

CHAPTER 12

From Public Understanding to Public Policy: Public Views on Energy, Technology, and Climate Science in the United States

David M. Reiner

As in many political disputes, opponents in partisan battles over energy and environmental policy often invoke public opinion to justify their preferred position or policy choice. Being able to cite favorable public opinion polls or other indicators of public concern can provide an important source of legitimation for arguments in support of specific policies. The link between public opinion and policies can, however, be problematic. There are a host of reasons, including biases in the questions asked to assess public opinion, why indicators of public approval or disapproval might not offer a basis for action. This chapter explores some of the difficulties of translating public awareness and understanding first into public opinion and then into policy actions. In particular, the chapter presents evidence of public attitudes on the question of climate change because the associated policy debates are often viewed in a strongly partisan light in political debates in the United States.

An issue as technically complicated as climate change poses a series of demanding conditions in translating public support into public policy. The first hurdle is one of awareness. Many people simply do not pay attention to the issues involved in energy or environmental policy and so will be unaware of many of the issues of concern relevant to climate policy. Basic awareness does not imply understanding of the basic scientific facts or the

underlying mechanisms that lead to climate change. In the absence of a firm grasp of the facts, there is a wide range of cognitive biases that plague individual assessment, and complicated technical problems are especially prone to such biases (Kahneman, Slovic, and Tversky, 1982).

In turn, basic understanding does not imply clear opinions on associated policies. A scientist or technologist steeped in technical details, for example, might well be indifferent with regard to which specific policies are enacted. By the same token, ignorance does not preclude strong opinions. More generally, positive or negative views do not reveal the strength of those views. Strong opinions do not necessarily translate into political support, nor does affiliation with a political party necessarily imply support for their party's position on every issue. Next, general views do not always translate into support for specific action, particularly those that will have a direct personal or local impact. Finally, opinion need not translate into individual actions or active political support that might move a policy forward. It is these missing links in the chain linking public understanding with public policy that will be explored by drawing upon public opinion results in the areas of science and technology, energy, and the environment.

Applied to the question of energy choices and their interaction with climate change policy, one might expect that some disconnects are severe. Public attention to both science and technology and to environmental issues is relatively low. Moreover, the underlying scientific evidence for climate change that would motivate action has been contested, at least in the United States, leading to further uncertainty. Possible solutions to the climate problem are often of a technical nature and themselves subject to considerable confusion. Translating those imperfect understandings into opinions can be affected both by political affiliation and personal interests. The environment has become a partisan issue in the United States that can then impact perceptions and attitudes. Even the term *environmentalist* has become laden with different meanings, with diverse implications for attitudes and policy choices. Many environmental issues also come with their own set of local and personal repercussions, such as siting of facilities or impacts on individual behavior. Finally, there may still be notable differences between the public's preferences and the choices made by their elected representatives.

Establishing the links between understanding and policy choice has to date been imperfect at best. Any inquiry, therefore, must rely on incomplete evidence. Probing these links is vital, however, to producing a richer appreciation of how the public can influence policy debates and, equally, to understanding how ongoing policy debates might influence the public.

Public Awareness

There is a relatively small informed audience for many policy questions. Researchers have concluded that less than one-fifth of U.S. residents meet

TABLE 12-1. Levels of Public Attention to Policy Issues (2002)

<i>Issue</i>	<i>Attentive Public</i>	<i>Interested Public</i>	<i>Residual Public</i>
Local schools	31	28	41
Foreign policy	5	23	72
New scientific discoveries	7	39	53
The use of new inventions	6	36	58
Science and technology	10	48	42
Space exploration	5	21	74
New medical discoveries	14	51	35
Environmental pollution	10	38	52
Economic issues	12	33	55
Agriculture	6	23	71
Military/defense	7	31	62

Source: NSB, 2002, Appendix Table 7-7.

a minimal standard of civic scientific literacy (Miller, Pardo, and Niwa, 1997). Looking across a range of policy issues, the National Science Foundation's Survey of Public Attitudes towards Science and Technology found that roughly 10 percent of a representative sample of the U.S. population could be categorized as "attentive" on both science and technology and on energy and environmental issues. New medical discoveries score slightly higher (14 percent), but it was local issues such as schools that registered by far the highest level of attention (31 percent).

