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Understanding Public Perspectives on Nuclear Energy

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DISCLAIMER

UNDERSTANDING PUBLIC PERSPECTIVES ON NUCLEAR ENERGY

Introduction

The purpose of this paper is to examine the levels of and underlying bases for public support, opposition, and ambivalence toward continued nuclear power development. First, we will present data on the public's general evaluations of nuclear power by indicating the extent of support and opposition, by discussing the interpretation of undecided responses, and by examining changes in public opinion over time. In addition, we will identify differences in general attitudes toward nuclear energy related to demographic characteristics, including sex, age, education, income, and geographic region.

Second, we will discuss bases for explaining public support of and opposition to nuclear power by identifying consistent patterns of attitudes among pronuclear individuals and among antinuclear individuals in the general public. We investigate the ways in which perceptions both of the specific characteristics of nuclear power and of broad energy orientations influence general evaluations of nuclear energy.

The data presented are based on a comprehensive review and synthesis of over 100 surveys, including 27 national probability samples, dealing with public attitudes toward nuclear power and related energy issues (1).

General Public Evaluations of Nuclear Power

Levels of Support, Opposition, and Ambivalence toward Nuclear Power

The survey data clearly indicate that through 1976 a majority of the public favored the use of nuclear energy. In the national probability studies that were conducted primarily during 1975 and 1976, approximately 60% of the public supported nuclear energy, with support levels ranging from 45% to 80%; approximately 23% of the public opposed nuclear power, with opposition levels ranging from 6% to 35%; and approximately 17% of the respondents were undecided, with undecided levels ranging from 11% to 32%. In all of the 55 studies which asked for a respondent's general evaluation of nuclear power, support for nuclear power exceeded opposition.

Since a sizable minority of those polled in the national surveys did not know whether they favored or opposed nuclear power, we further analyzed this group of respondents. On the average, these respondents had lower educational attainment and income when compared to pronuclear and antinuclear respondents. Also, women were more likely than men to be undecided about nuclear power.

Our statistical analysis of responses in two major nuclear surveys of 1975 and 1976 conducted by Louis Harris and Associates, Inc. (2,3) further indicated that undecided respondents represented a middle or neutral position on the nuclear power question. These respondents took positions on specific nuclear power issues and on general energy issues that were in between the positions taken by pronuclear and antinuclear respondents. Response patterns of these respondents did not resemble response patterns of pronuclear respondents any more closely than they

resembled response patterns of antinuclear respondents. Thus, we found no reason to believe that the undecided group was either latently pro-nuclear or antinuclear.

Changes in General Evaluations of Nuclear Power over Time

A major question regarding the public assessment of nuclear energy is whether support or opposition has changed in recent years. In summary, although fluctuations in support and opposition were common, the comparison of data collected at different times by survey organizations does not indicate any clear trend over time in changes either in support or opposition to nuclear power.

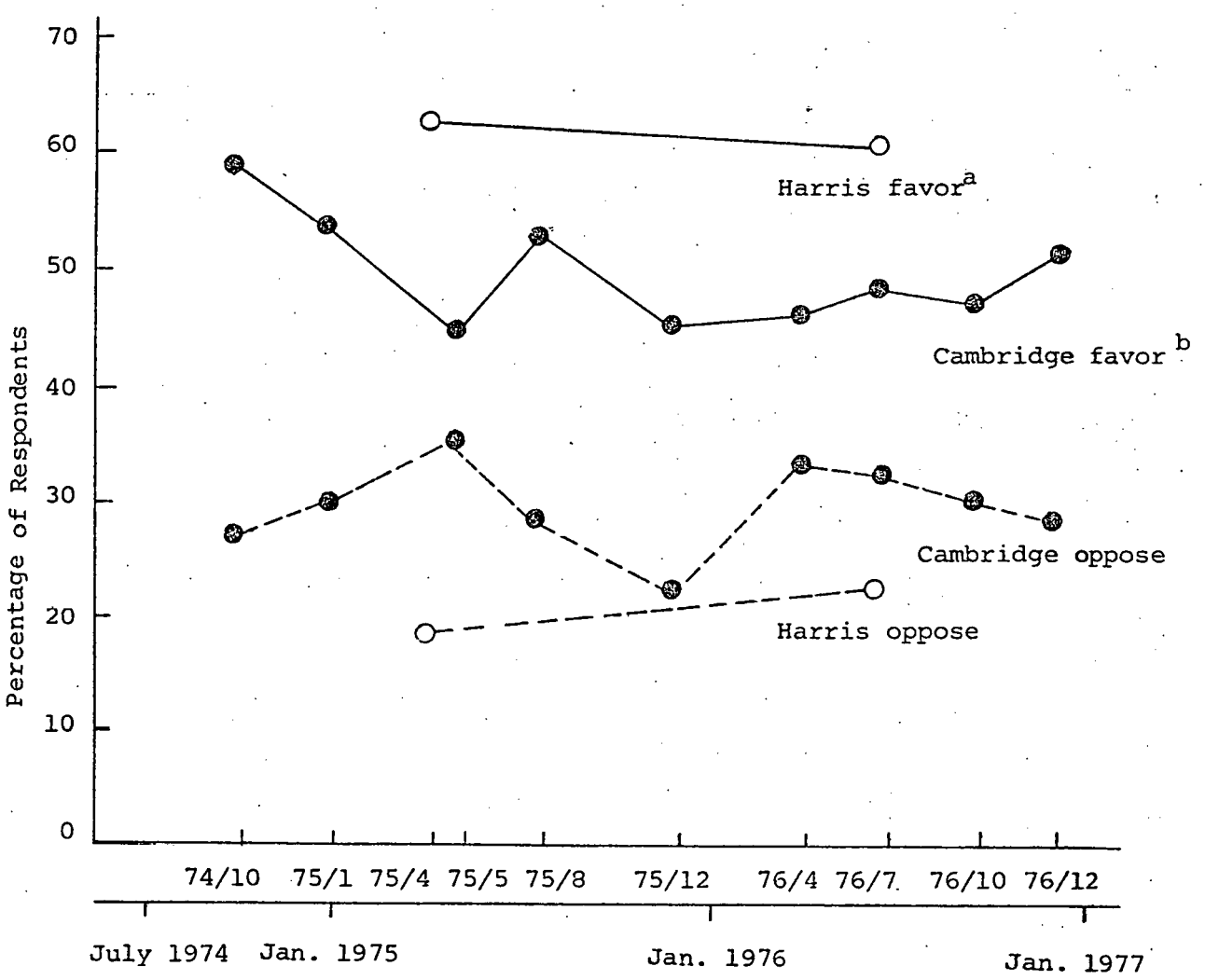
Representative findings from two national survey organizations are provided in Figure 1. Note the somewhat large fluctuations of over 10% in support and opposition found by Cambridge Reports (4). Taken in the aggregate, however, there is no evidence that overall support or opposition changed from 1974 through 1976.

