

The Offshore Wind Power Debate: Views from Cape Cod

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Wind power resources on the eastern U.S. continental shelf are estimated to be over 400 GW, several times the electricity used by U.S. eastern coastal states. The first U.S. developer proposes to build 130 large (40 story tall) wind turbines in Nantucket Sound, just outside Massachusetts state waters. These would provide 420 MW at market prices, enough electricity for most of Cape Cod. The project is opposed by a vigorous and well-financed coalition. Polling shows local public opinion on the project almost equally divided. This article draws on semistructured interviews with residents of Cape Cod to analyze values, beliefs, and logic of supporters and opponents. For example, one value found to lead to opposition is that the ocean is a special place that should be kept natural and free of human intrusion. One line of argument found to lead to support is: The war in Iraq is problematic, this war is “really” over petroleum, Cape Cod generates electricity from oil, therefore, the wind project would improve U.S. security. Based on analysis of the values and reasoning behind our interview data, we identify four issues that are relevant but not currently part of the debate.

Keywords environmental values, facility siting; marine policy, offshore wind power, public opinion

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The way is paved for offshore wind energy development to happen in a big way in this country. We're finding [that] we're the guinea pig. National policy is happening in our backyard, in Nantucket Sound. (Interviewee CP8)

. . . anybody who had anything to do with wind, from the Dept. of Energy all the way down to GE company who builds turbines and everybody who owned a wind farm development in this country . . . are *all* looking at the ocean as the next big frontier. And what they're watching is to see what happens with this project. Because if this project goes down in flames . . . that may prevent the development of offshore wind for a very long time. (CP7)

If the wave of the future is wind energy, then all for it. Why wind energy in the ocean? I'm not for that at all. (CW10)

I heard there's a company going up and down the coast looking for places to put [offshore wind power]. And the irony of that is they proposed one off the coast of Massachusetts up there and all those rich energy loving environmentalists up there shot that down before it even got off the ground. (Delaware interviewee DPY)

Introduction

Recent assessments of renewable energy show that wind power has, since the turn of the century, become cost-competitive in the sites with the most favorable wind regimes (Herzog et al., 2001). Until very recently, large-scale North American wind resources were believed to exist in the Great Plains of the United States, northern Canada, and central Canada only (Grubb & Meyer, 1993). Although these huge resources are enough to meet the entire continent's electrical needs, they are distant from the large coastal cities where electricity is primarily consumed—imposing a need for costly large-scale transmission lines (Cavallo, 1995). In just the last couple of years, it has been recognized that the Atlantic Ocean also has a large wind resource on the continental shelf, close to East Coast cities. Three or four manufacturers have developed large wind electric turbines designed to be placed offshore, in waters up to 20–30 m in depth. To date these have been placed only in European waters. By late 2003, the resources, the technology, and the economic viability had all come together in the Eastern United States, potentially allowing large-scale deployment to begin by 2005.

The furthest advanced of a handful of proposed U.S. offshore wind developments is in Nantucket Sound, off the Southern coast of Cape Cod, Massachusetts. This proposal has engendered a widespread, well-organized, well-financed, and politically potent opposition. This movement's strength, and the apparent contradiction of such opposition coming from a population thought of as politically liberal and environmentally concerned, have garnered national press coverage (e.g., Burkett, 2003). A second project was proposed by the Long Island Power Authority for the southern edge of Long Island, with an RFP issued in 2003. At least two other developers are exploring additional possible sites but none have concrete proposals under review.

The Nantucket proposal, upon which this article focuses, seems almost a textbook case of environmental policy debates and environmental mobilization. The project would provide clean energy but would intrude on a beautiful, unspoiled natural area. One can

see the wind turbines as an ugly intrusion on the seascape or as a beautiful portent of clean energy for the 21st century; as a threat to tourism or an opportunity for year-round local jobs; as a menace to marine and avian species or as pollution reduction; as a government-financed boondoggle or a hedge against foreign oil dependence; as an example of market solutions to environmental problems or as greedy developers spoiling Cape Cod yet further. Because there is an oil-burning electric plant in the same area, the possibility of wind electricity displacing oil electricity makes the air pollution and energy security aspects of wind energy locally immediate and easy to visualize. However, no public commitment has been made to shut down the oil generator if the wind project is built (they are managed by different entities and their generation is governed by fluctuating electricity markets). Another potentially important issue in this locale, one that we will show is not part of the debate, is that parts of Cape Cod are at low elevation, with beaches and salt-water wetlands important environmentally, economically, and culturally; thus climate change caused by burning fossil fuels would have more effect on Cape Cod than most areas. By a quirk of geography and law, the proposed site is surrounded on three sides by lands of the State of Massachusetts, yet the waters are Federal.¹ Only the electrical transmission line would pass through Massachusetts' waters. Thus, the permitting process is led and primarily controlled by the Federal Government, with the state having minimal influence. The Federal law governing the approval or denial of the project is laughably mismatched to the issues under debate, with the lead agency's prime mandate being to determine whether the wind towers would constitute an "obstruction to navigation" (Rivers and Harbors Act 1899; also see Firestone et al. 2004).

The project, as one informant described it, "has pitted environmentalist against environmentalist" (CP6). It is a revealing and rich case of environmental values, beliefs, and mobilization, operating in the context of environmental policy and law. In this article, we draw on interviews with residents to analyze the reasons for the opposition to, and support for, the proposed offshore wind development. As a prelude to our analysis of the public's views, we describe offshore wind power and the proposed Nantucket Sound development. After analyzing our interview data on the debate, we then lay out issues that seem important but that are not highlighted in the debate so far.

Why Wind Power? Why Offshore?

Wind turbines tap a renewable energy resource. Air motion spins a propeller, which generates electricity. As an electricity source, it competes with coal, natural gas, and petroleum, all of which cause air pollution and give off CO₂, the primary anthropogenic cause of climate change. Why is wind power being pursued now rather than other renewable energy sources like solar energy or tidal power? The answer is a cross between resource size, geophysics, and cost of current technology. For example, solar electricity is abundant and it is cost-effective in remote locations. But for large-scale power, wind is far cheaper (e.g., 4¢/kWh for Class 6 wind versus 28¢/kWh for solar photovoltaic, Hertzog et al., 2001). Hydroelectric power river locations are mostly tapped, and there are concerns about the environmental impact of large dams. There are other niche renewable energy technologies such as geothermal or tidal power, which may be sensible in a few locations but could not provide more than a couple of percent of world electrical power needs, and still others, such as ocean thermal and undersea current generators, which are as yet undeveloped in their technologies, economics, and/or understanding their environmental impacts.

Thus, the short answer to “Why wind?” is: the technology is mature, reliable generators are available, it is already cost-competitive; it produces essentially no pollution or greenhouse gases, and it is a very large resource.

This combination of favorable resources, economics, and recent maturation of technology has led to explosive growth. Figure 1 shows the growth in installed capacity, which climbed to 39 GW by the end of 2003.

Wind power also has the economic characteristic of being labor-intensive; it requires more labor per MW generation than any other electric generator (Greenpeace and European Wind Energy Association, 2002). Although modern wind turbines are entirely automated, they are nonetheless large rotating mechanical devices exposed to the elements that require regular inspection, lubrication, and occasional repair. At the local level, wind power creates more long-term employment than other power sources.

High labor costs also strongly affect optimum unit size and development size—larger machines and larger clusters are more cost-effective because, for example, mechanics, electricians, ornithologists, and boats or trucks are shared across more output and revenue. It is also important to locate areas of frequent high winds, as the investment in machines and labor only pays back when the wind blows frequently and strongly. Size optimization and favorable wind sites are essential for labor-intensive wind to cost less per MWh than coal.

How much potential power is offshore? Although no thorough assessment of the resources has been made, a preliminary estimate was recently presented by the National Renewable Energy Laboratory (NREL) (Butterfield, Musial, & Laxson, 2004)—in the shallower waters (<30 m) of New England and the Mid Atlantic States, assuming only 1/3 of that area is available (due to shipping lanes, protected ecosystems, and other coastal uses), summing their estimates yields a 95 GW potential. For comparison, that

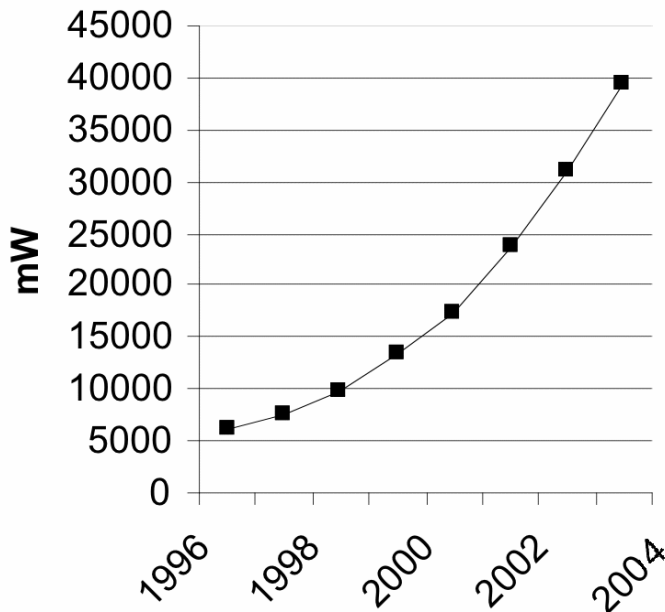


Figure 1. Growth in installed world capacity of wind power, 1996–2003 (American Wind Energy Association, 2004).

amount of wind power potential is approximately equal to the entire generating capacity of these coastal states (Maine through Maryland) of 99 GW (Energy Information Administration, 2004). Currently available products use monopile towers that can be placed up to 20 m depth. As deeper-water mountings are developed and become available, there is an additional 386 GW in the deeper waters out to 50 nautical miles from shore.