In Table 12-1, the attentive public is defined as those who express a high level of interest in a particular issue, feel very well informed about the issue, read a newspaper on a daily basis, and regularly pursue news magazines or a magazine relevant to the issue. By contrast, the interested public consists of those who claim to have a high level of interest in a particular issue but who do not feel very well informed about it. The residual public consists of those who are neither interested in nor feel very well informed about a particular issue.

Science-attentive members of the public are most likely to be male, young, better educated, and affluent. They are also likely to vote, be politically active, be savvy about technology, and understand scientific information with minimal explanation (Borchelt, 2002). Even among those with graduate or professional degrees, however, less than 25 percent are considered attentive to science and technology issues. Similarly, attentiveness is low even among those with a "high" level of education in science and mathematics defined as having taken nine or more high school or university level science or math courses. Only 15 percent are considered attentive, although this percentage is still three times the level for those with "low" levels of science and math education (NSB, 2002, Appendix Table 7-8).

With regard to particular technologies, some register much greater awareness than others. Transport and renewable energy received above-average attention among a long list of energy-related technologies in studies at MIT (Curry et al., 2004; Curry, 2004). The highest level of awareness registered was for more efficient cars, which 70 percent of the U.S. public admitted to having heard or read of in the past year. Next were solar energy (65 percent public recognition), nuclear energy (55 percent), and wind energy, energy-efficient appliances, and hydrogen cars, all registering public recognition just below 50 percent. By contrast, technologies such as biomass or carbon capture and storage technologies were acknowledged with a high level of awareness by 10 percent or less of those people surveyed. Even these figures are likely to be inflated, since respondents are often reluctant to admit ignorance. Close to 20 percent of the public admitted not to have heard or read of any of the listed technologies.

Public Understanding

Given the low level of attentiveness to science or environmental issues among even highly educated members of the public, it is not surprising that many people have fundamental misunderstandings of basic scientific facts. For a number of years, the National Science Foundation (NSF) has tested public understanding of basic scientific terms and concepts (NSB, 2004). It has found that some concepts are understood by 80 to 90 percent of the public, including that the center of the Earth is very hot and that the oxygen breathed by humans is emitted from plants. Similarly, almost 80 percent of the public is aware that the Earth goes around the Sun. Other factual questions scored closer to 50 percent, indicating ignorance and, in some cases, that myths have taken root, displacing the scientifically correct answer. The idea that earliest humans lived at the same time as the dinosaurs, that antibiotics kill viruses, and that lasers focus sound waves are areas where misconception was common. Responses to identical surveys in the European Union are similar or, quite often, worse. Furthermore, polls in both the United States and Europe find that these correct or incorrect conceptions are virtually unchanged over time, indicating the level of public knowledge is not increasing in either place.

As part of its studies of environmental literacy, the National Environmental Education and Training Foundation (NEETF) has sought to develop a set of knowledge questions on basic environmental and energy facts (NEETF/Roper, 2002). Given a list of ten factual questions on energy, the average respondent was only able to identify slightly more than four correct answers on average, as shown in Table 12-2. Respondents were asked, for example, to describe the leading source of electricity in the United States and to identify examples of renewable resources. While almost two-thirds were able to recognize that heating and cooling used the most energy in the home, only one-third recognized that burning coal, oil, and wood is by far

TABLE 12-2. Public Assessment of Basic Energy Facts

<i>Energy Knowledge Question</i>	<i>Percent Correct</i>
Source of most energy usage in average home	66%
Percentage of oil imported from foreign sources	52%
Percentage of world's energy consumed by United States	50%
Disposal of nuclear waste in the United States	47%
Fastest and most cost-effective way to address energy needs	39%
U.S. industry increased energy demands the most in past 10 years	39%
Fuel used to generate most energy in United States	36%
How most electricity in the United States is generated	36%
Sector of U.S. economy consuming greatest percentage of petroleum	33%
Average miles per gallon used by vehicles in past 10 years	17%
Average number of correct answers:	4.1

Source: NEETF/Roper, 2002, pp. 4–5.

the largest source of electricity, accounting for roughly 60 percent of total generation. The top choice was hydroelectric power, which was selected by 39 percent of the respondents. A further 12 percent chose nuclear power as the leading power source (Coyle, 2004, p. 35). In spite of high levels of awareness of transport issues, some of the most persistent misperceptions were with respect to transport. For example, only 17 percent were aware that the average fuel efficiency of vehicles decreased over the course of the 1990s.