In order to obtain a further indication of whether nuclear power attitudes may have changed over time, the median levels of support and opposition from all the national and area samples were computed. When support levels for 1976 were then compared with those for all previous years, no statistically significant difference was found. Similarly, a comparison of support in 1975 and 1976 with support in all previous years yielded no statistically significant difference. When the same comparisons were made using national survey data only, no differences were found. Similar comparisons for levels of opposition also indicated no significant changes during these time periods.

Residents near a nuclear power plant site have been the only group displaying consistent attitudinal change, although this change has been

FIGURE 1

SHALL WE BUILD MORE NUCLEAR POWER PLANTS?



[a]Louis Harris and Associates, Inc. (2, 3) asked, "In general do you favor or oppose the building of more nuclear power plants in the U.S.?"

[b]Cambridge Reports, Inc. (4) asked, "Do you generally favor or oppose the construction of more nuclear power plants?"

with regard to either support or opposition to a specific nuclear power plant. Matagorda County, Texas residents, Columbia County, Oregon residents, and Oregon State residents have shown a consistent pattern: favorability toward a nearby nuclear power plant site increased as the possibility of the plant's construction became a reality. In all cases, the percentage of respondents who favored plant construction increased significantly, the percentage of respondents who opposed construction remained stable, and the percentage of respondents who were undecided decreased significantly.

Support and Opposition as a Function of Demographic Characteristics

While analysis of survey data according to sex, age, income, education, and region of the country revealed no demographic group among whom opposition to nuclear power exceeded support, some groups consistently supported or opposed nuclear power more than did other groups.

Males and females differed more consistently and markedly in their attitudes toward nuclear power than did segments of any other demographic classification. In the national surveys, mean support levels for nuclear power were 65% for men and 46% for women, whereas mean opposition levels were 21% for men and 28% for women. Although attitude differences among age groups were less pronounced, there was about 5% less support of nuclear power for the youngest age group when compared to all other age groups.

In general, support for nuclear power increased with one's educational level. Those with low educational attainment indicated greater opposition to nuclear power; they were also more likely to be undecided compared to those with high educational attainment. On the average, there was 13% more support for nuclear power among those with the

highest educational attainment than among those with the lowest educational attainment. Higher income levels were also positively related to favorability toward nuclear power. Among the highest income group, the percentage of respondents favoring nuclear power ranged from 45% to 81%, with a median of 61%. Among the lowest income group, the percentage of respondents favoring nuclear power ranged from 28% to 53%, with a median of 39%.

Differences in support or opposition to nuclear power among respondents from different regions of the country were small in magnitude. However, consistent differences in support for nuclear power were found between residents of the Western states and the Northeastern states. Usually, support among Western residents was about 10% greater than among Northeastern residents. Residents from other areas of the country averaged an intermediate position with regard to nuclear support compared to Westerners and Northeasterners.

The Relationship of Specific Nuclear Power Issues to General Evaluations of Nuclear Power

We have analyzed the levels of support and opposition to nuclear power as well as the demographic characteristics of those who support or oppose nuclear power. Now we will examine the basis for why one holds a given nuclear power attitude as a function of beliefs about specific nuclear power issues. Many of these beliefs were volunteered by survey respondents as reasons for supporting or opposing nuclear power. In other cases, all respondents have volunteered perceived advantages and disadvantages of nuclear power. Finally, we will present findings from secondary analysis of two national surveys that indicate which specific

nuclear power issues are the most important determinants of one's general evaluation of nuclear power.

Concerns about Nuclear Power

One important group to address when analyzing concerns about nuclear power is that comprising respondents who have an antinuclear attitude. Examining the reasons volunteered by this group for opposing nuclear power can lead to insights as to where further research efforts may be placed.

