



WIND ENERGY

Views on the Environment: Clean and Green

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Executive Summary

As the United States grapples with the issue of global climate change resulting from fossil fuel combustion, and as the U.S. Congress and individual state legislatures consider restructuring the electric utility industry, lawmakers should keep in mind the environmental preferability of renewable energy sources such as wind and the long, continuing record of public support for them.

This is particularly important in view of restructuring, which will have the effect of shifting decisions about the type and quantity of new power plants to be built from utility executives to the general public. Preliminary information suggests that "green," or environmentally-friendly, power sources could win a significant market share. In addition to creating new demand for clean energy sources, this development is likely to create a committed, educated political constituency for clean energy that has not existed in the past.

In such an altered environment for the selection of new generation, public attitudes on the desirability of various power sources will become much more important than they have in the past.

The purpose of this paper is to briefly summarize public opinion surveys on the environment in general, renewable energy in general, and wind energy in particular in that order, using data gathered from polling in the U.S., the United Kingdom, and Canada. At this writing, more than 16 years after the first wind plants began going up in California, there is a solid and growing body of information available on public acceptance of wind energy. This paper draws on more than 25 surveys conducted over the years on wind and renewables, as well as individual findings on attitudes on the environment from other polls.

An abbreviated summary of the public attitudes reviewed in this document is as follows:

Views on the Environment: Public concern about protecting the environment, and particularly those aspects of the environment that relate to human health, such as air pollution, is high and growing.

Views on Renewable Energy: The public strongly prefers using a combination of efficiency and renewables to meet energy needs, and has done so in poll after poll taken since the late 1970s.

Views on Wind, General: The bulk of public opinion on wind is from the U.K., where wind development in recent years has been active and controversial. In more than a dozen surveys taken over the past five years, respondents have expressed strong backing for wind. In addition, support for wind has typically strengthened after a wind plant has been installed and operating for some time.

Views on Wind, Specific: Public polling information on wind energy's specific attributes is also primarily from the U.K. Surveys found that wind's primary positive points are that it is clean, renewable, safe, and helps conserve fossil fuels; its principal weaknesses are the fact that it is intermittent and somewhat more expensive than fossil-fired power. With respect to wind's environmental impacts, those surveyed were most concerned by visual impact and noise. However, in virtually every poll, the number of respondents expressing negative views is very small.

Views on the Environment: Clean and Green

Ever since Earth Day was first observed on April 22, 1970, Americans have generally expressed concern about the state of the natural environment and support for efforts to preserve it. The level of their concern has varied from time to time as coverage of environmental issues in the media has waxed and waned, but there has been a consensus in favor of maintaining or strengthening environmental regulations that continues to this day.

Dr. Barbara Farhar of the National Renewable Energy Laboratory (NREL) has developed an issue brief for the Renewable Energy Policy Project (REPP) that synthesizes information on environmental views from more than 700 national surveys taken in the U.S. between 1973 and 1996[1], and readers seeking more detail in this area are encouraged to consult it. Among Farhar's findings:

- Since the mid-1980s, public opinion has tilted toward **stronger concern about environmental quality**. In 1974, for example, only about 25% of the public felt that "environmental laws and regulations" had "not [gone] far enough.[2] By 1989, this number had increased dramatically, to 55%, and it remained at about half the public in 1996.

- With the waning of the energy crisis since the 1970s, **more people are concerned today about protecting the environment than about obtaining enough energy.** In the early and late 1970s, when oil price shocks were headline news for extended periods of time, concern about energy supplies briefly outweighed environmental sensitivities. More recently, however, the pendulum has swung decisively in favor of the environment, by roughly a 50% to 25% margin.[3]
- **People are willing to pay money if necessary to protect the environment,** in the form of higher taxes or prices or even, in the case of one survey, in willingness to accept "a lower standard of living if it meant a cleaner environment" (63% majority).[4] According to Farhar, "approximately 56% to 80% of respondents to recent national surveys say they would pay a premium for environmental protection or renewable electricity."