Only 1 percent of the respondents achieved an overall score of 9 out of 10 correct answers, 3 percent answered 8 out of 10 correctly, 8 percent had 7 correct answers, and 13 percent had 6 out of 10 answers correct. Men scored notably better, with 68 percent failing by scoring below 60 percent, compared to 84 percent of women. Perhaps unexpectedly, the youngest demographic group, aged 18 to 34, did not score best on environmental or energy knowledge. That distinction went to somewhat older respondents aged 35 to 64. The eldest age group performed worst on the knowledge question (Coyle, 2004, pp. 16–19).

The public demonstrated the same mix of understanding and confusion on specific questions linking energy technologies and their environmental impacts. Asked how different technologies contribute to carbon dioxide levels, the vast majority of respondents were able to identify that cars, coal power plants, and steel mills increased carbon dioxide levels, that trees reduced carbon dioxide levels, and that wind turbines did not contribute to an increase in carbon dioxide. The one area where respondents showed considerable confusion was with regard to nuclear power plants, where the majority of respondents either did not know or gave the wrong answer (Curry et al., 2004, pp. 4–5).

Similar results were reported in the 2003 Eurobarometer on Energy, which found that nuclear power was perceived as having a significant

impact on global warming across most member states in the European Union, including France, with heavy reliance on nuclear power, and Germany, which had an acrimonious political debate over phasing out nuclear power (EC, 2003). Only in Sweden and Finland, which conducted intensive national dialogues over nuclear power over the course of many years, did the majority understand that nuclear power does not contribute to global warming.

The complicated, nonlinear, and contested nature of climate change means that there are relatively few that have accurate conceptions of either the problem or of possible solutions. There is an obvious confusion between weather and climate. Given the variability of both weather and climate, there is a tendency to confuse the two. Moreover, there is an inevitable attraction to ascribe causes even when it is difficult or impossible for even experts to discern a specific cause. Just prior to the United Nations climate conference in Kyoto in 1997, during an El Niño year, U.S. interviewees were asked, "What is the major source of the recent 'strange weather'?" (CBS News/NY Times, 1997). Thirty four percent cited natural variability, and 17 percent named El Niño—both plausible explanations. Many others offered a variety of other causes, including pollution or resource degradation (11 percent), space junk (10 percent), divine intervention (8 percent), and ozone depletion (8 percent). Global warming was suggested by only 5 percent of the respondents, the same percentage that answered, "Don't know."

Establishing the correct answer for such a question is virtually impossible, since many scientists themselves do not agree. At best it might be possible to say that the weather in 1997 was being affected by a variety of factors or that such unusual events might become more likely as a result of global warming. Many of the answers are clearly incorrect, but particularly notable is the reluctance to admit they simply "don't know" to complicated technical questions, which testifies to the difficulty in accepting uncertainty.

Finally, it is not only science or technology that can be the subject of misunderstanding. There is also considerable confusion over policy. Many studies, for example, find that the public favors U.S. participation in the Kyoto Protocol (Harris Interactive, 2002). When asked President Bush's position on the Kyoto Protocol, however, there was an even split in the general population. Roughly 60 percent of Republicans espoused the belief that President Bush supported the agreement, which he, in fact, emphatically rejected in the first days of his administration (PIPA/KN, 2005, p. 4). Willingness to support action on climate change also was related to beliefs over U.S. actions relative to those of other developed countries. While 44 percent believed that the U.S. effort was comparable to other developed countries, 24 percent believed that the United States was doing more than average to limit its greenhouse gases, which included 14 percent of Democrats and 38 percent of Republicans. Only 27 percent thought the United States was

doing less than average, including 40 percent of Democrats and 16 percent of Republicans.

Impact of Information on Public Opinion

Understanding the impact of information is critical for complicated technical questions that are subject to so many misconceptions. New information can sometimes affect public opinion in important ways. For example, although confusion over facts remains, there has been a notable shift recently on the acceptance of the science of climate change in the United States. Public recognition that “there is a consensus among the great majority of scientists that global warming exists and could do significant damage” has grown from 28 percent in 1994 to 43 percent in 2004 and to 52 percent in 2005. At the same time, the view that scientists are divided on the existence of global warming and its impact fell from 58 percent in 1994 to 50 percent in 2004 and 39 percent in 2005. It appears that Republicans account for most of the recent shift. Republican believers in a scientific consensus on global climate change increased from 30 percent to 41 percent, while doubters fell from 63 to 46 percent (PIPA/KN, 2005, p. 5). Although the U.S. political parties remain divided, their partisan supporters are actually moving closer.