These startling resource numbers, the availability of turbines at competitive market prices to harvest this power, the proximity to load centers, and the now-favorable economics raise the possibility of displacing much of the fossil fuel power on the East Coast of the United States. Whether or not this possibility is realized will depend on public acceptance and the policies for project evaluation and permitting. This article analyzes public acceptance of wind turbines in the ocean; a simultaneous paper by an overlapping set of authors (Firestone et al., 2004) considers permitting and regulatory issues.

Prior Studies of Public Support and Opposition

Despite public support for wind power in general, opposition at specific sites can block development. As shown at Tejon Pass, California and Livingston, Montana, well-organized opposition, even by a minority, can defeat local projects (Richter, 2002, 37). In Germany, where governmental support of wind power development has resulted in the world's highest wind power growth rate, the most common reason cited for rejecting new wind turbine proposals is "reduction in the value of existing landscapes" (Hoppe-Klipper and Steinhäuser, 2002, 85).

Many wind industry experts did not anticipate environmental opposition to wind power (Richter, 2002, 38). They apparently presumed that the macro-environmental benefits were so compelling that local objections could be disregarded as parochial and self-serving. In addressing a now common theme, Brittan talks about the macro/micro schism that wind power has created within the environmental community by pointing out that wind power helps solve invisible problems whereas the impact of wind power is "clear and unavoidable" (Brittan, 2002, 60). Put another way, wind power's benefits are global and invisible whereas the costs are local (Hoppe-Klipper and Steinhäuser, 2002, 86).

Several studies have found that support for local wind projects often increases once the projects are built (Walker, 1995; Krohn & Damborg, 1999; Bishop & Proctor, 1994). One study found a slight "U" pattern: Acceptance is high initially, it drops during the planning and construction, and increases almost to the initial level after the facilities open (Gipe, 1995 cited by Krohn & Damborg, 1999). In a study of three projects, with the surveys conducted pre-construction and three years post-construction, acceptance rose by 25%, opposition rose 1.6%, and undecided fell 18% (Bishop & Proctor, 1994). In these three projects, the predominant shift was from undecided or not answering to favorable, with opponents remaining opposed.

Reasons for Support or Opposition

Short (2002) notes that in England, three-quarters of proposals fail and suggests this is due to industry's failure to "grasp the important links among landscape, memory and beauty in achieving a better quality of life" (Short, 2002, 45). He proposes that rather than attempting to marginalize those holding such views, developers should appeal to the concept of global citizenship by emphasizing global benefits over local costs.

Looking at factors influencing support or opposition, research in Germany has identified public feelings toward the developer, the local decision makers and the decision-

making process (Erp, 1997 cited by Krohn & Damborg 1999). Looking at the institutions and processes in California, Bosley & Bosley (1988) characterized the wind industry at that time as small independent producers without public relations staff, who thus fail to respond to concern or lack of knowledge from local environmental organizations and citizen groups, leading in turn to mobilization of these groups to defeat of the project.

A few studies have explored the reasons for opposition having to do with place and preservation, issues we find important in our study. Schwahn (2002, 139) comments that although there was general support for wind power, some local projects in the 1990s made locals feel “expelled from their homeland.” He describes this as a “public sense of angst brought about by the rapid changes in the landscape that wind power can bring.” However, it was regarded as a subjective feeling that residents were reluctant to express directly. Instead they resorted to expressing environmental and economic objections.

A related analysis by Pasqualetti (2002) studied wind development in the San Geronio Pass, CA. This area was considered unsuitable for other development, in part due to the strong winds. However, locals valued the “landscape permanence” of this area. He attributes much of the opposition to the conversion of this desert area into “an industrial landscape” violating the expectations of nearby residents who expected that the desert landscape would remain forever unchanged.

Is Opposition NIMBY?

Much of the environmental movement is comprised of local actions often in opposition to proposed local facilities (Kempton et al., 2001). One label that has been given to local opposition is NIMBY (“not in my backyard”). NIMBY has been defined as “an attitude ascribed to persons who object to the siting of something they regard as detrimental or hazardous in their own neighbourhood, while by implication raising no such objections to similar developments elsewhere” (Simpson & Weiner, 2003). For example, with regard to solid-waste-disposal facility siting, Lober and Green comment that the NIMBY argument “contends that people from the host community perceive an imbalance between the benefits they will receive from hosting a disposal facility . . . and the costs they will bear” (Lober & Green, 1994, 34). Krohn and Damborg note that, when it comes to wind development, NIMBY can be used to describe people who “support wind energy on an abstract level but object to specific local projects because of the expected consequences primarily concerning noise and visual impact” (Krohn & Damborg, 1999, 957).

Although proponents of the project often label opponents NIMBY, we feel that use of this term does not explain the opposition. We have three reasons for our not using this term. First, it is generally used as a pejorative implying selfishness as an underlying cause; second, it appears to incorrectly describe much local opposition to wind projects; and third, the actual causes of opposition are obscured, not explained, by the label. These are expanded in what follows.

Although the term NIMBY can be used as a neutral descriptor, more often than not it is used to imply selfish behavior and is used as a pejorative. Brion writes that NIMBYs are generally viewed as bad citizens who put their own private interests ahead of the interests of wider society (Brion, 1991). Even when the term is used in a more neutral sense, for example, when Inhaber argues that NIMBYs act “logically, in their own interest” (Inhaber, 1998, 11), it still contains an implied attribution of self-interest; implied attributions constitute neither evidence nor an explanation.

Our second objection to labeling offshore wind opposition NIMBY is that, even

without the negative connotations, it may not be accurate. In a study conducted in the Netherlands, despite noting that the main factors that affect an individual's evaluation of a proposed development are local variables (such as the type of landscape that will be used, the scenic value of that landscape, beliefs about interference such as noise, and the impacts on birds and nature), Wolsink points out that "this does not mean that people are suffering from NIMBYism" (Wolsink, 1996, 1087). In a later study using data collected around three wind farms, again in the Netherlands, Wolsink (2000) reports that over half of those asked put greater weight on the wider public interest in the project rather than their own individual cost-benefit calculations. Only about a quarter of the respondents related these costs and benefits to their own individual utility. To classify this remaining one-quarter subset of the population as NIMBY, they would need to be in favor of wind power elsewhere, but the data showed that few were. Wolsink concludes that most opponents to local wind projects cannot accurately be characterized as NIMBY (Wolsink, 2000, 54). A recent study in Sweden also found that feelings toward wind power were not strongly influenced by NIMBY issues but rather by levels of income, education, age, and whether the person has an interest in environmental issues (Ek, 2005). Consistent with these earlier studies, we observe from our data (following) that offshore wind opponents on Cape Cod split over whether or not they oppose all offshore wind.

Our third objection to the term NIMBY is that even though some of our interview data could be labeled NIMBY, this label leaves the cause of opposition unexplained. Vitte, Pollock, and Lilie suggest three factors that affect people's beliefs about controversial siting decisions and that should be considered when a situation has been labeled NIMBY. These are: "(a) the core cultural values that people bring to an issue; (b) the manner in which an issue is presented to the public, through significant opinion leaders in the community and the media; and (c) the ways in which people make preferred connections between their core values and the resulting issue positions" (Vitte, Pollock, & Lilie 1993, 125). Rather than simply labeling local opposition NIMBY, we attempt to elicit these cultural values that people bring to the debate, and the connections they draw.

The Cape Cod Proposal

A private company, Cape Wind Associates, proposes to install 130 wind turbines in 62 km² (24 square miles) of Nantucket Sound. They plan to use the new General Electric model 3.6s wind generators, designed exclusively for offshore use. These machines are 128 meters from sea level to top blade tip (420 feet, or about 40 stories) and their nameplate electrical output is 3.6 MW. This development is projected to generate a peak power of 420 MW, adding up to 1,491,384 MW hours of electricity per year, which is about 3/4 the electrical needs of Cape Cod, or 1/10 of the demand of the entire state of Massachusetts (Cape Wind, 2004a).² Geographically, the developer states that Nantucket Sound is a highly favorable site for wind development, arguably the best on the east coast (strong steady winds, close to power lines on shore, shallow water, protected from high waves, and minimal conflicts with transportation systems). Financially, private investors are supplying about \$750M capital; about \$12M has been spent to date on environmental impact studies, erecting a wind measuring tower on-site, and an extensive public relations campaign.