The results cited in Farhar's REPP paper are borne out in a variety of other recent polls. Some examples:

- **Global Climate Change:** Asked in April, 1998, whether Congress should act immediately to increase research funding on energy technologies to reduce greenhouse emissions or wait until the international treaty signed in Kyoto, Japan, is ratified, nearly six of 10 (57%) of those with an opinion favored immediate action.[5] Similarly, respondents favored signing an international treaty with "a legally binding deadline for reducing greenhouse gas emissions" by a 50% to 41% margin in late 1996,[6] and more than 70% said in late 1995 that climate change is a "very serious" or "somewhat serious" threat.[7]
- **Pollution:** In a "deliberative poll"[8] conducted among a random sample of customers of Central Power & Light, a utility based in south Texas, in mid-1996, respondents ranked "reducing pollution" as their highest concern among a variety of issues (such as "meeting everyone's basic [electricity] needs" and "promoting economic growth"), with an average rating of 9.32 out of a possible 10. Customers of Southwestern Electric Power Co., which serves parts of Texas, Louisiana, and Arkansas, also picked "reducing pollution" as their top choice at an average of 9.1 in a deliberative poll a few months later,[9] and customers of West Texas Utilities rated it at 8.9.

Views on Renewable Energy: A Consistent Preference

Farhar sums up public attitudes on this question clearly and emphatically: **"The pattern of preferences for using energy efficiency to decrease demand and [renewable energy sources] to supply energy has been consistent in the poll data for 18 years. This is one of the strongest patterns identified in the entire data set on energy and the environment."**

A series of national polls conducted for the Sustainable Energy Coalition (formerly Sustainable Energy Budget Coalition) by various pollsters, some of them well-known Republican survey firms, has documented this preference in recent years:

- In December, 1995, Vincent Breglio, a pollster who had worked for Presidents Reagan and Bush, found that when asked which technologies should receive the highest research priority from the Department of Energy, respondents selected renewable energy sources (34%) first and energy efficiency (21%) second.[11] By contrast, 9% picked nuclear energy. In the same poll, respondents said by a nearly 4-to-1 margin (75% to 20%) that the U.S. should do something to reduce dependence on oil imports. Among those supporting action, 94% backed energy efficiency and 90% developing renewable energy alternatives. Meanwhile, 72% opposed developing a new generation of nuclear plants.
- Breglio tallied similar results in another survey a year later.[12] This time, 56% of respondents named either renewables or efficiency as their top preference for research funds, compared with 55% in 1995. And while 73% of those surveyed said cutting taxes made a difference in how they voted for Congress, 52% nevertheless supported tax incentives for either renewable energy or energy efficiency. Support for similar incentives for natural gas or nuclear power measured only in the single digits.
- In the most recent Sustainable Energy Coalition poll, conducted by International Communications Research in April, 1998,[13] the number of respondents picking renewables or efficiency as their highest research priority rose to fully 60%, compared with 10% for natural gas, 8% for fossil fuels, and 6% for nuclear power.

Results from the several Texas utility deliberative polls conducted in 1996-1998 provide a similar response pattern. Customers of each utility were asked to choose among four options--energy efficiency, renewable energy, fossil-fired power, and wholesale purchases--for meeting the utility's future supply needs. When respondents' first and second choices were combined, results were as follows:

Utility	Efficiency	Renewables	Fossil	Wholesale
West Texas Utilities	61%	65%	37%	42%
Southwestern Electric Power	75%	57	34	27
El Paso Electric	81%	81%	15%	-

Customers of three of the utilities--West Texas Utilities, Southwestern Electric Power, and Central Power & Light--were asked to rate a series of utility planning options on a 1-10 scale, with 10 being "extremely important." In each case, they rated the same three options above all others--"generation by technologies such as wind and solar power," "options that add an extra measure of environmental protection," and "services and technologies which reduce the need for additional electric generation facilities."