Table 12-3 summarizes the results of an investigation into the impact that increased recognition of the scientific consensus on global climate change could have on public policy preferences. The half of the sample that was asked to assume there was “a survey of scientists that found that an overwhelming majority have concluded that global warming is occurring and poses a significant threat” was notably more amenable to taking more aggressive action than those that were not asked to make that assumption.

TABLE 12-3. Effect of Asking Respondents to Presume a Consensus on Science of Global Warming

<i>Preferred Policy</i>	<i>Not Asked to Assume Consensus (half of sample)</i>	<i>When Asked to Assume Consensus (half of sample)</i>
Not take any steps to reduce greenhouse gases that would have economic costs	21%	6%
Take steps to reduce greenhouse gases, but only those that are low in cost	42%	35%
Take steps to reduce greenhouse gases, even if this involves significant costs	34%	56%

Source: PIPA/KN, 2005.

While the majority might now recognize the scientific consensus, there is still a small but respectable core of skeptics. In spite of three major international assessments of the science done by the Intergovernmental Panel on Climate Change involving many leading U.S. scientists over the last decade and a U.S. National Research Council report commissioned by President George W. Bush in 2001, public awareness of the consensus statements from the scientific community is still relatively low, undoubtedly affected by the partisan political disputes over the Kyoto Protocol.

In terms of solutions for addressing climate change, there is a strong and clear preference for new renewable energy technologies, such as wind and solar, and considerable optimism about the costs of these technologies. An MIT study on the future of nuclear power found that providing information had an impact on support for nuclear energy. The largest shift to nuclear power occurred when information on relative prices was provided (MIT, 2003). Similarly, if information on the technology including costs and emissions was provided, another MIT study found that support for both carbon capture and storage and nuclear energy increased substantially (Curry et al., 2004). Nevertheless, in both surveys, support for renewables remained quite strong even in the face of information showing much higher costs than many might have expected. Another notable finding of the NEETF survey cited earlier was that knowledge improved the espoused “pro-environment” response by 10 to 15 percent in many areas such as stated willingness to recycle, turn off lights and appliances when not in use, and lower the thermostat to conserve energy. Nonetheless, greater knowledge of energy and environment problems did not increase the willingness for other desirable behaviors, most notably using other forms of transport instead of driving or to accelerate slowly to conserve gasoline (NEETF/Roper, 2002, Figure 22).

Strength of Opinion

What does it mean to say that the public “favors renewables” or “supports the Kyoto Protocol”?

There are many economic or regional explanations that might be invoked to explain the current situation, but even a narrow focus on public opinion will give pause to the view that public support means that a policy will inevitably be enacted. Support or opposition does not indicate the depth of support or the reaction to moving forward with a policy. Simply lining up supporters against opponents may not offer much insight into the resulting political dynamic.

The issue of opening up the Arctic National Wildlife Refuge (ANWR) to oil exploration provides an example. Opposition to exploration changed slightly from 56 percent opposing exploration in 2002 to 53 percent in 2005, while support for exploration moved from 35 percent to 42 percent. More relevant for policymakers, however, was the fact that almost all that

opposed exploration said they would be upset if drilling was allowed, whereas less than half of those that supported drilling said they would be upset if the refuge was not opened to drilling (Moore, 2005). Fully one-third do not care whether oil exploration proceeds or not, although almost all respondents were willing to voice an opinion.

There can also be significant differences between general beliefs and those at the local level. For example, 54 percent of U.S. residents favor the use of nuclear power to provide electricity for the country, including 17 percent who “strongly favor” nuclear power, against 43 percent who oppose the idea, including 22 percent who voice strong opposition. By contrast, 63 percent oppose building a nuclear power plant in their area, including 4 in 10 who oppose the idea strongly. By contrast, only 35 percent favor the construction of a plant in their area (Carlson, 2005).