The reasons for opposing nuclear power were consistent across national, state, and area samples, so we will only examine the data provided by national samples. In general, reasons for opposition centered on safety concerns. Economic considerations, pollution problems, satisfaction with other energy sources, and a lack of perceived need for nuclear energy were mentioned much less frequently.

The major reason for opposing nuclear power has always involved considerations of danger or risk. In the earliest national survey available to us, the Sindlinger Company in 1960 found that 54% of those respondents who opposed nuclear power volunteered some sort of "danger" as their reason for opposition (5). Similarly, the Becker Research Corporation in 1973 found that 56% of those who opposed nuclear power volunteered "concern over safety" as a reason (6). In 1974 the National Opinion Research Center (NORC) found that 70% of those who opposed nuclear power chose the response "dangerous to health or the environment" (7). And again, the Harris (2,3) and Cambridge (4) survey findings indicated that safety concerns continued to be the major reason for opposition through 1976. About 40% to 60% of the respondents in these latter surveys who opposed nuclear power volunteered the reason that

nuclear power was "dangerous, unsafe, or posed a health hazard." Also, about 10% to 20% of those who opposed nuclear power volunteered specific "danger" reasons for their opposition, which included dangers from accidents, explosions, leaks and cracks in the reactor, radiation contamination, and nuclear wastes. For most of the above surveys, other reasons for opposition were volunteered less than 20% of the time.

Safety concerns are expressed by nuclear supporters as well as by nuclear opponents. For instance, in 1975 Cambridge (4) found that the biggest worry about nuclear power volunteered by the total public always involved some sort of danger. About 50% of the respondents cited dangers usually related to reactor operation such as accidents, explosions, or radiation contamination. Nuclear wastes and terroism were each volunteered by about 8% of the respondents. Harris (2,3) in 1975 and 1976 asked the total public to volunteer "two or three main disadvantages of nuclear power." The most frequently volunteered disadvantages, cited by over half of the respondents, centered on some sort of danger from reactor operation.

Of course, other concerns have been expressed about nuclear power. Since 1960, from about 5% to 20% of those who opposed nuclear power have volunteered the reason that they are satisfied with present methods of generating electricity. Also, from 5% to 20% of those who opposed nuclear power volunteered pollution concerns, and an additional 5% to 20% felt that nuclear power was too expensive or caused unemployment. When, in 1975 and 1976, Harris (2,3) asked the total public to volunteer disadvantages of nuclear power, pollution concerns were volunteered about 20% of the time, economic considerations 15%, and waste disposal problems 12%. Finally, about 9% of the Harris respondents felt that there were "no disadvantages" associated with nuclear power.

Harris (2,3) in 1975 and 1976 used a structured set of questions to determine which specific nuclear power safety problems were perceived to be most severe by the public. The disposal of radioactive wastes was seen as a "major problem" by about 65% of the total public. In general, each of four problems concerning health and safety dangers from reactor operation were perceived as "major problems" by about 50% of the respondents. About 40% to 50% of the respondents felt that both water and air pollution were "major problems" associated with nuclear power. Respondents exhibited the least amount of concern regarding sabotage and terroism. Of most importance here is the fact that, when a structured response format was used, nuclear wastes were perceived to be more of a problem than dangers from reactor operation. Data from 1974 and 1975 by the Opinion Research Corporation (ORC) from structured response formats uphold this finding (8). When given a list to choose from, about 50% of the respondents considered the "disposal of wastes" to be a "serious problem," while less than 25% of the respondents considered "radiation discharge," a "nuclear accident," or "thermal pollution" to be "serious problems."

In summary, the dangers often associated with reactor operation are most often volunteered either as reasons for opposing nuclear power or as perceived disadvantages of nuclear power. Satisfaction with present electrical generation methods and concerns regarding pollution, nuclear wastes, and economics are volunteered much less frequently. However, since 1974, when given a list of concerns to choose from, respondents exhibit more concern regarding nuclear waste disposal than reactor operation.

The Perceived Benefits of Nuclear Power

Let us examine the perceived benefits of nuclear power, first by analyzing the reasons volunteered for favoring nuclear power, and then by analyzing the advantages of nuclear power as perceived by the total public. The reasons for holding a pronuclear attitude center on nuclear power as a good and needed energy source, the attendant economic benefits of nuclear power, the belief that nuclear power conserves other resources, and the belief that nuclear power is less polluting than other energy sources. Yet the main reason volunteered by respondents for favoring nuclear power has changed since 1960.

In 1960 a slight majority of Sindlinger's national survey respondents who favored nuclear power believed that atomic power should be used because it would provide "cheaper electricity" (5). Only about 10% to 20% of the respondents favored nuclear power for each of the following reasons: it allows atomic energy for "peaceful purposes," it "conserves other resources," it "represents progress," or it is "available where other sources are not."

In 1973, after environmental awareness had begun to grow and before the Arab oil embargo was imposed, Becker (6) found that the main reason volunteered for supporting nuclear power "in the area," cited by about 21% of the pronuclear respondents, was that it was a "cleaner system that controls pollution." This reason was closely followed by the belief that nuclear power was "more efficient and more powerful" (19%) and that nuclear power was a "safe system" (16%).

Since the Arab oil embargo, the main volunteered reason for favoring nuclear power has centered on the perception that nuclear power is a good source of needed energy. In 1974 NORC (7), using structured

response categories, found that 75% of the nuclear supporters favored nuclear power because it "conserves other resources," and 64% favored nuclear power because it is "available where others are not." These responses appear to reflect salient concerns of an American public that had recently experienced an oil embargo.