Utility	Wind & Solar	Environment	Efficiency
West Texas Utilities	8.8	8.3	8.0
Southwestern Electric Power	8.2	8.8	8.3
Central Power & Light	8.4	8.35	8.5

Extensive polling on attitudes toward wind energy in the United Kingdom has also included a few questions on renewable energy. Again, sentiment is strongly positive:

- At Cilciffeth in Wales (1995), 79% of those responding favored use of renewable energy sources.[14]
- In Pembrokeshire (1996), 83% said more electricity should come from renewable energy.[15]
- At Coal Clough in Lancashire (1996), "the vast majority . . . felt that energy production using renewable sources was important." [16]

Views on Wind, General: Enthusiastic Support

As one might expect from the foregoing, public support for wind energy is strong. This section of this report will focus on attitudes in general, while the following section will look at public opinions on various specific aspects of wind energy such as aesthetics and noise.

The bulk of wind-specific polling has taken place in the United Kingdom, where the nuclear industry has organized and funded a "countryside preservation" group to oppose wind development. This organization, Country Guardian, has been successful in stimulating enough controversy to delay or even defeat a number of wind projects. Even so, opinion surveys in areas where wind development has taken place show strong general public support.

A summary of these surveys follows:[17]

Location	Sponsor/Organizer	Date	In Favor	Against	DK
Delabole	DTI	1992/3	84	4	11
Cemmaes, Powys	DTI	1992/3	86	1	13
Llandinam, Powys & Llangyryfon, Dyfed	CCW	1992 1993	83 78	3 8	14 14
Llandinam Rhyd-y-Groes, Taff Ely	BBC	1994	76% 61% 74%	17% 32% 9%	8% 7% 17%
Kirkby Moor, Cumbria	NWP	1994	82%	9%	9%
Bryn Titli, Powys	NWP (pre construction) NWP (open day)	1996	68% 94%	14% 3%	19% 3%
Trysglwyn, Anglesey	NWP (open day)	1996	96%	4%	-
Coal Clough, Lancashire	Liverpool University Dissertation	1996	96%	4%	-

NWP: National Wind Power

CCW: Countryside Commission for Wales

BBC: BBC (Wales) and the University of Wales)

Of particular significance, public opinion in support of wind usually shifts to become even more strongly in favor once the wind turbines are installed and operating. For example, in surveys carried out by the British Broadcasting Company in three communities in Wales, opinion was measured before and after construction. In Taff Ely, support for wind increased from 32% to 74%; in Rhyd-y-Groes, from 36% to 61%; and in Llandinam, from 65% to 76%. In another survey in Cornwall, the percentage of respondents approving or strongly approving of windpower rose from 40% before construction to an overwhelming 85% afterwards. And in the Welsh community of Cemmaes, surveys before and after operation both found 86% support. Commented the pollster, "By the end of the first year of operation the 'vast' majority of respondents were still feeling positive about the wind farm. There has been little adverse reaction to it, and most people have proved generally supportive or unconcerned."

Only one public opinion poll, by an anti-wind advocacy group, has found respondents solidly opposed to wind. However, the results of that survey appear to have been skewed by the survey procedure--Country Guardian distributed a "fact sheet" detailing its perception of windfarms to respondents prior to the survey.

The British Wind Energy Association, which has compiled records on wind polls in the U.K., perhaps best sums them up: "Since 1990, 13 different research studies have been carried out by different research groups . . . In total, these surveys have canvassed the opinions of 3,549 people . . . Every single study shows that the overwhelming majority of residents in areas with a wind farm are pro-wind power, both in theory as a renewable energy source and in their area."