In spite of generalized support, there may also be differences in approval of different policies to accomplish the same objective. A survey conducted by Yale University in May 2005 sought to identify preferences regarding policies to address U.S. dependence on imported oil. It found that mandating fuel-efficient vehicles was the leading option among survey respondents. Requiring the auto industry to make more fuel-efficient cars was viewed favorably by 93 percent of the national sample, including 85 percent of Republicans and 90 percent of sport utility vehicle owners. By comparison, 40 percent of the respondents favored a tax on cars with poor gas mileage, and only 15 percent supported increasing the tax on gasoline (Yale, 2005, p. 5). Thus, there may be tensions between the preferred policies of economists or policy analysts and the public. Another example involves the idea of emissions trading. When first proposed by policy analysts, there was considerable opposition. When informed that emissions trading would reduce the costs of compliance from \$50 a month to \$10 a month, support rose from 34 to 66 percent (PIPA/KN, 2004, pp. 11–12).

Changing Behavior and Perceptions of the Role of the Consumer

Most ambitious proposals to address climate change inevitably require some degree of personal sacrifice or inconvenience for consumers, whether that means higher prices or changing behavior patterns. The biggest problem in studying behavioral changes is that usually all that can be discerned is professed behavior. Thus, it is impossible to know if the NEETF study, which showed that more educated respondents were more likely to say they turned off the lights to save energy, actually showed that this group did, in fact, turn off lights to the same extent (NEETF/Roper, 2002). Perhaps their greater awareness of energy issues made them recognize that they should turn off lights more frequently. This could convince them to answer such a question in the affirmative, regardless of their personal behavior.

There is an inevitable tendency to underreport consuming behavior, particularly when conservation and efficiency are perceived as virtues. In certain cases, it is possible to compare the professed behavior against actual data, but this is usually quite difficult. Nevertheless, it can still be informative to examine how individuals claim to react to changes in their environment.

Issue framing can be particularly important in designing behavioral questions. For example, at the time of the surge in gasoline prices in the United States during the summer of 2005, 60 to 70 percent said that the price increases had led them to "cut down" on driving (CBS News, 2005). Yet, in that same period, only 32 percent said they drove less than the previous year when the price rise was not mentioned, while 50 percent said they drove the same amount and 14 percent said they drove more (ABC News, 2005). Final measurement of actual vehicle-miles traveled in 2005 might show some decline compared to 2004 when fuel prices were cheaper, but not nearly to the extent that the first polls might indicate.

Similarly, two-thirds of those polled in August and September 2005 agreed that gasoline price increases had led to "financial hardship" when the average U.S. retail price was just over \$3.00 (CNN/USA Today/Gallup Poll 2005). However, almost 50 percent agreed with the same statement in March 2004 when the average price of gasoline was \$1.70 and in May 2001, when the price was about \$1.66 (EIA, 2005).

The other aspect of views regarding personal behavior that is relevant is the extent to which consumer demand is recognized as having an important role in contributing to either environmental change or to price hikes. Asked in an Associated Press/America Online poll, "Which ONE of the following would you say deserves the most blame for higher energy prices?," fewer than 10 percent were willing to hold the drivers of "gas-guzzling vehicles" responsible, compared to the 30 percent that blamed "oil companies that want to make too much profit," or the 20 percent of the respondents that attributed most blame to the "foreign countries that dominate oil reserves" or to "politicians" (AP/AOL, 2005). Similarly, when a Fox News/Opinion Dynamics survey asked who had "the most control over gas prices," 36 percent named domestic oil companies or producers as having the greatest role, compared to 13 percent that cited government, 12 percent that cited OPEC members or the Middle East, and 10 percent that cited the President or the Bush Administration. Only 5 percent cited consumers as having the most control (FOX News/Opinion Dynamics, 2005).

When posited in a more evenhanded manner, many respondents are more willing to admit that consumers do play some role. Asked who "should share the blame for the rise in gas and oil prices," 31 percent said "waste by consumers," and 20 percent said that this waste had at least some role. Only 7 percent said that consumers played no role (CBS News, 2005).

Identity Politics: Death of Environmentalism?

Another reason for exploring public attitudes in greater depth is the inclination of advocates on one side or another to invoke public opinion to support their position. One of the most influential, or at least one of the most discussed, challenges to the environmental movement came not from its traditional opponents on the right but from two avowed progressives, Ted Nordhaus and Michael Shellenberger. They argue that modern environmentalism, as embodied in the activities of the major national environmental groups, is “no longer capable of dealing with the world’s most serious ecological crisis”—namely global warming (Shellenberger and Nordhaus, 2004, p. 6). Rather, after 15 years of campaigning and having spent hundreds of millions of dollars of funding from private donors and major foundations, environmental groups have “strikingly little to show for it.” Their suggestion for moving forward relies on a heavily partisan assessment that calls for mobilizing the left rather than winning over moderates or conservatives.