The Harris (2,3) and Cambridge (4) surveys conducted in 1975 and 1976 reflect a similar trend. The reason volunteered most often (about 25% of the time) for favoring nuclear power was that we "need more power." Other frequently volunteered reasons were that nuclear power is a "good source" of energy (12%), that there is an "abundant fuel supply" for nuclear power (12%), and that nuclear power helps to achieve "energy independence" (6%). As with NORC (7) both Harris (2,3) and Cambridge (4) found that the second major set of reasons for supporting nuclear power involved economic considerations. The third most volunteered reason for favoring nuclear power involved pollution considerations.

In 1975 and 1976 Harris (2,3) asked the total public to volunteer two or three main advantages of nuclear power. On the average, the greatest perceived advantages (volunteered by about 39% of the respondents) was that nuclear power would be "cheap," the second most cited advantage (volunteered by about 25% of the respondents) was that nuclear power was "clean energy," and the third main reason (given by about 20% of the respondents) was the belief that there is an "unlimited supply or abundant source" of nuclear fuel. About 6% of the respondents thought that nuclear power had no advantages.

In 1975 and 1976 Harris (2,3) also presented to all respondents a set of questions with structured responses to determine how beneficial 10 purported advantages of nuclear power were perceived to be and confirmed the findings discussed in the above paragraph. Relatively speaking,

economic considerations and energy source considerations were seen as the main advantages of nuclear power. Nuclear power's advantage as a nonpolluting energy source followed.

Thus the main perceived benefits of nuclear power have involved the low perceived cost of nuclear power, the comparatively nonpolluting effect of nuclear power, and the need for nuclear power as an energy source. But the single most important reason volunteered for holding a pronuclear attitude has changed from 1960 to 1976. Again, the reason volunteered most often in 1960 was that it was seen as a cheap source of energy. In 1973, the reason volunteered most often was that it was seen as a clean source of energy. Yet, since the oil embargo, the reason volunteered most often for holding a pronuclear attitude has involved the perceived need for energy. However, the main advantage of nuclear power as perceived by the total public was that nuclear power would provide cheap electricity.

Comparison of Concerns about and Advantages of Nuclear Power

In this section, we would like to note the fact that many of the arguments for and against nuclear power reflect opposite human perceptions of a specific nuclear power issue. Perceptions of nuclear power economic considerations provide an example of an issue area where opposite beliefs about nuclear power have been held from the earliest survey to the present.

In 1960, Sindlinger (5) found that about one-third of the national survey respondents favored nuclear power because they believed it provided cheaper electricity; about one in fifty opposed nuclear power because they believed it was not economical. For the national surveys conducted from 1973 through 1976, from 10% to 40% of the respondents

volunteered economic reasons for favoring nuclear power and from 1% to 8% of the respondents volunteered economic reasons for opposing nuclear power. Harris (2,3) found that 42% of the total public in 1975 and 1976 volunteered economic advantages of nuclear power when asked for an opinion, while about 16% in 1975 and 1976 volunteered economic disadvantages. Thus, although more people felt that nuclear power provided an economic advantage, a small segment of the public felt that nuclear power was uneconomical.

Pollution provides another example of opposing perceptions on the same issue. For instance, when Harris (2,3) asked all respondents to volunteer the advantages and disadvantages of nuclear power, about 25% of the respondents volunteered the belief that nuclear power is a clean form of energy, while about 20% of the respondents volunteered the belief that nuclear power causes environmental pollution damage.

To a lesser degree, these types of opposing perceptions are also observed with regard to other issue areas. Whereas some sort of danger was most often cited as a disadvantage or reason for opposing nuclear power, from 2% to 10% of the national survey respondents believed that the safety records of nuclear plants was a reason for supporting nuclear power from 1973 through 1976. We also note that waste disposal has become an important issue since a few (less than 0.5%) of the Harris respondents volunteered "they will solve waste disposal problems" as a main advantage of nuclear power.

Secondary Analysis of the Determinants of One's General Evaluation of Nuclear Power

As a final method for determining which attitudes and demographic characteristics were most closely related to one's general pro/con

nuclear power evaluation, we procured the Harris (2,3) data for further analysis. We used a statistical technique to determine which variables best predict one's nuclear power attitude.

The best predictor of one's nuclear power attitude is one's attitude about the safety of nuclear power plants. The second and fourth most important predictors are related to the price of energy produced by nuclear power. The third most important predictor is one's attitude about the reliability of nuclear power as a long-term energy source. The fifth most important predictor is one's attitude about whether nuclear power pollutes more than other energy sources. Finally, one's attitude about the seriousness of nuclear waste disposal problems is the sixth best predictor. It should be noted that one's attitude about power plant safety is a much better predictor of one's nuclear power attitude than is one's attitude about the seriousness of the waste disposal problem. This is because, in general, pronuclear respondents think nuclear power plants are safe and antinuclear respondents think they are dangerous, whereas most respondents think nuclear wastes constitute a serious problem.