The proposal to build what could become the United States' first offshore wind farm, in the waters of Nantucket Sound, has generated a vigorous local opposition movement,

focused around the Alliance to Protect Nantucket Sound (an organization specifically created to oppose the development). The Alliance seems to have both popular support and a financially strong core. In 2003 it received \$1.7 million from 2,891 individuals, with just 56 of them giving \$1.3 million of that; the top four individuals gave over \$100,000 each, including a loan that was forgiven (Zindler, 2004). A similar pattern with a small number of large and very large donations was seen in 2002 (Zindler, 2003). Publicly declared opponents of the project include several local environmental and business groups, the Editorial page of the *Cape Cod Times*, U.S. Sen. Ted Kennedy, U.S. Rep. William Delahunt, several state legislators, and the Massachusetts Governor and Attorney General.

The opposition comes primarily from those who consider themselves environmentalists. For example, the Alliance to Protect Nantucket Sound's website says: "The Alliance is a 501(c)(3) nonprofit environmental organization dedicated to the long-term preservation of Nantucket Sound" (Alliance to Protect Nantucket Sound, 2004). The various opponents mostly support wind power in general, and split on whether they oppose wind power anywhere in the ocean. Opposition from those who consider themselves environmentalists has been seen in other wind projects (Bosley & Bosley, 1988; Walker, 1995; Krohn & Damborg, 1999; Wolsink, 2000).

The Alliance to Protect Nantucket Sound and its allies have conducted a public campaign using television and radio spots as well as many guest editorials in the local newspaper, *The Cape Cod Times*. Signs against the project dot yards and some storefronts (Figure 2). As noted previously the Alliance is well financed. It spent \$1.1 million from May through December 2002 (Zindler, 2003); in 2003 it raised \$1.7 million and spent \$2.4 million (Zindler, 2004). The wind industry, and even some analysts (e.g., Pasqualetti 2004, 35) have characterized the Alliance as being primarily concerned about the visual-aesthetic impact. Based on our interviews with their senior staff, their website, and their written communications to us, this is a deficient explanation. A good case could be made from available data that the environmental impacts of the project and the unfairness and inadequacy of the permitting process are both more important issues. However, we do not focus on this organization, rather this article draws on multiple data sources to explain the beliefs and motivations of the public.



Figure 2. Sign seen in yards and businesses on Cape Cod, from the Alliance to Protect Nantucket Sound.

Another local grassroots group, “Clean Power Now,” is the primary independent supporter of the Cape Wind proposal. This group is far less visible locally than the Alliance and appears to have far less funding; its tactics include attending town meetings, hosting meetings with business groups and local experts, and recently, running newspaper advertisements (Clean Power Now, 2004). One national group (Greenpeace USA) and several regional ones have come out in favor of the project; more environmental groups (e.g., NRDC, FOE, CLF, UCS, WWF) are reserving endorsement pending release of the Environmental Impact Statement (EIS).

Prior Surveys on Cape Cod and the Islands

Three surveys of residents’ views on the wind proposal have been conducted; one funded by Cape Wind (Opinion Dynamics Corporation, 2002), a second funded by the Alliance (Haughton, Giuffre, & Barrett, 2003), and a third jointly funded by a local newspaper and radio station (DeSantis & Reid, 2004).

The Cape Wind-funded survey sampled 400 voters of the Cape and Islands, and an additional 200 from the state of Massachusetts. Both were random samples, contacted by phone in September 2002, and had sampling errors of 4.9% and 6.9%, respectively. Respondents were read the following description of the debate: “People who support the project say it is needed primarily to generate clean, renewable energy for Cape Cod and also to reduce our reliance on imported energy. People who oppose the project say it’s not needed primarily because this is a bad location due to the project’s visual impact—and also that a private company should not profit from a public resource like Nantucket Sound.” (As we will see from our interviews, this omits central parts of the opposition argument.) Given that question wording, in 2002 the majority of respondents supported the project, 55% for to 35% against. In MA overall, it was supported by a wider margin, 64% to 22%. This survey also found that 47% of Massachusetts’s residents, and 42% of the residents of Cape Cod, Martha’s Vineyard and Nantucket (the Islands) favor wind energy as the best choice for future energy production (Opinion Dynamics Corporation, 2002). The survey also asked for the reasons why residents favored or opposed the project; because question format and results were very similar in the more recent media-sponsored survey, we review these results when we discuss the latter.

The Alliance-funded survey (Haughton, Giuffre, & Barrett, 2003) focused on economic impacts. Questions were asked in person in the six towns from which the project would be most visible from shore. Two populations were sampled: homeowners within these towns ($N = 501$), and tourists approaching a variety of locations in these towns ($N = 497$). The survey researchers report confidence intervals of 4.4% on each sample, but one must consider that this confidence is with respect not to the general population but with the homeowners and tourists in these particular six towns. Respondents were shown visual simulations of the proposed development, and questions elicited the expected economic impact of the project.

For property owners in these coastal towns, Haughton, Giuffre, and Barrett (2003) found an expectation, on average, of a drop of 10.9% of their own property value. They also asked about willingness to pay, finding that “22% would pay a one-time sum of an average of \$286 each to keep the windmills away, while 9% would pay an average of \$112 to encourage them to come.” These survey results have been used to argue that the project would have negative economic impacts on Cape Cod. We interpret these data more directly, as indicating one reason some property owners might oppose the project. Additionally, we suggest that the willingness to pay measures could be an index of

relative donations. That is, we suggest that the 22% of homeowners saying they were “willing to pay to keep the windmills away” are potential donors to organizations opposing the wind project. In contrast, we suggest that the smaller 9% supporting might be more likely to donate to organizations “encourag[ing] them to come.” Our inference is consistent with the contrast in donations and financing between the opposition and proponent organizations, as reviewed in the prior section.

However, as predictors of actual change in property value homeowner expectations are questionable. We feel that a better predictor can be found in a comprehensive review of actual effects of wind projects (Sterzinger, Beck, & Kostiuk, 2003). That study compared properties in view of large wind projects against comparable communities out of view of the wind farms, for three years before and after. In 8 of the 10 communities studied, “after projects came on-line, values increased faster in the view shed [of the wind farm] than they did in the comparable community” (Sterzinger, Beck, & Kostiuk, 2003, 4). One could argue that oceanfront Cape Cod property values depend more on the view than the non-coastal communities in the study. Nevertheless, because the study showed that values typically went up, there is little empirical support for the Cape Cod homeowners’ expectation that values will drop.

The most recent of the three Cape Cod surveys was in February 2004, for the *Cape Cod Times* and WCAI radio (DeSantis & Reid, 2004). Using random-digit dialing, they surveyed 588 voters on Cape Cod, Nantucket Island, and Martha’s Vineyard, resulting in an error of $\pm 4\%$ at the 95% confidence level. The survey primarily covered political topics and candidates but also included two questions on the Cape wind project.

When asked “Do you favor or oppose the “Cape Wind” project to construct windmills on Nantucket Sound?” 259 people (44%) responded they were opposed, 211 (36%) were in favor, whereas a full 118 (20%) declined to answer, the highest refusal rate of any question on the survey. We infer that about 16% were undecided on the issue.³ The DeSantis and Reid survey is more recent, and we judge its wording more neutral (but less informative), than the support/oppose question on the Opinion Dynamics survey. Demographically, opponents were more likely than supporters to be over 61, earn over \$75,000, have higher education, and identify themselves as Republican (Coleman & Melo, 2004).

Related to support or opposition is the salience of the issue. When one visits the area, the yard signs (Figure 2), the local newspaper coverage, the passion of some opponents, and the late-night diatribes on local cable TV, all lend the impression that this issue is at or near the top of concerns in the area. But when DeSantis and Reid asked, “Looking out over the next year or so, what do you think is the most important problem facing the Cape Cod and Islands?” only 4.6% cited the wind power project as their major concern. It fell well below affordable housing (26%), overdevelopment (17%), jobs (11%), and even traffic (9%). Even if only a small percentage, like 4.6%, ranks this issue “most important,” as noted in the literature review, a passionate and active minority is enough to successfully stop a project.

The survey provides only a narrow window onto understanding support or opposition. The 259 opposed were asked the open-ended question, “Why do you oppose the proposed ‘Cape Wind’ project?” Their responses were a word or phrase that was then categorized by the survey researchers, as shown in Table 1. The top three, approximately tied, are “aesthetics,” “environmental concerns,” and “not worth it.” The names of these categories and their groupings are created by the surveyors, and based on our interviews we feel are little off. For example, if the coders had grouped “environmental” together with “wildlife/conservation/fishing,” the resulting environmental/wildlife category

Table 1
Reasons given for opposing the Cape Wind project
(*N* = 259)

Aesthetics	16.2%
Environmental Concerns	15.1%
Not worth it/Cape better off without it	15.1%
Poor location	11.6%
Economics/Costs	5.8%
Wildlife/Conservation/Fishing	5.4%
Shouldn't use public property	3.9%
Other	26.9%

would have been the most common category, at 20.5%. Based on our interviews, we also suspect that respondents who gave “view” as a reason for opposition were grouped into the “aesthetics” category (as we will suggest, this categorization is not appropriate for some respondents).