The furor over their self-published paper, “Death of Environmentalism: Global Warming Politics in a Post-Environmental World,” led to a rebuke from many environmental groups following its release in October 2004. Carl Pope, president of the Sierra Club, described the attack as “unclear, unfair and divisive.” Pope took issue with many of the article’s presumptions and conclusions and argued that the problem could be attributed to the left more generally, not just environmentalism. Pope did agree that environmental groups had “still not come up with an inspiring vision, much less a legislative proposal, that a majority of Americans could get excited about” (Mieszkowski, 2005).

Critical to the thesis of Shellenberger and Nordhaus are several assumptions about public opinion. To overcome the slow progress of action on climate change, they promoted a broader progressive agenda that sought to leverage coalitions with unions, minorities, and other stakeholder groups. On this point at least, Pope supported the idea of a coalition of progressive organizations as an important step forward.

It is useful to review the evidence that Nordhaus and Shellenberger cite to support their case. They argue that conservatives have been more successful in crafting their message that members of the environmental movement hold dissimilar values from the average U.S. citizen. As evidence of this rightward shift, they noted the following:

The number of Americans who agree with the statement, “To preserve people’s jobs in this country, we must accept higher levels of pollution in the future,” increased from 17 percent in 1996 to 26 percent in 2000. The number of Americans who agreed that, “Most of the people actively involved in environmental groups are extremists, not reasonable people,” leapt from 32 percent in 1996 to 41 percent in 2000. (Shellenberger and Nordhaus, 2004, p. 11)

One of the core problems in gauging support for environmental measures and the environmental movement in particular is that there are wide differences over what being an “environmentalist” means. A Gallup poll in 2000 found that while 83 percent said they agreed with goals of the environmental movement, only 16 percent described themselves as active participants in the environmental movement. Similarly, in a 2002 poll, Gallup found that 70 percent of Americans described themselves as either active in the environmental movement or sympathetic to it. About one-quarter were neutral, leaving only some 5 percent who were unsympathetic (Saad, 2003; Harris, 2005).

Even more problematic for the Nordhaus and Shellenberger thesis that success lies with a progressive coalition, support for environmentalism is virtually unrelated to political persuasion. Work by Gallup in 2003 found that of the 14 percent of the sample that said they were an “active participant in the environmental movement,” 37 percent were self-described conservatives, 39 percent were moderates, and 20 percent liberals. These ideological breakdowns are not very different from those of the general population—17 percent liberal, 41 percent moderate, and 39 percent conservative (Crabtree, 2003). An additional reason to be skeptical of redefining environmentalism as a progressive issue is found in the earlier finding that Republicans accounted for the bulk of the shift towards greater credence in the scientific consensus “that global warming exists and could do significant damage.”

Based on interviews with active members of some 20 environmental groups in the northeastern United States and control groups, Tesch and Kempton identify four quite distinct groups that fall under the catchall term of “environmentalist” (Tesch and Kempton, 2004). Based on their categorization, an environmentalist can be someone who does the following:

- Claims to be concerned about the environment, but takes no action
- Acts to preserve local habitat usually through private actions, also called a conservationist
- Participates in the political process by writing to public officials or attending hearings, also called an activist
- Participates in various forms of direct action, such as civil disobedience, also called a radical

These groups do not share common views, nor do they even all accept the label of environmentalist. With the exception of those belonging to radical or national environmental groups, 8 to 25 percent of environmental groups did not consider themselves environmentalists.

As one of Tesch and Kempton’s interviewees described her dilemma over using the label, “You know you have to watch out for terms anyway because to term yourself or somebody else as an ‘environmentalist,’ ‘religious fanatic,’ or to put a label on somebody . . . [is] limiting and it’s because

you have an idea about what an environmentalist is and it might not be the same idea that I have, which may not be the same idea as somebody else has" (Tesch and Kempton, 2004, p. 77).