Conclusion

The strength of the relationships between specific nuclear power issues and one's general evaluation of nuclear power was assessed. The evaluation of the safety of nuclear power plants was found to be the most important predictor, while economic variables were next in importance. Thus, safety and economic considerations, issues on which pronuclear and antinuclear individuals often disagree sharply, are basic determinants of evaluations of nuclear power. However, the assessment of nuclear waste problems, which is perceived as serious by most individuals, is

not readily distinguished between pro and antinuclear respondents. Thus, the nuclear waste problems must be actively addressed by the nuclear community in order to maintain existing nuclear power support as well as to win over non-supporters. In addition, safety and economic issues must be addressed in order to ease the concerns of those who are presently undecided about or opposed to nuclear power.

The Context of General Energy Orientations

The purpose of analyzing the public's opinion toward energy issues broader than the development of nuclear power is to place the discussion of nuclear attitudes in the context of the larger energy picture as it is perceived by the public. We will be concerned with two ways in which examining public attitudes towards general energy issues can provide insight into understanding public perspectives on nuclear energy. First, the comparison of public judgments about nuclear energy with similar types of judgments about alternative energy options provides a necessary relative perspective. It is difficult to interpret the meaning of support and opposition levels toward nuclear power without knowing these levels for alternatives. That is, in public policy matters, concern for the relative attractiveness of policy options is, to a large extent, as important as is concern for the absolute desirability of any particular policy. Second, the identification of underlying bases for nuclear power attitudes can be approached by examining consistent patterns of general energy attitudes among various sectors of the public. Our findings from this type of analysis suggest that distinct energy perspectives exist, centering on energy supply versus energy demand orientations, which appear to influence attitudes toward nuclear energy development.

Energy Alternatives in Comparative Perspective

Several opinion surveys have assessed the public's relative preferences for alternative energy sources. Below, we briefly present a review of the major findings of these surveys.

An April 1975 Roper Organization (9) survey asked a direct comparison question, requesting respondents to select one or two "best" long-term sources of energy (see Table 1). Strong preferences for both solar energy (50% selection) and nuclear power (47% selection), relative to the other specified alternatives (18% selection of coal, 18% selection of offshore oil and 12% selection of hydropower), were found. Demographic data from the Roper survey (see Table 1) indicate that the greatest amount of support for solar energy was from the high-income (62%), college-educated (63%), executive/professional (67%), under-45 (56%), and Western region (62%) groups. It is of considerable interest to note that nuclear supporters also came from some of the same groups favoring solar energy: the high-income, college-educated, and Western region groups. These data indicate that support for nuclear energy is not inconsistent with support for solar energy, a point we shall return to later.

A second comparative approach has been to assess favorability toward a series of possible steps to solve energy shortages. Data spanning the period from September, 1973, through July, 1976, from a series of Louis Harris and Associates (2,3) and Roper Organization (9) polls are presented in Table 2. Solar energy appeared only once, in the Harris July, 1976, survey (3). Eighty-two percent of the public was in favor of speeding up solar development, signifying a considerable degree of public support for solar energy. Nuclear energy quite consistently received majority support, with an overall average of 61%

TABLE 1

ONE OR TWO BEST LONG-TERM SOURCES OF ENERGY

Respondent Category	Roper (75/4)				
	Solar	Nuclear	Coal	Offshore Oil	Water Dams/Rivers
Total	50%	47%	18%	18%	12%
Sex					
Male	53	57	19	16	12
Female	47	38	18	19	13
Age					
18-29	56	49	13	15	13
30-44	55	50	16	17	10
45-59	47	52	20	16	12
Over 60	38	36	26	24	14
Income					
$0-5,999	31	32	23	25	16
$6-11,999	44	42	18	18	14
$12-17,999	60	55	15	14	11
$18,000 and over	62	59	19	15	9
Region					
Northeast	54	47	18	21	9
Midwest	55	47	20	13	13
South	56	45	19	22	12
Western	62	53	14	12	15
Education					
Grade school	26	28	24	24	17
High school	49	47	18	20	13
College	63	58	16	11	9
Occupation					
Blue collar	49	49	19	17	12
White collar	53	60	14	18	10
Exec/prof	67	54	17	9	8

NOTE: "Looking ahead to the year 2000, which of these sources do you think offers the best long term source of energy--which one or two do you think we should spend the greatest effort on to develop? [coal, water power, ocean tides, wind power, offshore oil, oil from shale, nuclear, solar]."

TABLE 2

STEPS TO SOLVE ENERGY CRISIS
(Percentage Favoring)

Energy Policy	1973		1974			1975		1976	
	Harris[a] 73/9	Roper[b] 73/12	Roper[b] 74/6	Harris[a] 74/7	Harris[a] 74/11	Harris[a] 75/4	Roper[b] 75/6	Roper[b] 76/6	Harris[a] 76/7
Speed solar development	--	--	--	--	--	--	--	--	82%
Increase or start offshore oil drilling	67%	72%	68%	67%	--	66%	70%	61%	64
Expand atomic energy program or speed building new nuclear plants[c]	64	62	57	75	66%	67	53	47	62
Allow more strip mining	42	57	46	48	--	49	48	42	49
Eliminate automobile pollution devices	--	--	45	--	--	--	48	42	--
Relax pollution standards on fuels	--	54	39	--	--	--	45	33	--
Slow down clean-up of water and air pollution	29	--	--	--	39	26	--	--	20

[a]"I am going to read you a list of steps which have been suggested to help solve the energy crisis. For each one, tell me if you favor or oppose it." [Also included: increase efforts for oil shale, speed construction of Alaska pipeline, use naval oil reserves, eliminate electric power plants that use oil by 1980.]