The two other wind-specific public opinion surveys that has been taken, from Canada in 1995 and southern Vermont in late 1996, also found strong positive attitudes.[18]

The Canadian poll, of 1,500 adults, found that 82% of respondents would be interested in buying wind-generated electricity if it were available for "about the same price" as electricity from other sources, and 63% said they would "definitely" or "probably" pay more to purchase wind power.

The Vermont survey was mailed to a random sample of residents in the town of Searsburg, where a 6-megawatt wind farm was planned (and has since been built).

Sixty-three percent of those receiving the survey questionnaire completed it, a very high percentage. Of those responding, 89% said they would like to see increased use of wind energy, compared with 79% for hydro, 53% for municipal waste, 47% for gas, 25% for nuclear, 22% for wood, 6% for coal, and 5% for oil.

As with the surveys in Britain, the Vermont sample found little objection to wind development in Searsburg itself. Residents were asked (1) if they supported the Searsburg project, (2) if they would support it if it were in another community, and (3) if they would support it if there were no better place in Vermont where it could be built. Results to all three options varied only slightly, from 73% to 76% in favor, indicating an absence of "not-in-my-backyard" sentiment.

Views on Wind, Specific: Pluses Top Drawbacks

Public polling on wind energy's specific attributes is also from the United Kingdom and Vermont. In general, surveys found that wind's primary positive

points are that it is clean, renewable, safe, and helps conserve fossil fuels; its principal weaknesses are the fact that it is intermittent and concerns about cost.

With respect to wind's environmental impacts, those surveyed were most concerned by visual impact and noise. However, in virtually every poll, the number of respondents expressing negative views is very small (20% or less). The British Wind Energy Association again provides a good summary:

" . . . [W]here two phases of research took place [typically, one immediately after wind plant construction and a second one a year later], concerns about noise and visual impact were less in the second survey than the first, demonstrating that direct experience of wind farms tends to allay fears for the majority. This was true in Cemmaes, where only 18% of people could hear the turbines [and] only 2% were bothered by the noise, and in the BBC survey, in which noise was a primary concern at Stage 1, and yet at Stage 2, only 21% could hear the turbines at all, and the majority of them were unconcerned.

"Concerns regarding the visual impact of the wind farms tended to follow the same pattern, with a decrease in those concerned at Stage 2, once the wind farms had been running for some months."

The Vermont survey took a somewhat different approach from the U.K. polls, offering a series of more detailed known or potential attributes of wind and asking respondents to rate each from 1 to 7, with 1 being a "big advantage" for wind and 7 being a "big disadvantage. Results were as follows:

- "It does not pollute the air and water." Average response 1.41, with 78.6% voting 1.
- "It's an energy source that can be produced and used locally." Average 1.92, 53% voting 1.
- "Land under wind turbines can be used for some other purposes." Average 2.90, 26% voting 1.
- "The wind power facility will increase the local tax base and lower property taxes." Average 2.99, 24% voting 1.
- "Wind turbines must be on hilltops to intercept strong winds, resulting in man-made structures in the Vermont landscape." Average 3.86, 19% voting 1, 12% voting 7.
- "Wind power's impact on birds and wildlife (which is not well understood, and may be negative)." Average 4.68, 17% voting 7.

- "Wind power is not reliable because the wind does not blow all the time."
Average 4.82, 13% voting 7.
- "Wind turbines may make sounds heard by neighboring residences."
Average 5.27, 25% voting 7.

However, while the Vermont survey indicates that noise, wildlife impacts, and visual impacts are potential *prospective* problems for wind, the British polls make it clear that in *practice*, negative concerns about wind plants are not borne out. (The Vermont survey also suggests this possibility--note that the highest vote for any item as a "big disadvantage" was 25%, while 78% voted for its nonpolluting nature as a "big advantage." This suggests a predisposition)

Some typical findings from the U.K.:

- The number of those concerned about noise dropped from 86% immediately after construction to 20% a year later (Cornwall).
- 80% of those responding felt that the local wind plant was a potential tourist attraction (Cornwall).
- 92% of respondents were not bothered by the visual impact of the local wind plant (Cemmaes).
- 3% of respondents were bothered by the wind plant's noise (Cemmaes).
- 23% of those responding could see the wind farm from their homes. Of those, 22% (or 5% of all respondents) were concerned, while 61% were "not at all concerned" (Kirkby Moor).
- 81% believed the wind farm "has caused little disruption." (three areas, Wales).