In that same vein, the issue is not only what people think, but what their leaders or elected representatives think they think. There is a notable disparity between the public's views and what leaders and political leaders expect those answers to be. Interestingly, not only did the vast majority of Democratic congressional staffers (94 percent) support the Kyoto Protocol, but so too did the majority of Bush administration officials (68 percent). Only Republican staffers, 21 percent of whom supported the Kyoto Protocol, were largely hostile (CCFR, 2004). Nevertheless, regardless of their personal views, most leaders presumed that the public was opposed to the agreement even though their overall level of support (71 percent) was almost identical to that expressed by the political leaders surveyed. Still, many more Democratic staffers (45 percent) and Bush administration officials (41 percent) correctly estimated at least the direction of support compared to Republican staffers (15 percent). The greater recognition of the public support of the Kyoto Protocol by Bush administration officials may help explain their personal backing for the treaty in spite of the administration's continued official opposition.

Shellenberger and Nordhaus argue that "the truth is that for the vast majority of Americans, the environment never makes it into their top ten list of things to worry about. Protecting the environment is indeed supported by a large majority—it's just not supported very strongly. Once you understand this, it's much easier to understand why it's been so easy for antienvironmental interests to gut 30 years of environmental protections" (Shellenberger and Nordhaus, 2004, p. 11). Using their logic, if environmental concerns "never make it into their top ten," one might ask why the environment should be a political priority and why politicians should respond to such a low priority with substantial resources and aggressive regulation. The reality is that there has been longstanding bipartisan support for environmental regulation and it is strong bipartisan support that led to the passage of strong environmental legislation such as the Clean Air Act and the Clean Water Act. To imagine that regulation of greenhouse gases can be accomplished without enlisting moderates and conservatives defies history and more importantly ignores current trends in public opinion.

Conclusion

Simply because opinions may be influenced by cognitive bias, misinformation, or ignorance does not mean they are not legitimate. Every election and referendum is contested with imperfect information. Many more decisions, made on a daily basis by elected leaders and appointed regulators, are taken without explicit recourse to public opinion.

Nevertheless, one might still ask to what extent policymakers should seek to correct misunderstandings or simply proceed as if the public were more fully informed. The “paradox of representation” has long held that while legislators are elected to represent the views of their constituents, they are also elected to govern and are expected to lead and thereby influence public opinion rather than simply voting in the same manner as the public would on every issue. Leaders, therefore, may find themselves unaware of what views are held by the electorate.

Public support is neither necessary nor sufficient for a technology to succeed or fail, but public opinion can influence votes over legislation, research and development funding levels, and regulatory decisions, especially when issues rise to public attention. The level of knowledge of both science and technology and energy and environmental issues affects behavior and ultimately erodes support for the difficult decisions that will be needed on climate change. Current levels of both awareness and understanding of basic scientific facts are low and have not changed significantly in a decade. Knowledge is also sporadic, as some facts are well understood while others are subject to persistent myths.

Education clearly has a role to play. One might contrast the confusion over nuclear power with the remarkably high levels of public understanding of the role that trees play in the carbon cycle. At the same time, few have heard of such technical terms as biomass or carbon sequestration. For whatever reasons, certain basic facts are successfully imparted to the vast majority of the public. Both the media and the education system influence public awareness and understanding, and more effort should be given to better understanding that process.

On the issue of climate change, there remains a stronger level of public support for taking action than realized by many politicians. More importantly, the public has increasingly begun to accept the scientific consensus about global climate change, and with that acceptance comes a greater willingness to support more aggressive action. Much like environmentalism, calls for action on climate change, at least among the public, remain deeply bipartisan.

References

- ABC News. Poll conducted by TNS Intersearch. August 18–21, 2005.
- AP/AOL. Associated Press(AP)/America Online (AOL) poll conducted by Ipsos-Public Affairs. August 9–11, 2005.
- Borchelt, R. “Research Roadmap for Communicating Science and Technology in the 21st Century.” In *Communicating the Future: Best Practices for Communication of Science and Technology to the Public*. Gaithersburg, MD: National Institute of Standards and Technology, 2002.
- Carlson, Darren K. “Public Warm to Nuclear Power, Cool to Nearby Plants: Gender, Politics Affect Responses.” Gallup News Service, May 3, 2005.
- CBS News. Polls conducted on October 3–5 and August 29–31, 2005.

