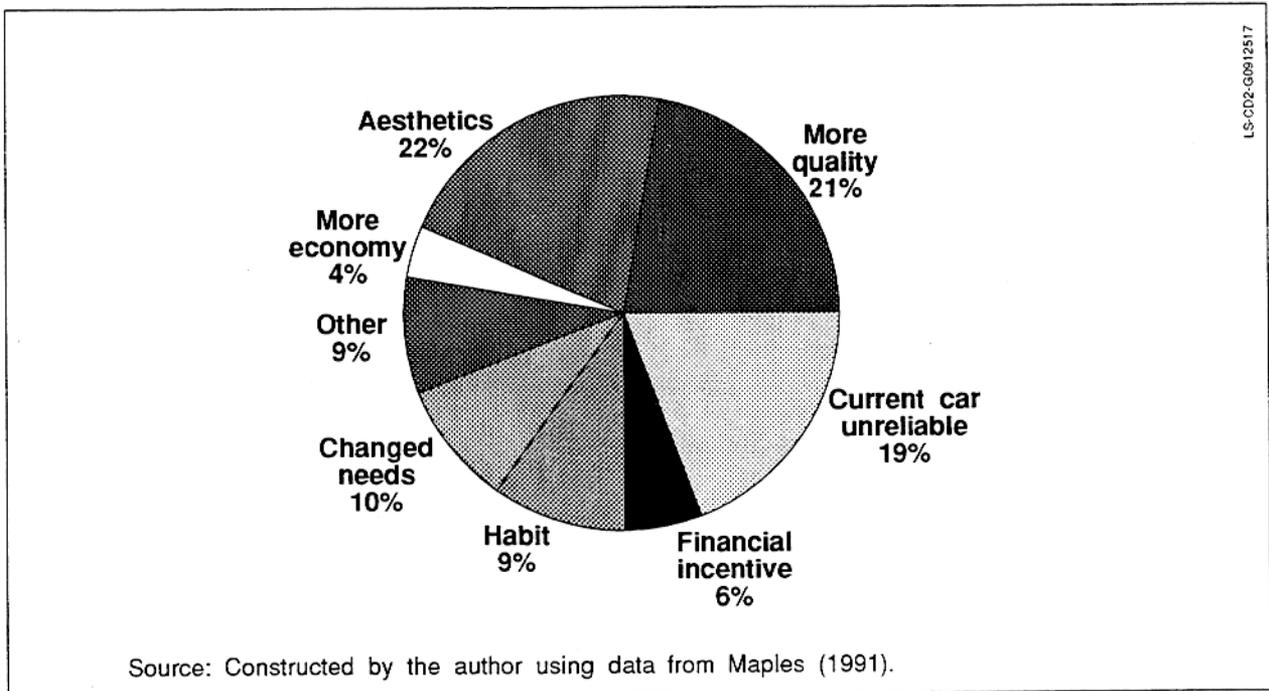


Figure 11. Reasons for buying a new car

More data on decisions and behavior with respect to alternative fuels and alternative fuel vehicles no doubt exist in local-area studies. At the national level, however, few data are currently available.

### Transportation Policy Preferences

The public's perceptions of other transportation policy issues are organized into four policy categories: (1) oil and gasoline, (2) conservation, (3) mass transit, and (4) alternative fuels and alternative fuel vehicles.

#### **Oil and gasoline policy**

***Gasoline tax increases.*** More data exist on this policy than on most others. The public has consistently opposed gasoline tax increases. Regardless of item wording, majorities oppose such tax increases. The public tends to overestimate the amount of federal, state, and local gasoline taxes, actually 26 cents per gallon, by approximately 9 cents per gallon. The federal gasoline tax is 14.1 cents per gallon. A majority believe the taxes are "too high." When compared with other means of reducing the federal deficit, gasoline taxes were virtually the least popular action that could be taken. Despite the fact that energy efficiency advocates support gasoline tax increases to increase gasoline prices to a level at which conservation would occur, this policy cuts deeply against the grain. Other policies to reduce gasoline consumption would enjoy more widespread public acceptance than this one. Much of the public apparently does not believe that increasing gasoline taxes would result in reduced gasoline demand in any event.