Similarly, the 211 in favor were asked, “Why do you favor the proposed ‘Cape Wind’ project?” Table 2 shows the categories into which the survey researchers grouped the answers.

The reasons given for opposition or support are critical to understanding the controversy, but this methodology of categorizing short answers is insufficient. Our empirical research, described later, focuses on the reasons, the logic of the arguments, the deeper values and cultural models being coded in the word or short-phrase answers categorized in Tables 1 and 2.

Methods of Data Collection

To better understand opposition to, and support for, large-scale offshore wind development, we conducted intensive semistructured interviewing (e.g., Bernard, 2002), made on-site observations, and reviewed local press coverage of the proposed project. Interviews were taped and transcribed verbatim; 24 full interviews were conducted, supplemented with about a dozen brief conversations on the Cape and two on Martha’s Vineyard. Interviewees were selected at random, typically in public places. We also selected a few members of both opposed and supporting organizations. Interviews were carried out off-season, and a qualifying question required the interviewee to have heard of the project, so virtually all interviewees are Cape Cod residents. The refusal rate was low, approximately one in eight approached. A higher refusal rate was encountered for one

Table 2
Reasons given for supporting the Cape Wind project (*N* = 211)

Clean alternative/renewable energy	43.6%
Economic/cost reasons	10.4%
Environmental reasons	7.6%
Dependence on foreign oil/use of fossil fuels	7.1%
Other	31.3%

subgroup—coastal property owners approached in their homes, most of whom refused the formal interview, although several consented to brief informal interviews. Their high refusal rate is probably due both to our approaching them at their homes, and due to their having been previously stigmatized by others, as we describe in our results. An indicator of these problems was that coastal homeowners, unlike other groups we approached, requested assurances that we were objective unaffiliated researchers, and sometimes refused our use of tape recording.

For those not familiar with qualitative research, when seeking to elicit an inventory of the concepts of a population, studies have found that nearly all of those concepts can be identified from a diverse sample of 20–30 individuals (Morgan et al., 2002, 77). By “concepts,” we include values, beliefs, and mental models (cf. Kempton, Boster, & Hartley, 1995). The qualitative analysis of this article is being used to construct a questionnaire for a larger sample, to determine the frequencies and correlations among the concepts documented here.

Interviews used a semi-structured protocol, in which questions took forms like “What have you heard about that?” and “Why?,” eliciting descriptions and long answers rather than single words or sentences. Question order and follow-up questions were based in part on the informants’ responses. Topics covered in the interview included: what the informant had heard about the proposal; what they saw as the positive and negative aspects of it; whether they are in favor or opposed at this site and to wind power in general; whether they saw wind power as an “important source of energy”; effects on the local economy; opinions of the developer; how they got information and what led them to their own personal decision on this site; how they thought the project decision should be made, and whether they thought they themselves could affect the final decision.

The interview transcripts were read through for all relevant concepts, using the data itself to determine the analytical categories. This is approximately the method of grounded theory (Glaser & Strauss, 1967; Strauss & Corbin, 1998), although the wind power literature cited earlier was read and discussed prior to analysis of the interviews, and guided both the question protocol and the analysis to a small extent. These interviewing and analysis methods have been used in the study of the values, beliefs and logic behind other environmental debates (e.g., Paolisso, 2002; Kempton, Boster, & Hartley, 1995). The major concepts we found are organized in what follows as a section for each. Quotations are verbatim, each identified with a code of two letters and a number (“C” for Cape Cod, letter for interviewer initial, informant number).

Results from Interviews

This section discusses our findings from the interviews. It is organized by topics as raised by the informants. This analysis lays out the issues as local people see them. We know from the surveys the percentage of residents opposed and supporting—the purpose of this article is to reveal the content of the support and opposition. Unless noted otherwise, points described here were made by more than one person, even if we use just a single illustrative quotation to make the point concrete.

The Ocean as a Special Place; Human Structures Do Not Belong There

Against the project, the most emotionally felt argument, and we suspect the most motivating one, is that it will intrude on a very special place and the creatures that live there.

We came to Cotuit by chance, strolled down Main St and walked out on Oregon Beach, both got tears in our eyes and both decided we didn't want to live anywhere else. We had found what we thought was one of the most beautiful places on earth. And it was with that we decided to buy our house. . . . We've since become sailors. We taught ourselves to sail here, because it's part of the heritage of Cape Cod. . . . And so, I guess you could say that my objections are very personal because it's a place that I love. . . . (CP6)

Several answered our question "when did you decide against?" that they decided against as soon as they heard the location. For example, one said she decided:

In the beginning. . . . When I first heard about it . . . just the location. . . . For the beauty, for the beauty on the Cape here. (CW5)

Another said that this type of intrusion would be "sacrilegious." A related argument is that no one owns the ocean, it belongs to the public, or to the creatures who live there, it should not be intruded upon by private interests:

I don't think anybody should be allowed to do anything with the ocean because I feel that nobody can actually buy a piece of the ocean or own the ocean. . . . It should be left the way it is. . . . There has to be something left for everybody, whether you have money or not, to be able to enjoy. (CW3)

This informant also said that wind towers "didn't belong" in the ocean and were an intrusion, in comparison to fishing boats that just go through:

It just doesn't seem to fit in out there . . . it would just seem that like it's out of place, you know. [Interviewer: Is there anything else like that that seems out of place . . .] No, no, I mean boats go through there all the time. It's not like they stay there But . . . They come and go and they use it for access, you know, fishermen and tourism. . . . I just think of the ocean as so big and wide open, you think of it as wide open, nothing out there for as far as you can see. I mean on clear days from Sandy Neck and Sandwich you can see all the way over to P-town. It's really just a nice, nice view; you would hate to litter the whole area with stuff like that. (CW3)

Similarly:

I do think it would be a big danger to the sea life. [later] I still think that it's still going to interfere with the sea life, and I don't think that we have a right to, you know. . . . They don't have anywhere else to go. That's their home and you know we take up all the land. I think they can have the sea. (CW3)

The CW3 interview was interesting in that she was undecided prior to the interview, but during the interview she decided that she opposed the development. Our questions were neutral, but they stimulated her to go through logic that made sense and led her to oppose the project.

What is this logic of opposition? We note that, in thinking about the likely impacts of the proposed project, CW3 contrasted it with commercial fishing. The visible fishing

boats she noted include the trawl fishery from Barnstable, along with others. The two economic activities can, in fact, be compared on the basis of the environmental criteria she mentioned, how much each is a “danger to the sea life,” and how much each disturbs “their home” (these can be quantitatively compared as the amount of wildlife killed, and the amount of sea bed covered or torn up). The basis of her evaluation, seen also in other interviews, is readily accessed information, obtained by informal observation. By contrast, an environmental evaluator would use measured data, not readily accessible to the public. Table 3 uses these two bases for evaluation, applying each to both one of the local fisheries (trawling) and the wind turbines.

The difference in the conclusions one would draw from these two data sources is dramatic. Based on the information that is readily accessible by the public, the wind turbines would seem to obviously have a greater environmental impact. Based on measurements, trawling by the six boats in Barnstable has more impact than would the proposed 130 wind turbines—from 100 to 10,000 times more impact.

Regardless of any critique one might make of CW3’s evaluation, one cannot similarly critique the environmental values expressed: that the ocean is a special place where first priority should go to sea life, and our terrestrial needs do not sufficiently justify human intrusion there. These appear to be important values for many.

A related value is that the ocean should be for all people of whatever income, not bought by one user for commercial profit:

I don’t think you should be able to put a price on something like that. There has to be something left for everybody, whether you have money or not, to be able to enjoy. (CW3)

In summary, a key source of opposition to the wind development is based on values about the ocean in general, and specifically on the uniqueness and value of Nantucket Sound. This area is enjoyed by residents and tourists and is a source of inspiration so compelling as to bring some to tears. Related is the sense that humanity does not have a right to make permanent intrusions onto the ocean, which belongs to the creatures of the sea. Although such sentiments have not previously been reported in the literature (due to the fact that offshore wind power is relatively recent) related findings can be found regarding terrestrial wind projects. The studies mentioned earlier by Short (2002) and Hoppe-Klipper and Steinhäuser (2002), both discuss the importance of the landscape, with Short noting how industry (in this case, wind developers) often fail to “grasp the important links among landscape, memory and beauty in achieving a better quality of life” (Short, 2002, 45). Our data suggest that such feelings also relate to the seascape. However, we suggest here that peoples’ sentiments toward the ocean go deeper than merely being concerned with one’s quality of life. Rather, there appears to be something special about the ocean, a feeling which for many people underpins their opposition to the project.

Why Not Put Wind Power on Land?