[b]"There has been much talk about the problem of a fuel and energy shortage in this country. Here is a list of steps that have been or could be taken to conserve supplies of energy. Is that something you think we should do or should not do?" [Asked for each item; also included: limit home use of air conditioning, homes heated at no more than 68° in winter, build enough plants for steady supply of electricity, place penalty tax on large cars, charge substantially more for home electricity used during peak daytime hours.]

[c]Roper question worded: "Go into a greatly expanded program to develop atomic energy."

favorable. Coal, explicitly allowing more strip mining, generally received lower support levels, with an overall average of 48% favorable.

The lowest levels of approval regarding steps to solve the energy crisis, consistently found across all the surveys, involved reducing pollution control standards or efforts. Thus, the public appears to be unwilling to forego environmental improvements as a means to save energy. Trend data from Roper surveys between 1973 and 1976 (9) indicate increasing emphasis on environmental quality. Between 1973 and 1975 opinion was slightly in favor of increasing energy over protecting the environment. In the 1976 survey, however, there was a significant shift: a 44% plurality preferred environmental protection, while 33% preferred an energy increase.

In 1975 Cambridge Reports (4) assessed public perceptions of the potential contributions of three non-nuclear approaches to solving energy problems: (1) construction of solar facilities; (2) more extensive use of coal; and (3) strict energy conservation. Over half (54%) of the public believed that solar energy could "do a lot to solve the energy crisis" in the next 25 years. On the other hand, only about one-third of the respondents felt that conservation (36%) or coal (31%) could be very effective during that time period.

Demographic groups showed distinct response patterns for these alternatives. In general, belief in the efficacy of solar energy was directly related to income and educational level and inversely related to age. Men were more likely to believe in the potential of solar energy than were women; 59% of the men and 49% of the women said solar energy could "do a lot to solve the energy crisis." The Pacific and Industrial regions showed greater belief in the potential of solar energy than did other regions; about 60% of the respondents in these two

regions said solar energy could "do a lot" compared to between 44% and 56% of the respondents from other regions of the country. Again, note that some of these groups--e.g., men, the highly educated, and the Western region respondents--are the same as the major nuclear energy supporters.

The final comparison of energy alternatives was reported in Becker Research Corporation surveys in June, 1973, and May, 1974 (6). Data on favorability toward both coal plants and nuclear plants in the respondents' own locality indicated consistently greater support for nuclear power plants (56% and 55% in 1973 and 1974, respectively) than for coal power plants (37% and 44% in 1973 and 1974, respectively).

The basic conclusions regarding the relative preferences of the public for specific energy sources rank solar energy the most desirable, nuclear energy the next preferred source, and coal one of the least preferred sources. Furthermore, a majority of the public is not willing to reduce pollution control efforts in order to save energy. These findings have been documented across a rather broad range of national surveys conducted by a number of different survey organizations over the past few years.

The Relationship of General Energy Attitudes to Evaluations of Nuclear Power

The comparison of pronuclear and antinuclear individuals' attitudes concerning broad energy issues provides a means for exploring the ways in which general energy orientations underlie evaluations of nuclear energy development. The positions of pronuclear and antinuclear individuals on a wide range of energy issues are presented in Table 3.

TABLE 3

RELATIONSHIP OF GENERAL ENERGY ATTITUDES
TO NUCLEAR POWER ATTITUDES

Survey	Response		Total				Pro Nuclear[a]				Con Nuclear				Don't Know No Opinion			
			73	74	75	76	73	74	75	76	73	74	75	76	73	74	75	76
Becker (73/6 and 74/5)[b] Which is better:	Build as many new power plants needed--use all electricity wanted.		52%	48%			61%	59%			37%	38%				--		
	Cut back electricity used--build fewer new plants.		35	39			31	34			50	51[c]				--		
Becker (73/6 and 74/5)[c]	Need more nuclear plants in next 10-20 years OR		61	58			75	77			46	37				--		
	Have enough energy from other sources.		16	24			10	14			30	47				--		
Becker (73/6 and 74/5)[d]	Coal OR Oil Plant	All right	37	44			44	59			29	33				--		
		Oppose	45	41			44	27			61	61				--		
Cambridge (75/8)[e] To say each of three nonnuclear solutions do a lot to solve crisis.	Solar				54%				60%				54%				37%	
	Coal				31				35				28				24	
	Conservation				36				36				42				29	
Cambridge (76/4)[f]	Conservation means much lower standard of living:	Agree				54%				56%				52%				52%
		Disagree				38				38				41				29

TABLE 3 (Continued)

Survey	Response	Total 73	Total 74	Total 75	Total 76	Pro Nuclear[a] 73	Pro Nuclear[a] 74	Pro Nuclear[a] 75	Pro Nuclear[a] 76	Con Nuclear 73	Con Nuclear 74	Con Nuclear 75	Con Nuclear 76	Don't Know No Opinion 73	Don't Know No Opinion 74	Don't Know No Opinion 75	Don't Know No Opinion 76
Cambridge (75/8)[g]	Economic growth requires increase in energy OR			41%				54%				31%				31%	
	Can have growth with conservation			45				36				57				40	
Cambridge (76/4)	"Conservation is a good alternative, but frankly there's not much I can personally do about it." Agree				48%				44%				51%				--
	Disagree				47				52				47				--
Cambridge (75/8)[h]	For equality and stability Need economic growth OR			52%				59%				38%				46%	
	Simply distribute more equally			36				30				51				33	
Bardsley (OR 76/9)[i]	Nuclear power conserves natural resources Agree				80%				90%				66%				--
	Disagree				10				5				20				--

[a]Becker (73/6 and 74/5) Pro/Con question: "Suppose your electric company announced that it planned to build a nuclear power generating plant in this general area producing electric power by means of atomic energy. Would building this kind of plant be all right with you or would you oppose it?"