- CBS News/New York (NY) Times. Poll conducted on November 23–24, 1997. Roper Center Question ID: USCBSNYT.97011B, Q06.
- Chicago Council on Foreign Relations (CCFR). *Global Views 2004: American Public Opinion and Foreign Policy*. Chicago: CCFR, 2004. Available at www.ccfcr.org/globalviews2004/sub/pdf/Global_Views_2004_US.pdf.
- CNN/USA. Today/Gallup. Polls conducted on September 26–28, September 12–15, and August 28–30, 2005.
- Coyle, K. J. *Understanding Environmental Literacy and Making It a Reality: What Ten Years of NEETF/Roper Research and Related Studies Tell Us about How to Achieve Environmental Literacy in America*. Washington, D.C.: National Environmental Education & Training Foundation, 2004.
- Crabtree, S. "Surprising Stats on 'Active' Environmentalists," Gallup News Service, April 8, 2003.
- Curry, T. E. "Public Awareness of Carbon Capture and Storage: A Survey of Attitudes toward Climate Change Mitigation." Master's Thesis. Cambridge, MA: Massachusetts Institute of Technology, June 2004.
- Curry, T. E., D. M. Reiner, S. Ansolabehere, and H. J. Herzog. "How Aware Is the Public of Carbon Capture and Storage?" In E. S. Rubin, D. W. Keith, and C. F. Gilboy, eds., *Proceedings of 7th International Conference on Greenhouse Gas Control Technologies*. "Volume 1: Peer-Reviewed Papers and Plenary Presentations." Cheltenham, UK: IEA Greenhouse Gas Programme, 2004.
- Energy Information Administration (EIA). "Retail Gasoline Historical Prices." 2005. Available at www.eia.doe.gov/oil_gas/petroleum/data_publications/wrgp/mogas_history.html.
- European Commission Directorate General for Research (EC). *Eurobarometer—Energy: Issues, Options and Technologies, Science and Society*. Report EUR20624. Luxembourg: European Communities, 2003.
- FOX News/Opinion Dynamics. Poll conducted on September 13–14, 2005.
- Harris. Poll conducted on August 9–16, 2005.
- Harris Interactive. "Majorities Continue to Believe in Global Warming and Support Kyoto Treaty." 2002. Available at www.harrisinteractive.com/harris_poll/index.asp?PID=335.
- Kahneman, D., Paul S., and A. Tversky, eds. *Judgment under Uncertainty: Heuristics and Biases*. New York: Cambridge University Press, 1982.
- Mieszkowski, K. "Dead Movement Walking?" Salon, January 14, 2005. Available at archive.salon.com/tech/feature/2005/01/14/death_of_environmentalism/print.html.
- Miller, J. D., R. Pardo, and F. Niwa. *Public Perceptions of Science and Technology: A Comparative Study of the European Union, the United States, Japan, and Canada*. Chicago: Chicago Academy of Sciences, 1997.
- MIT. *The Future of Nuclear Power: An Interdisciplinary MIT Study*. 2003. Available at web.mit.edu/nuclearpower.
- Moore, D. W. "Public Leans Against Oil Exploration in Arctic Reserve: About a Third of Americans Would Not Be Upset if Oil Exploration Occurs or Not." Gallup News Service, March 18, 2005.
- National Environmental Education and Training Foundation (NEETF)/Roper. "Americans' Low Energy IQ: A Risk to Our Energy Future." Washington, D.C.: NEETF, August 2002. Available at <http://www.neetf.org/roper/Roper2002.pdf>.
- National Science Board (NSB). *National Science Foundation Science and Engineering Indicators 2002*.
- . *National Science Foundation Science and Engineering Indicators 2004*.
- Program on International Policy Attitudes (PIPA)/Knowledge Networks (KN). *Americans on Climate Change*. Washington, D.C.: PIPA, June 2004. Available at www.pipa.org/OnlineReports/ClimateChange04_Jun04/ClimateChange04_Jun04_rpt.pdf.
- Program on International Policy Attitudes (PIPA)/Knowledge Networks (KN). *Americans on Climate Change: 2005*. July 2005. p. 4.

- Saad, L. "On Linking the Environment with Energy Policy." Gallup News Service, March 4, 2003.
- Shellenberger, M., and T. Nordhaus. "Death of Environmentalism: Global Warming Politics in a Post-Environmental World." 2004. Available at www.thebreakthrough.org/images/Death_of_Environmentalism.pdf.
- Tesch, D. and W. Kempton. "Who Is an Environmentalist? The Polysemy of Environmentalist Terms and Correlated Environmental Actions," *Journal of Ecological Anthropology* 8: 67-83, 2004.
- Yale University School of Forestry & Environmental Studies. *Survey on American Attitudes on the Environment—Key Findings*. May 2005. p. 5. Available at www.yale.edu/envirocenter/poll2key.prn.pdf.