One consequence of this view of the sea as being special is the frequently raised question of why build the development in the water in the first place:

. . . we certainly have plenty of room here on the Cape and anywhere else to put one. I don’t understand why it has to be in the ocean. . . . It doesn’t

Table 3

Environmental impacts of existing local trawl fishing and proposed wind development. Each is evaluated by readily accessed information, inferred to be used by some informants (top of table), versus measured data, as used in fisheries reports and environmental impact statements (bottom of table)

Basis of evaluation	Datum	Commerical fishing (Trawl)	Wind turbines
Readily accessed information	Count of units (boats or turbines)	6 ^a	130
	Familiarity	Cultural heritage	New and unknown
	Permanence	Transitory	Permanent structure
	Scale of structure	Home size	Skyscraper size
Measured data	Disturbed sea bed area (km ²)	1,267 ^b	0.023 ^c
	Wildlife killed (kg)	1,715,369 ^d	364–3,516 ^e

^aSix trawlers are harbored in Barnstable, not counting up to 12 transient vessels, primarily targeting groundfish (pers communication, Eric Shufelt). New England has 748 groundfish trawling vessels (NAS, 2002, 41). Trawling is the local fishery with the greatest impact; adding other fisheries would increase the fisheries impact but would not substantially change the results in this table.

^bTotal trawled area for New England is 46,193 nautical miles² (NAS, 2002, 39), times 6/748 is 370 nm² attributable to Barnstable, times 3.43 km²/nm².

^cEach turbine tower is 4.88m (16 ft) outside diameter. Assuming scour guard with additional 5 m, total radius is 7.44 m, area is 174 m², so total for 130 turbines is 22,607 m² or 0.023 km².

^dNew England groundfish trawl catch is 178,582,212 lbs (NAS, 2002, 41), times 6/748 (per note a) is 649,761 kg landings attributable to Barnstable. For the Northwest Atlantic region, trawling results in 5.28 kg of unintended catch discarded per kg landed (Alverson et al., 1994, Table 7a). If we assume prompt mortality of 1/2 of those discards (the true figure may be higher, Alverson et al., 1994, Table 5), then discard deaths = landings *5.28*0.5, or 1,715,369 kg. If landings were evaluated as an environmental impact in addition to discards, this figure would be higher by 649,761 kg. A 14 September 2004 press release from FAO estimates that discards have dropped by 60% since the 1996 report we rely on here; a subsequent adjustment for this would improve but not change the result of the basic comparisons in this table.

^eThe largest wildlife impact of wind appears to be avian death from collisions. The best-documented case, Altamont Pass, has atypically high mortality because this wind facility was built in an avian flyway. There, mortality for all birds has been documented to be 8.14 birds/MW/year (Smallwood & Thelander, 2004). Cape Wind would have peak power of 432 MW, so scaling the Altamont Pass data proportionately would be 3,516 birds/year. However, far fewer birds would be present in Horseshoe shoals than Altamont Pass. The draft EIS for Cape Wind (released as this article was in press) estimates from 0 to 364 bird deaths per year for the entire 130 turbine site, based on other U.S. wind sites (U.S. Army Corps of Engineers, 2004). These counts can be compared with fishing discard deaths by weight, the only comparable metric. From weights of the most at risk birds in Nantucket Sound, terns (150 g), gull and skia (1 kg) and loon (2–5 kg) (see e.g., Pough, 1951), we roughly convert bird death counts to kg at 1 kg/bird. Some marine species are likely to be harmed or disturbed by the wind farm due to yet-unknown effects (Jarvis, 2004), but we judge these likely to be far fewer than avian deaths. Thus we use the Cape Wind Draft EIS number and the Altamont number is the range of possible wildlife deaths in Table 3.

make any sense, if they're not going to use the ocean's currents, why does it have to be in the ocean? There are the same winds [on shore and offshore]. (CW10)

Seeking an explanation for the puzzling fact of the proposal on water, several explained it as a strategy to reduce public opposition, and that the developers do not have to pay for the ocean:

I don't understand why it couldn't be on land. I think they are just thinking that "Oh it would be far enough away that people wouldn't really notice it," and also that they would have to buy land to put it here and I think, you know, they can just kind of stick it out there and you know. . . . "It's the ocean, put it out there." (CW3)

It is interesting that several members of the public have apparently independently arrived at this explanation, that the developer chose this site to minimize opposition or to save money on land purchase. We infer that this explanation derives from multiple persons' independent deductions because the organized opposition does not make it a major point.

Just one informant, a proponent studying the project (CT1), could cite the developer's logic why Horseshoe Shoals would be an ideal site: wind resources, proximity to local power lines, in an area that is not very ecologically sensitive, that does not have high biodiversity, and that is not a wildlife sanctuary.⁴ This ability to produce an inventory of the reasons for the site was unique among the interviewees. However, from sailing or other personal experience, several interviewees did recognize one rationale—that the site has good wind resources.

In sum, based on knowledge from boating and fishing, many recognize the site rationale based on the powerful winds. Otherwise, the rationale for this site—an important issue given both the sense of the ocean as special and given suspicion of developer motivation for picking an offshore site—has not been effectively communicated to the population. This lack of effective communication could either stem from a failure by the developer to provide people with the information they need, or from a general distrust of the developer. Ill feelings toward developers of wind farms have been encountered elsewhere. Research mentioned earlier in Germany (Erp, 1997, cited by Krohn & Damborg, 1999), found that the public's view of the developer, along with their views of the decision-making process and the decision makers themselves, are important in determining support or opposition to wind projects.

Local Impact with Minimal Local Control

Legally, living and nonliving resources (including wind power), from mean low tide⁵ to three nautical miles out, are managed by the State of Massachusetts. Beyond three miles—where the project is proposed—are managed by the Federal Government.⁶ But this is not the way some of the opponents of the project see it. Among those that opposed the project, there was a sense it was being built in the territory of Cape Cod residents. It was seen as affecting Cape Cod and in the domain of Cape Cod. There is almost a sense of ownership of the near ocean, for example:

[The people on Nantucket Island] won't have a choice. Their surroundings is the water, that's what they have. Being an island . . . no matter where you

go, that's what they look at and so I don't think that's right to take that away from the people that have been there. (CW3)

Note that CW3 is not making a claim about law, but rather about fairness and values—she says it is “not right” to “take that away from the people who have been there.” A related perspective is that people of Cape Cod would receive the brunt of the impact of the project, but not the benefits.

[Wind power] has a place where it will most directly benefit the people and the place where it exists. Here, we don't need the energy. . . . it's going to get shipped off Cape. So if it was for Nantucket, if it was for the Vineyard, that would be one thing. . . . What I see is that this is being built [in Federal waters] to benefit “the region” but it's affecting Cape Cod and the Islands. (CP6)

[It should be that] the money benefits the Cape, it doesn't benefit the corporate entity, and doesn't benefit off the Cape. It benefits the people on the Cape. They need the break. That the energy generated by the wind farms affects the people on the Cape. (CP2)

This idea also came out when we asked how interviewees thought the decision should be made. For example:

The people on the Cape should decide, not the guy in Boston, not the guy in Washington. (CW10)

But perhaps the saddest part for me is how little we, as a community, have to say in this major project because it happens to be outside of the Massachusetts coastal waters. And that the decision that's being made here could be made by a federal bureaucracy that does not know or does not care about the local community. . . . I'm really fearful that the public policy is going to be decided without the people involved and the people affected really having much of a say. (CP6)

Although CP6 recognized that public comment is required by, and is considered in, the siting process, she also noted, correctly, that public comment is advisory and that the decision will primarily be based on Federal requirements and law. We find telling that she said the site “happens” to be outside of Massachusetts waters, suggesting a process less deliberative, or less well motivated, than the court decisions that have in fact established jurisdiction (Utzinger, 2004).

Conversely, some of those interviewed supported the process, for example,

It's just everybody getting together trying to come up with a solution that's as close to a compromise that they possibly can so everybody can live with that. (CP3)

Organized proponents supported a broader decision constituency (e.g., Massachusetts rather than just Cape Cod). They also critiqued the possessiveness described by the opponents, suggesting that in conversations and media coverage, they have heard statements like those we quote earlier:

What is my compensation for putting these things in the ocean? For me—it is just a move that benefits the whole country, so I don't feel possessive about what are you going to give me. But for a lot of Cape Codders, it's about "What's in it for me?" (CT2)

It's a good question and I think that the decision should be left up to a vote of the entire people, of either the entire country or the entire state. Not just the Cape Cod people. It should benefit the Cape Cod people but it should be left up to the people who are eventually, if it works out well, it'll benefit the entire country. (CT2)

And they feel that because this is the first major place in the country that is going to have a wind farm, offshore, I mean, "Why the Cape?" well, why anybody? Why put a house for kids that come out of prison and they need some kind of a home situation? Why next door to me? Why not next door to the other guy? There is always "Why, why, why to me?" And it doesn't bother me one iota. (CT2)

These interview data lead us to conclude that many people in this area feel they should, and/or believe they do, have some claim to the ocean, both the waters of the state of Massachusetts and beyond to waters of the United States. This, to us, explains why they think they should have a role in decision making. A nuance of the jurisdictional debate among the public is that opponents were more likely to say the Cape should decide, whereas supporters said it should be the people of Massachusetts. These perceived claims of a right to decide do not correspond to the law, but nevertheless lead residents, opponents especially, to feel that the Federally based decision process is improper or unfair.