Cambridge (75/8 and 76/4) Pro/Con question: "Do you generally favor or oppose building more nuclear power plants?

TABLE 3 (Continued)

Cambridge (76/4) Pro/Con question: "Do you generally favor or oppose the construction of more nuclear power plants?"

Bardsley (OR 76/9): "Overall, would you say your opinion of nuclear power plants is--very favorable, somewhat favorable, somewhat unfavorable, or very unfavorable?"

[b]Becker (73/6 and 74/5): "All things considered, which do you think is better: to build as many new power plants as are needed to let everybody use all the electricity they want or to try to limit or cut back the use of electricity so that fewer new power plants will have to be built?"

[c]Becker (73/6): "The use of electric power is expected to double by 1980. Do you think that more nuclear power generating plants will be needed in order to have enough electric power for all needs, or will there be enough electric power from other sources such as coal, gas, oil, and power dams?"

Becker (74/5): "During the next 10 or 20 years, do you think we will need more nuclear power plants in order to produce enough electricity for all needs, or can we produce enough electricity from other sources such as coal, oil, gas, and power dams?"

[d]Becker (73/6 and 74/5): "Suppose your electric company announced it planned to build an electric power plant in this general area that burned oil or coal for fuel. Would building this kind of plant be all right with you or would you oppose it?"

[e]Cambridge (75/8): "Three possible solutions to the energy problem have been proposed that do not involve nuclear power: construction of solar energy facilities, more extensive use of coal, and strict energy conservation. Do you think in the next 25 years each of these can do a lot to solve the energy crisis, something to solve the problem, or very little to solve the problem?"

[f]Cambridge (75/4): "Conservation is not a realistic solution to the energy crisis unless we are all prepared to accept a much lower standard of living."

[g]Cambridge (75/8): "Some people have argued that we can have economic growth here at home even if we don't increase energy supplies by conserving and using the energy we have more wisely. Other people say this is unrealistic and that we need to increase energy in order to have economic growth. Which is closer to your opinion?"

[h]Cambridge (75/8): "If we don't increase economic growth, some people say there will be increasing unrest in our society because the people at the bottom of the economic ladder will no longer be able to get ahead and will have to literally fight for a larger share of things. Other people say this won't really be a problem because there is plenty to go around in our society, and all we need to do is distribute it more equally. Do you think growth is essential or do you think we could solve the problem by simply distributing more equally?"

[i]Bardsley (OR 76/9): "Nuclear power plants help to conserve on other natural resources, such as coal, oil, water, and gas."

Becker surveys in 1973 and 1974 (6) found that pronuclear and antinuclear individuals took opposite positions on the issue of increasing the energy supply as opposed to cutting back electricity use. About 60% of the pronuclear group favored building as many plants as needed to meet electricity demand, compared to 38% of the antinuclear group; about 50% of the antinuclear group preferred reducing electricity consumption in contrast to approximately 35% of the pronuclear group. In terms of specific energy sources, the Becker surveys (6) found that about 75% of pronuclear individuals saw a definite need for more nuclear plants in the future, while the antinuclear group changed from a 46% plurality, agreeing that nuclear energy would be needed in 1973, to a 47% plurality saying other sources would be sufficient in 1974. In 1975, a Cambridge Reports survey (4) found similarities between pro and antinuclear respondents regarding beliefs about the efficacy of coal: only 35% of the pronuclear and 28% of the antinuclear individuals felt that coal could do much to solve the energy crisis. However, Becker surveys in 1973 and 1974 (6) indicated that the pronuclear group was favorable toward building coal plants (52% in favor and 36% opposed) while the antinuclear group was opposed to such plants (31% in favor and 61% opposed). In 1975, a Cambridge Reports suvey (4) reported a majority of both groups felt that solar energy could do much to solve energy problems.

Cambridge Reports (4) found that pro and antinuclear individuals agreed on the effectiveness of conservation. In 1975 36% of the pronuclear and 42% of the antinuclear individuals felt that conservation could do much to solve the energy crisis. In 1976 both groups were about equally divided on whether personal conservation efforts could have an impact on the energy situation, and over 50% of both groups

agreed that conservation will produce a lower standard of living for everyone. However, these two groups disagreed considerably on the relationship of conservation to economic growth. In 1975, Cambridge (4) reported that 54% of pronuclear individuals, compared to 31% of antinuclear individuals, believed that increased energy supplies are required to maintain economic growth, while 57% of the antinuclear individuals, as opposed to 36% of the pronuclear individuals, believed economic growth could continue with strict conservation programs.

Pro and antinuclear individuals also disagreed concerning the impact of economic growth on lower income individuals. Cambridge (4) data indicated that the pronuclear group believed economic growth was essential to help the economically disadvantaged improve their position (59% of the pronuclear individuals took this position compared to 31% of the antinuclear individuals); while the antinuclear group viewed the problem as one of unequal distribution rather than a need for economic growth (51% of the antinuclear individuals agreed with this perception compared to 30% of the pronuclear individuals).