The only exception to this pattern occurred when items asked about increased gasoline taxes to protect and improve the environment. When framed this way, increased gasoline taxes were more widely accepted. The use of revenues generated in this way to actually improve the environment may be critical to actual public acceptance of such taxes.

***Oil and gasoline price controls.*** By 1990, almost two-thirds favored price controls on gasoline and home heating oil. Attitudes about price control policies appear to be influenced by gasoline prices. The higher the price of gasoline, the greater the proportion of the public calling for regulation of gasoline prices.

***Oil import taxes and incentives for domestic production.*** Opinion seems divided on the desirability of taxing imported oil. Many tend to favor such taxation when the question is couched in terms of reducing the federal deficit or increasing international competitiveness. However, when presented in terms of raising the cost of gasoline, many tend to oppose the idea. An import tax on gasoline could reduce the federal deficit and increase international competitiveness, but it is not a widely accepted option.

***Windfall profits tax.*** Excess taxes on profits were favored in the late 1970s and were still favored in 1992 by approximately two-thirds of the public. However, currently this sentiment seems less intense than in the late 1970s.

***Severance taxes.*** No data on severance taxes were found past 1984; polling organizations have apparently not included such questions in recent years. Prior to that time, nearly two-thirds of those polled favored individual states imposing severance taxes on natural resources such as oil, gas, and coal.

***Regulation of oil production.*** Most oppose an outright federal government takeover of the oil industry. However, in 1990, a majority favored the breakup of large oil companies to limit the influence the oil industry has on the domestic economy. Formation of a government-owned-and-operated oil corporation was also favored by a majority, although the data on this were somewhat limited. In general, the public seems unwilling to accept more stringent regulation of the oil industry.

**Strategic Petroleum Reserve (SPR).** The limited data available suggest that the public favors the maintenance of the SPR.

### Conservation policy

**Fuel economy/corporate average fuel economy (CAFE) standards.** The public strongly favors increasing automobile fuel efficiency, borne out by several polls. The limited evidence available on the point shows that the public favors increasing CAFE standards.

**Financial incentives for purchasing fuel-efficient vehicles.** A few of the survey items addressed the use of financial incentives to encourage transportation efficiency; these received favorable responses. Use of financial incentives for purchasing more fuel-efficient vehicles (and disincentives for "gas guzzlers") is an acceptable method for steering purchasers toward more efficient vehicles to reduce fuel consumption. The few data available suggest that public opinion has shifted toward favoring tax penalties on larger, less efficient automobiles. Opinion was divided on the desirability of offering tax incentives to oil companies to encourage domestic exploration and production. Although energy industry leaders favored this option, public interest agency leaders did not support the idea.

**Ridesharing/car pooling.** In 1989, most people were unwilling to see regulations that would require car pooling to and from work, although one-third were willing. Encouraging car or van pooling appears to be acceptable; however, the data are very limited.

**Gasoline rationing.** Only two items in all of the surveys studied asked about gasoline rationing; the majority continued to oppose the concept.

**Limited access to gas stations.** The evidence shows a pattern of public disinterest in or opposition to this idea.

**No-drive days.** In 1989, most were unwilling to see regulations that would require limited driving days. The majority did not want more restrictions on when and where automobiles are used. More recently, polling organizations have not asked about this option, however, and almost no data on it exist.

**55-mph speed limit.** Almost no data on the 55-mph speed limit were located after 1980. However, in 1989, most people said that the good effects of the speed limit outweighed the bad effects. The available evidence is very limited; however, it appears to show declining support for the 55-mph speed limit as public policy and less willingness to observe it currently than in the late seventies.