It should be noted that such views are not expressed by those more heavily involved in the debate. The leaders of opposition groups are familiar with the legal issues, recognize that the waters are Federal, and do not claim State or Cape Cod rights to decide on the project itself (although they argue that these waters should not be Federal, and try to use any existing state authority to block the project). In turn, members of supporter organizations said the decision making by the Army Corps of Engineers was a reasonable and fair process.

Visual-Aesthetic Impact

Our interviews show that Cape Cod residents' mention of "the view" is embedded in the earlier topics: the ocean as a special place, the puzzlement about why wind power would not be located on land, and local impact (without local control). The visual-aesthetic impact of the project is only one component of this. Yet, outside observers often claim that the visual or aesthetic impact is the primary cause of opposition—this claim is heard often in discussing this project with those in the wind power industry, in some popular news reporting (e.g., Burkett, 2003), and even in a report by a wind analyst (Pasqualetti, 2004, 37). What is the role of visual or aesthetic impact in opposition?

The visual objections are summarized by one man (who later says he is a supporter of the project):

Nantucket Sound is beautiful. They just don't want to see a bunch of towers. I mean, have you been out to the West Coast, Palm Desert? Have you seen

all the wind towers out there when you are driving through the desert? It looks like hell. But it's in the desert. And it generates a lot of electricity and power that they need out there. It probably would look like hell in Nantucket Sound if you sail on by. (CP4)

Aesthetic impacts are also seen as reducing tourism:

Who wants to take a beautiful boat trip over there when you [are] looking at all those. . . . You're spoiling the business for the boats, because we'll have all these windmills to look at. And the beauty's gone. (CW5)

Other visual concerns seem partly aesthetic, but equally or more important as symbolic of development on Cape Cod. Development is widely seen as excessive and changing Cape Cod's character; for example, large hotels and mansions replacing cottages. This is sometimes expressed by saying the wind project would make it an "industrial" area:

You know what, I think that's the main objection to the whole thing. You have the Cape Cod quaint shoreline, and you're going to stick this industrial, sort of complex looking New Jersey thing, you know what I mean, out off the water, you know. I mean take a ride to Jersey, you know. So that's the main drawback. People are freaking out about it. (CW7)

However, the question of whether the proposed wind development would or would not be aesthetically negative is a matter of considerable debate within the local community. Opinion seemed to be polarized. Some, including those who had seen other wind facilities, were neutral or thought the towers were attractive:

Cape Cod is a tourist area and I live here full time and I want it to be beautiful and I think it is very far off shore and I think it is enough off shore that it is not going to interfere with anybody. I know what they look like and they look fine to me. . . . The windmills to me look like artwork anyway, so it doesn't bother me. (CP2)

I don't have a problem with the view—I think they are gorgeous—my mother was in England and took a trip especially to Denmark to view the windmills which is . . . what we heard from travelers. "They are soooo beautiful!" (CT2)

One member of a proponent organization predicted that opposition would diminish after the facility was in place, and that people would see them as "beautiful" because they are "symbolic of doing the right thing" (CT2). The literature reviewed earlier suggests that opposition and perception of ugliness diminish, but do not disappear, after installation, and that people see machines with stationary blades as more ugly, those which are running more attractive (Gipe, 2002). That is, their aesthetics are partly related to their perceived functionality or symbolic meaning.

The coastal property owners who were informally interviewed typically commented on issues of appearance, often in combination with another of the earlier objections such as a lack of benefit to the area. Comments included the project's "destroying the scenic value of the sound," not wanting their view "spoiled" and concern about the impact on their property values (notes from informal interviews).

As reviewed earlier, the literature suggests that a value given to the landscape, and expectation of its permanence, is an important source of opposition to wind projects (Schwahn, 2002; Pasqualetti, 2002). On Cape Cod, concern about industrializing Nantucket Sound echoes San Gorgino Pass residents' concerns about industrializing the desert (Pasqualetti, 2002).

A substantive finding with methodological implications is that concerns expressed as "the view" are only partly direct visual aesthetic concern; they also serve as a gloss for the specialness of the ocean, the value that humans should not intrude on it, concern about development, and seeing visual size and permanence as an indicator of environmental, land, and ocean impact. Further interviewing and surveys will be more useful if they distinguish among these visual components.

Why is "the view" so often cited as the primary cause of opposition, when we find it secondary or tertiary? We summarize our conclusions on the aesthetic impact, based on the reviewed surveys and our in-depth interviews. For the majority of the population, the aesthetic impact is not the primary cause of opposition. For coastal landowners, it may be a primary cause for opposition; they are a very small fraction of the population but are disproportionately influential due to contributions to opposition organizations and potential political influence. For the majority of residents interviewed in the present small sample, opposition appears to be based more on the other factors reviewed earlier in this article than the aesthetics. However, this must be considered a preliminary conclusion, pending our more systematic measurement of these separate factors, using the survey we are now preparing. Until then, claims about opposition being due to "the view," whether by analysts or residents of the Cape, must be considered unsubstantiated, in part because that word refers to an unmeasured combination of factors.

Pollution Prevention

Pollution benefits were frequently mentioned in our interviews, sometimes noting problems with existing nearby sources of electricity: the oil-burning power plant (Canal Electric in Sandwich), the nuclear power plant in Plymouth, and a recent oil spill just off Cape Cod, in Buzzard's Bay. Both supporters and opponents mentioned the pollution benefits, although opponents sometimes discounted the pollution benefits because they would be minimal, or because of wind power's other expected environmental damages.

Well, I think that perhaps eventually we're going to have to do something about additional power and we can't continue building, eh, having these polluting power plants for the environment and I think perhaps wind power is one of the cleanest kinds of power. . . . Well, one of the major plants around here, Canal Electric, this is just what I read in the newspapers and hear in the news that it pollutes considerably and the other thing we've got up here in Plymouth, we've got the nuclear station. I'm totally against nuclear power. . . . (CP1)

I think we need renewable energy. I think it's a lot better than trucking in the oil on barges. They just had a spill a year ago right off Buzzard's Bay that had some sort of impact on wildlife, that sort of thing. So I think it's a good idea, less dependence on foreign oil. I'm for it. (CP3)

Supporters of the wind development off Cape Cod usually begin their arguments with pollution, and also often link pollution to either energy security or health.

When I speak, I speak from my heart to people about my asthma and my son's asthma. One of the facts that has come out of this from the Harvard School of Public Health, if we can get the windfarm, it could, by reducing emissions cut out 1500 premature deaths, and 5000 trips to the emergency room for respiratory [illnesses]. . . . [Air quality on the Cape is] terrible! Because of the way the wind goes off the land—there is a funnel affect because of the way the Cape heats up and pulls the wind back towards it; I'd have to show you the map. There's the plant [Brayton Point in Somerset, MA]—it has huge emissions that get pulled right over the Cape. (CT2)

Some of the strongest feelings come from the health argument, although this informant's estimate of 1,500 premature deaths is much too high, as we will discuss later in the article.

U.S. Energy Security and the Iraq War

After pollution, the next most frequently mentioned argument in favor of the development concerned oil, security, and the Middle East. At the time of the interviews in late 2003, U.S. soldiers were engaged in Iraq and the destruction of the World Trade Center, on September 11, 2001, was still on people's minds. We found that many informants saw these current events as related to oil and oil security, and thus to the wind proposal. We did not ask about these topics at all, but informants mentioned them in response to our questions about the project and about wind power in general:

[My first reaction to the project was] I just said, gee, that a great idea. . . . Because we don't have to be so reliant on outside sources for oil, or gas, we can be more self-contained. (CW6)

. . . not only have we based our current lifestyle on an exhaustible resource, but in so doing we have created a bizarre foreign policy that has done U.S. a lot of harm in the eyes of the world. . . . I think we are living on borrowed time, I think that it is entirely possible that in the next 5–10 years some international event will occur that will make the 1970s look like a pinprick. . . . And when . . . the price of gasoline doubles . . . and we sit in our cold dark homes. . . . That could be too late for U.S. to look for answers, so we have to be doing this kind of thing now; we have to be looking at all kinds of renewables. (CT3)

The energy security issues were most immediately pressing for one informant, whose son was serving in Iraq and who did not believe the U.S. administration's rationale for the Iraq war:

I see a need for all kinds of alternate energy sources. One of the reasons my son's over there in Iraq currently is basically because of oil. They can say what they will about it but, one of our concerns about over there is that if we don't control it, [pause] we just don't want to lose it. That's basically one of the reasons that we're there. Alternate sources of energy to me are something that's really critical. (CP9)

One opponent considered both the World Trade Center attack and the Iraq war as increasing the political pressure to build the wind project:

But that we're being pushed so hard to do this [wind development] now against the backdrop of a war in the Middle East . . . the Iraq War. . . . It's all about the national policy. . . . [Interviewer: Do you mean you feel that the Iraq war is a factor driving this?]. . . . I knew about this project before September 11th and I think that when September 11th hit we all took a deep breath and understood very clearly that this project was probably going to move a little faster against that backdrop. (CP6)

When opponents of the project mentioned energy or national security, they typically argued that other costs outweighed these benefits, or that wind provided minimal energy or was not cost-effective.