The belief that non-nuclear sources would be insufficient for the future; beliefs that conservation would result in lower economic growth hurting low-income individuals as well as lowering the standard of living for everyone comprised the cluster of attitudes surrounding pronuclear sentiments which included positive attitudes about solar energy and coal as well as nuclear energy as sources of energy. The majority of respondents with antinuclear attitudes, on the other hand, preferred cutting back the use of electricity to building more power plants, though they believed solar energy could contribute a great deal to solving energy problems. In general, those with antinuclear attitudes opposed the building of coal plants in their general area. A

majority of these respondents felt that it is possible to maintain economic growth without increasing energy supplies, although they agreed with the pronuclear group that conservation would lead to a lower standard of living.

These findings suggest that there may be two distinct energy perspectives influencing nuclear power attitudes. The first is a favorability toward increasing the energy supply which is associated with higher levels of favorability toward all types of energy sources. The second is favorability toward reducing energy consumption, which is associated with higher levels of support for conservation and environmental protection. These two positions are not necessarily mutually exclusive. One may feel that an emphasis on both conserving and increasing the energy supply is important. However, there is some evidence from the data on pro and antinuclear individuals of a tendency to focus on either the energy supply or the energy demand side of the energy issue.

Differences in energy orientations were consistently related to the variables of sex, age, income level, and educational attainment. Men and women held two considerably different sets of attitudes on a wide range of general energy issues. Women, who were one of the groups least supportive of nuclear energy, were much more likely than men to prefer limiting electricity use to building more power plants (6). In addition to nuclear energy, they were less supportive of virtually all energy supply options (e.g., coal, solar energy, offshore oil, and strip mining) than were men (9). Women were also more strongly in favor of environmental protection than were men (9). Though women preferred conservation more than men did, they held the same beliefs as men concerning conservation efficacy and the economic consequences of

conservation (4). Thus, men were generally more supply oriented than women, while women were more often oriented toward reduced consumption and environmental protection.

Age groups were also associated with distinct clusters of energy attitudes. The young probably presented the most clear-cut pattern in the area of energy perspectives. In general, they were in favor of conservation (6); they were the most proenvironment group (9); they showed the least support for coal and the greatest belief in solar energy's potential of any age group (4,6). The middle-aged respondents tended to be energy supply oriented. Generally, this group favored building as many power plants as were needed, supporting almost all the energy supply steps suggested for solving the energy crisis (6,9). The middle-aged were likely to be supporters of nuclear power and believers in the efficacy of solar energy (4,9). They were less opposed to coal than were the young respondents (6). The middle-aged individuals were split over whether protecting the environment or increasing the energy supply should take precedence (9). The set of attitudes of the older group differed from both the young and the middle-aged groups. In general, older individuals favored increasing the energy supply, were not supportive of conservation (6), and believed that conservation limits the economic growth that is believed necessary to help the low-income group (4). Overall, this group preferred coal to nuclear energy, and believed less in the potential of solar energy than the other age groups. Older individuals were more likely to be willing to relax pollution standards as a means for providing more energy for consumption compared to other age groups.

The high-income group tended to be favorable toward both solar energy and nuclear energy (4). This group believed more than did most

other groups in the potential efficacy of conservation and in the positive impact of individual conservation efforts on the total energy problem (4). High-income individuals also generally favored environmental protection (9). The low-income group was less favorably disposed either to solar energy or nuclear energy than most other groups (4). This group was split over whether energy supply or environmental protection should take precedence (9).

As with the high-income group, the highly educated group was interesting because it was one of the few groups which supported both energy supply and conservation action. Generally, this group was pronuclear, and believed in the efficacy of solar energy but was opposed to strip mining (4,9). Individuals with high educational attainment were also more favorable toward reducing energy consumption than other groups, placing a high priority on environmental protection (6,9). While the lower educated group, in general, was much more supportive of increasing the energy supply than reducing consumption, it was less favorable both toward solar energy and nuclear than most other groups (4,9). This group, on the other hand, was more supportive of strip mining than the highly educated group (9).

Although each demographic group had its own specific set of energy attitudes, there is evidence of general attitude interrelationships along the lines detailed for the pro and antinuclear groups. Preference for increasing the energy supply tends to be associated with higher levels of support for the whole range of energy source alternatives. Favorability toward energy conservation, on the other hand, is usually associated with stronger support for environmental protection and lower support for the various energy source options.

Conclusion

The examination of interrelationships between attitudes toward a broad range of energy issues and one's attitude toward nuclear power suggests that distinct energy orientations play a part in determining judgments concerning nuclear energy. Favorability toward nuclear power is highly associated with favorability toward all other energy technologies. For example, nuclear supporters are slightly higher solar supporters than are nuclear opponents. Concern for environmental protection and a focus on conservation appear to be significant elements underlying opposition to nuclear energy development.

Thus, it is important to recognize that, to some extent, the public debate over nuclear power is only one aspect of a much larger debate over energy policy directions, where the issue is not only which sources to develop but to what extent energy supplies should be expanded at all. To the extent that public attitudes toward the continued development of nuclear power reflect different priorities concerning general energy, environmental, and economic issues, technical information and public education concerning nuclear energy may do little to reduce the nuclear controversy. The political arena, where the recognition and confrontation of differing value positions is part of the process of decision-making, is the likely place for resolving these elements of the nuclear debate.

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