### Mass transit

The majority seems to feel that enough is being spent on mass transit, although, in a 1991 survey, a plurality did favor privatization. In another study, a majority favored requiring people who drive to work in major metropolitan areas to take public transport one day a week. Favorability to mass transit has continued; however, no strong mandate for it has emerged.

### Alternative fuels and alternative fuel vehicle policy

**Alternative fuels policy.** Few data were available on this topic. Most people appeared to know little about alternative fuels. Virtually everyone in a December 1990 survey favored providing "financial incentives to use or develop alternative fuels such as fuels produced from grains." No conclusions are possible on alternative fuels policy; this is a research gap.

**Alternative fuel vehicle policy.** From 42% to 56% of recent samples said that most cars should be required to use alternative fuels; opinion seems to be divided on such a mandate. Of a 1990 sample of new car buyers, a plurality of 48% said the government should require automakers to build cars that run on alternative fuels. Almost no other reliable data were available. In 1989, 76% approved of requiring automakers to build low-polluting methanol-powered cars and sell them "in urban areas with the greatest air pollution," even if that meant higher car prices. Also, 80% wanted oil companies to develop alternative fuels, although only one-third thought they were actually doing so. Alternative fuel vehicle policy preferences are another research gap.

## **Conclusions**

The Executive Summary has presented conclusions about the study's empirical findings. A second type of conclusion attempts to go beyond findings to interpret them, answering the question, "What does it all mean?" The conclusions discussed here offer a broad interpretation of the data and draw inferences from them. They touch on four areas: (1) environmental concerns, (2) institutionalizing efficiency and the use of renewables, (3) information and education, and (4) public trust and confidence. These areas need emphasis in the development of intelligent public policy.

Environmental concerns are beginning to drive energy choices. Problems such as global warming, stratospheric ozone depletion, acid rain, municipal solid waste, and air pollution in cities are primarily functions of energy production and consumption. As concern about the environment increases—itsself driven by health and safety considerations—energy decisions are bound to be affected. The public has exhibited strong and consistent preferences for energy efficiency, energy conservation, and renewable energy for the past 15 years. These alternatives are widely perceived to be environmentally advantageous, particularly when compared with traditional energy sources, such as coal and nuclear power.

Conservation behavior may have slowed during the 1980s, yet most people believe that the energy situation remains serious. Why, then, are people not engaging in more lifestyle changes and investment in efficiency that would reduce energy use? One possible explanation is that the public wants U.S. energy institutions to change the way they do business when it comes to energy and the environment. If public opinion is followed, efficiency and renewables use will become "institutionalized"—a routine way of doing business. The burden of the change should fall on institutional, not just on family and individual, shoulders.

For example, can the public trust that efficiency has been institutionalized in building practice and that its cost has been institutionalized in mortgage finance? Or do home buyers have to take it upon themselves to retrofit the house, after purchase, with additional insulation, energy-efficient windows, and the latest high-efficiency lighting, appliances, and heating, ventilating, and air conditioning systems?

The results show a deep-seated need for public education about energy and the environment. Such education should begin in the elementary schools and extend through secondary education because lifestyle habits are engrained early. This education should also be central to college and university programs, thus establishing an ecological imperative in future leaders and decision makers. Continuing education and training for adults is also needed. In addition, information and education are needed for an informed electorate that supports intelligent public policy. Basic energy facts need to be provided frequently and broadly; the media have a critical role and responsibility in this regard.

Another major key is credibility. Public trust and confidence in energy institutions is not high. Business as usual is completely outmoded—institutional support systems must be initiated that keep pace with the public desire for change.

People appear to be willing to shoulder the costs of institutional change, *if they believe that the funds will actually be used to improve efficiency, employ renewables, increase sustainability, and protect and improve the environment.* This will occur when institutional credibility is increased and credible leadership is established. Credibility building is crucial both for the public to believe factual information provided and for it to support effective policies.

To the degree that U.S. institutions are straightforward, share decision authority, and trust the public, they themselves will be trusted. The people are saying they care. They are looking for leadership, intelligent policies, and fairness on the part of U.S. public and private institutions.

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