I suppose if you believe that we have got to get off the fossil fuels My concern is we're going to go from one thing that's not good, i.e. oil, to another thing that's not necessarily good if we're not careful, of looking at what the impacts are of wind energy. (CP6)

. . . the cost is too much to build them because they only improve the energy by like 1%, or something like that. (CW2)

. . . everybody in the country's tax money is going to go pay for this thing. . . . Every penny they [the developer] put out they're going to get back just in government grants. (CW10)

Informant CW7 said that wind power was "archaic technology" (because mechanical wind power dates to antiquity), and predicted that solutions to energy problems would be found in solar power or fuel cells, not in wind power. Several complained that the project would not be cost-effective without "government grants" (CW10) (presumably a garbled reference to the production tax credit). These beliefs allowed opponents to acknowledge the possible energy contribution of wind power, while not considering this project worthwhile. By contrast, several supporters described wind power as "the way of the future" (CW10, CW4).

Other studies of public opinion about wind power have not highlighted oil dependence or the Middle East conflicts. These factors did seem to be important in support for this project on Cape Cod.

Offshore Wind Has a Good Track Record

Another type of argument in favor of the Cape Cod project is that, wind power, or offshore wind power, seems to be functioning satisfactorily in other places. For example:

I also happened to see a [TV] special that over in Europe, I think it's Holland, that they have vast wind farms over there and they haven't run into any problems. (CP5)

The large-scale sites around Europe do not report large numbers of bird kill or diminution of fishing stocks, in fact some fishing stocks increase where these things are built. (CT3)

I thought perhaps it was something that we should have in the near future. I've seen the uh, in California a few years ago, I can't remember exactly where it was but I've seen all the turbines out there, and also they have some in upstate New York, you know? I never really heard anything negative about them. (CP1)

Similarly, one informant (CW6) noted that earlier in Cape Cod's history, salt mining operations had used mechanical wind-driven water pumps, which were more numerous and, he said, less aesthetic than the proposed wind turbines.

Characterizing or Stereotyping the "Other Side"

In a polarized debate like this one, there are usually attributions of motivations, errors, ignorance, and other negative factors to the other side. This is true for both opponents and supporters of the project.

Opponents of the project paint the developers as greedy, interested in money, and able to manipulate the political system:

Look what they done down south with all the oil rigs and oil refineries, . . . [if] they do it on horseshoe shoals, what's going to prevent them to go out to Wasque and do it off of Chappaquiddick Island? You know, if they have the right money . . . [they will] push these communities and small people aside and say, you know, bribe the politicians . . . (CW7)

I think they [the developer] are a wolf in sheep's clothing. I think they want to make money and they are saying we're green and I think they are not honest in public. (CP7)

We're aware that they're applying political pressure in certain places. . . . I think we are up against a very savvy big businessman. He has a lot of influence and he's not afraid to use it. (CP8)

The proponents less frequently categorize the developers in any manner (the few who do see them as idealistically motivated business people, taking a substantial risk). More often proponents offer explanations of the opposition from their local Cape Cod residents as class-based and caused by misinformation:

The obvious problem is that there are a lot of very wealthy people who are going to do everything in their power not to have these little half-inch toothpicks sticking up on their horizon. That's the only problem—to be honest I am hoping that this succeeds, because it is . . . very symbolic of the struggle between the rich and the public, the people. And the way that the rich are pulling the strings to prohibit something that really does make sense. (CT2)

This is a very big boating community. . . . A lot of the people that are against it are the racers, . . . sailboat racing, that are going to pass through that area and they don't want those things there. . . . It'll be dangerous they think. Well let them make a new course. (CP2)

The Alliance will come out with blanket statements saying that most people don't support it, and there is no evidence to support that view. The main reason that people don't support it is because they don't have the right information, they are being fed misinformation by well-funded organizations who can afford to send that information out. (CT3)

One skeptic (CP7, not necessarily an opponent, but one who wanted better accounting of ecosystem impacts) lamented that the reasons for most opposition were not environmental, but view shed:

I think one of my concerns has been that a lot of what's driving the opposition here are, if I can stigmatize people, wealthy land owners who don't want to look at wind farms. . . . I don't have a lot of sympathy with people who paid a lot of money and want a pristine view. I mean welcome to the world that all the rest of us have to live in . . . I don't consider that to be a legitimate reason to oppose it. I think the benefits of that alternative energy source outweigh the viewshed. . . . [Unlike a pristine area like Cape Cod National Seashore, the Hyannis area near the wind site] is cluttered with rich peoples houses and all kinds of houses. . . . It's already "not pristine" so to me it's different. It's the difference between putting a wind farm in West Virginia and putting it in Yellowstone Park. (CP7)

She went on to claim that these view-oriented opponents were not concerned about offshore wind elsewhere (Smith Island and Davis Bank), and were not concerned about environmental issues:

If this project is killed, frankly, I don't think environmental [reasons will kill it]. The landowners try to use us as best they can to bolster their argument, which is basically a viewshed argument. And they could give a crap about Smith Island Virginia or Davis Bank. This is a very parochial issue for them. It's their backyard and their viewshed. If I was to say we need you to help us out here in Smith Island. They'd be like "Yeah well, I've got a golf tee time so I'll talk to you later." I'm really very annoyed about it. And these folks are all very wealthy Republicans that are very well connected in the Bush Administration. (CP7)

As noted previously, these stereotypes may be true of some coastal property owners, but do not appear to be true for the majority of the population. Nevertheless, they are common in the media and in the wind industry. We believe that these stereotypes develop as part of the dynamic of opposing sides and then become additional justifications for one's own position, rather than being prior, central drivers of opinion.

Missing from the Debate

This article has analyzed the public debate, but of equal interest is what is missing from that debate. We identify four issues as missing, but important from a policy perspective. By "missing" we do not mean that they are never mentioned—each of our points was mentioned by at least one interviewee (typically a person more informed than average), and most appear somewhere in writing, buried in the detailed arguments within one or

both sides' literature or websites. By "missing" we mean that these points were rarely or never acknowledged in our interviews with the public, are not popularly known or discussed, and/or receive much less prominence than we expected based on an analysis of the issues. The first two we list concern this particular project; the third and fourth are larger scale impacts.

Mortality

In our interviews, two advocates for the wind project mentioned health effects of air pollution from fossil fuel electric generation; the remainder of our interviewees made no mention of health impacts. Validating our findings, in neither of the two surveys reviewed earlier did respondents report health effects as an issue. We conclude that the general public has neither a general understanding, nor a quantitative estimate, of the health effects—which means that in weighing costs and benefits, they are effectively estimating a zero effect on health and mortality. If health benefits are small, or about equally counterbalanced by increased risks from the wind development, this issue is properly omitted from the debate. Here we develop an estimate to evaluate this implicit estimation of zero mortality.

The health effects of reducing power plant operations cannot be precisely estimated, because the health effects are probabilistic, and because the choice of which power plants to turn off is determined by market forces in real time. It would be worthwhile to develop a well-researched estimate. However, for the purpose of the argument in this article, we perform a simplified estimate that both illustrates how it is done and provides an interim order-of-magnitude approximation.

To simplify the problem, we consider only one pollutant, particulate matter, thought to provide 75–85% of the health impact from power plants (Krupnick & Burtraw, 1997; Aunan et al., 2000).⁷ We also simplify the problem by considering only mortality, not avoided asthma attacks, hospital trips, lost work days, and so on. And, we assume that the project displaces power from Salem Harbor and Brayton Point—Massachusetts coal-fired power plants that have been grandfathered from emissions control requirements under the Clean Air Act—rather than the mix of plants that would be turned off purely by market forces.

The Cape Wind project is projected to provide 1,491,384 MWh/year (Cape Wind, 2004b). This is 13.7% of the energy output of Salem Harbor and Brayton Point. Levy and Spengler (2002, 13) estimate that these two plants cause 79 premature deaths per year from particulate matter alone. Taking 13.7% of this figure yields the estimate that the Cape Wind project could result in approximately 11 fewer deaths per year. This is an illustrative figure based on the assumptions noted earlier. We recommend analysis to produce more precise figures for avoided premature deaths, with error bars. Until then, this rough and imprecise calculation is sufficient for our purpose of showing that both extremes of the numbers from our interviews are incorrect—both the 1,500 lives claimed by one advocate (CPT2) and the zero mortality implicit in most interviewee's never mentioning that human lives are at stake in this debate.

Lives saved from reduced pollution must be weighted against worker deaths. Building and maintaining 40-story structures on the ocean entails hazard. The advocates' analysis of averted deaths from pollution is incomplete without considering worker deaths during construction and operations. Paul Gipe tracks deaths of wind industry workers per TWh generated, finding .27 deaths/TWh during the 1990s (Gipe, 2001), improving to 0.08 deaths/TWh through the year 2003 (Gipe, 2004). Using the earlier Cape Wind

production estimate of 1,491,384 MWh/year, or 1.49 TWh/year, this would lead us to estimate 0.12 deaths/year from construction and maintenance, a number well under the lives saved from pollution reduction.