Conclusion

Wind and other renewable energy sources enjoy strong popularity with the public, a logical outgrowth of increasing concern about the environment and the perception that renewable energy sources have less environmental impact than their fossil and nuclear counterparts.

In the U.S. to date, wind energy's visibility as a potential source of electric power has been very low, both metaphorically and literally, with sizable wind plants operating only in the state of California. Now that situation is changing, with a score or more of utilities initiating "green power" programs in which wind is an option, and with large wind turbines being built or planned in Colorado,

Iowa, Kansas, Minnesota, Nebraska, Oregon, Texas, Vermont, Wisconsin, and Wyoming. As its visibility grows, wind is likely to add to its already strong latent public support and to become one of the most preferred electricity generation options of the next decade.

NOTES

[1] Farhar, Barbara C., *Energy and the Environment: The Public View*. Renewable Energy Policy Project (College Park, Md.; October 1996).

[2] The actual wording of the survey question, which has been repeated in surveys taken over time, is: "At the present time, do you think environmental protection laws and regulations have gone too far, or not far enough, or have struck the right balance?" See Farhar, *op.cit.*, Figure 2.

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

[4] Farhar, B.C., "Trends in U.S. Public Perceptions and Preferences on Energy and Environmental Policy." *Annual Review of Energy and the Environment* 19:211-239 (1994).

[5] "National Poll Again Finds Renewables Support Strong." *Wind Energy Weekly*. (Washington, D.C.: American Wind Energy Association, May 18, 1998), Vol. 17, No. 797, p. 3.

[6] "RPS, Renewables Gain Backing in Latest National Poll," *Wind Energy Weekly*. (Washington, D.C.: American Wind Energy Association, December 16, 1996), Vol. 15, No. 727, p. 2.

[7] "Poll Indicates Bipartisan Support for Renewables," *Wind Energy Weekly*. (Washington, D.C.: American Wind Energy Association, January 22, 1996), Vol. 15, No. 681, p. 2.

[8] "Deliberative polling" combines statistically valid surveys with opportunities for those surveyed to deliberate among themselves and to ask questions of experts. Several Texas utilities conducted such polls in two-day sessions in 1996-1998 while developing integrated resource plans to present to the Public Utility Commission of Texas. "South Texans Back Clean Energy in Utility Meeting," *Wind Energy Weekly*. (Washington, D.C.: American Wind Energy Association, June 17, 1996), Vol. 15, No. 702, p. 3.

[9] "Customers of Third Utility Endorse Renewables, Efficiency," *Wind Energy Weekly*. (Washington, D.C.: American Wind Energy Association, September 9, 1996), Vol. 15, No. 713, p. 3.

[10] "Wind and Solar Score Strongly in West Texas Utilities Survey," Wind Energy Weekly. (Washington, D.C.: American Wind Energy Association, August 26, 1996), Vol. 15, No. 711, p. 1.

[11] See note 7 supra.

[12] See note 6 supra.

[13] See note 5 supra.

[14] "A Summary of Research Conducted into Attitudes to Wind Power from 1990-1996," Simon, A. British Wind Energy Association, September 1996. This information is available from the BWEA Web site, <<http://www.bwea.com>>.

[15] Ibid.

[16] Ibid.

[17] Ibid.

[18] "Wind Scores Well in GMP Public Opinion Survey," Wind Energy Weekly. (Washington, D.C.: American Wind Energy Association, October 14, 1996), Vol. 15, No. #718, p. 2.