Although the mortality rates we develop are approximate, this calculation suggests that there would be a net of 10 human lives/year saved as a result of the project. This is a significant impact of the project and we feel should be part of the debate. (Although Clean Power Now advocates this as one of their main points, our interviews and the surveys reviewed earlier suggest it does not register for most people.)

How Offshore Wind Power Decisions Should Be Made

Our second point missing from the debate concerns the process of decision making rather than the outcome. Our interviewees, when asked how approval or denial of the wind proposal should be decided, typically suggested a vote of the residents of Cape Cod. Many seemed to have the sense that those impacted by the project should decide, and some felt that coastal homeowners had a right to maintain their view. In fact, the development in question is in Federal waters, which legally defines who decides and how the decisions are made. Some participants, like the Alliance, argue that existing federal standards and processes are inadequate for evaluating applications for offshore wind, but this issue is recognized by very few members of the public and the Alliance does not develop it fully. Another unresolved and undebated question is whether offshore wind is more like offshore oil, for which extractors pay royalties, or more like offshore fishing, for which extractors pay no fees at all, or whether it should be subsidized now to start up the industry with royalties beginning later. Some members of the public noted that no fees are paid for this public resource but there seems to be no public debate about the merits of the alternatives. (We discuss these issues ourselves in another article, Firestone et al., 2004.)

In short, there is a widespread sense that the wind proposal should be decided by a vote of nearby residents, which is not the case and for which no legal basis exists. If this issue were engaged and this misconception addressed, there could be a revealing debate about whether the decision is more properly a local, state, or federal one, whether landowners have a right to influence decisions affecting their ocean view, and whether, how and when royalties are appropriate for this and for other renewable ocean resources such as fishing.

One Project Versus Full Implementation

The third point missing from the debate is one of scale. The debate we observe in Massachusetts is not about whether or how to develop the huge wind power resources off the Eastern coast of the United States, it is about this one project. The difference is a conceptual and discourse gap, not just a parochial emphasis. This can be seen in that the supporters talk about this one project as solving national or global problems, but without any consideration of the necessary scaling up. Conversely, opponents dismiss the project as having minimal benefit, either without considering it as the first project of many (some were puzzled or dismissive of the idea when raised), or dismissing it as a harbinger because it was seen as uneconomic, too small to make a difference, and so on. Even when we dig deep into the opponents' and advocates' websites and arguments, we find no discussion of what wind power would look like on the scale necessary to significantly reduce the nation's major environmental and energy supply problems.

Again, we make a few sample calculations to illustrate what is missing from this debate. As noted in the introductory section (“Why Wind?”), the Eastern Continental Shelf wind resource is estimated at 481 GW, current generation of the NE coastal states is 99 GW, and the Cape Wind proposal is for 420 MW (0.42 GW) peak. Assuming the same capacity factor as expected for Cape Wind (40%), wind power displacing 1/2 of the NE states’ current 99 GW could be produced by wind turbines with a peak capacity of 124 GW. This would be approximately 34,375 individual 3.6 MW turbines, or just under 300 developments the size of Cape Wind’s.

What would be the benefits and negative impacts of full implementation? The benefit would be a halving of the power plant pollution of the entire Northeast, including a globally significant reduction in the gases forcing climate change, as well as major benefits to local human health and wildlife. The impact is also proportionately larger. As a first approximation of the impact, we consider density as well as our rough impact tabulations of Table 3. In density, about 300 developments spread evenly within the 200 by 700 nautical mile area of U.S. waters along the NE coast would be 1 per 466 nm² (1,600 km²) or, at 62 km² each, 3.8% of these U.S. waters. In terms of the environmental impact, using the type of comparison our informant made with the local fishery (Table 3), a full-implementation set of 300 Cape Wind-sized developments in U.S. waters, counterintuitively, would appear to have only 60% the wildlife impact and half of 1% of the bottom disturbance of just the six trawlers now harbored in Barnstable (and those six boats are less than 0.8% of the 748-boat NE U.S. groundfish fleet). We should caution that there has been no national commitment to such large-scale wind implementation; it would require solution to some technical problems,⁸ we know of no prior publication or analysis of these comparison figures, and our impact estimates are approximations. Nevertheless, if we are to take seriously the advocates’ claims that this technology can deal with the large-scale problems of fossil fuel power generation and import dependence, we must evaluate wind power at comparably large scales.

Climate Change

Cape Cod’s proximity to the ocean, its beaches and other environmental features near sea level, and the high tourist and recreational value of its shoreline all make it vulnerable to climate change effects such as sea level rise and more severe storms. For example, the Intergovernmental Panel on Climate Change (IPCC) makes a “best estimate” median prediction of about 1/2 meter of sea level rise by 2100, (IPCC, 2001, Table 11.4), with continuing rise for several centuries more. Abrupt changes in sea level and temperature are also possible at lower probabilities. Given the Cape’s vulnerability, we found it remarkable that only 1 of our 24 interviewees mentioned mitigation of climate change as a benefit of the proposed wind project. It is clearly not part of the public debate.

Of course, this one project in Nantucket Sound could not by itself make any significant difference in climate change. But wind power is today the only economically viable utility-scale renewable energy source, and offshore wind is the only U.S. wind resource strong and close enough to Eastern cities to displace significant greenhouse gas emissions in the near term. Supporters of the project could more clearly make the case that this project is the gateway to the only serious weapon to fight climate change, and that climate change will have devastating effects on Cape Cod. Correspondingly, opponents could acknowledge wind’s potential to fight climate change but argue that to do so, the required scale of deployment would entail unacceptably wide scale human intrusion

into, and impact on, the ocean. There is a legitimate debate over the tradeoffs, and Cape Cod is a good place to have that debate—the negatives of sea level rise, air pollution, and oil dependence, versus the impacts of offshore wind power are immediate and compelling right here. The usual wind power divide is that benefits are global and invisible, whereas impacts are local and concrete. But the severity of projected climate impacts on the Cape could offer a bridge over part of the usual global-local divide. To date, these possible bridging issues have not seriously entered into the debate here.

Conclusion

We analyzed reasons for public support and opposition to a utility-scale wind development off Cape Cod. Apart from differences in beliefs, some of which might be considered based on missing or incorrect information, there are also important value differences.

Some beliefs and values led to opposition. For example, many opponents believe that the project is uneconomic and that wind power will not make a significant contribution to electricity supply. Some apparently evaluated the project's environmental effects based on readily accessed factors such as scale, familiarity, and permanence; our quantitative comparison shows that this leads them to vastly overestimate the likely environmental impact of the project in comparison to existing activities such as trawling. On the part of the supporters, there was a facile characterization of the opposition as primarily concerned with aesthetics of their ocean view, and as being wealthy property owners and boaters. These groups appear to be an important financial base for opposition organizations; however, our study and the surveys reviewed earlier show that the opposition sentiment is far broader. Also, our analysis suggests that concern expressed as “the view” is not only visual or aesthetic; it is more importantly a gloss for the value that the ocean is special and humans should not intrude on it, and the value that Cape Code should be protected from the excessive development that residents feel is destroying its character.

We suggest four areas that, we feel, merit broader or more explicit debate. The first area is the human mortality averted by displacing current fossil fuel use. The second concerns the current Federal decision-making process and the philosophical and justice issues in this versus other decision-making modes. A debate on the decision-making process itself could engage citizens both on the question of the appropriate level of government to make the decision, and the question of licensing and payment for the resource (e.g., should wind developers pay, as do offshore petroleum developers, or should the wind be free, as are fisheries?). Third, are the implications of the scale of development implicit in claims for national-scale benefits—at that scale there appear to be very substantial benefits from offshore wind development, but the impact estimates must be scaled up commensurately. The fourth undebated point is the role of wind power in mitigating global climate change. This can be locally understood as balancing the impact of wind power development in Nantucket Sound now, versus the impact of future damage from climate change and sea level rise.

Underlying the current debate are several basic value questions and tradeoffs. For example, the value of protecting the ocean and keeping it free from human intrusion; the value of cleaner air and less human infirmity and mortality; the value of traditions like sailing and fishing in New England; whether there is a right to a local seascape that residents assumed would be there forever; the trade off between proceeding now with an imperfect process to start a clean industry versus first establishing proper procedures, and more globally, whether Cape Cod and the Islands are willing to absorb the negatives

of this wind development now, in order to set an example for mitigating climate change, a potentially far larger threat but one they cannot solve alone. We suggest that the debate would have a better chance for true engagement, perhaps even resolution, if these values and missing issues were aired and debated more explicitly.

Notes

1. The Supreme Court determined in the 1960s that Nantucket Sound is federal waters. A 2003 case challenging a Cape Wind weather tower established that, even though the Magnuson Act grants to the Commonwealth of MA the right to regulate fishing, this applies only to fishing activities, not other activities, even if they affect fish (Utzinger, 2004).

2. Because the developer plans to install 130 machines of 3.6 MW each, it is unclear why they describe the total maximum output as 420 MW, rather than 469 MW. We use their stated 420 MW figure in our analysis.

3. The prior five questions on the survey were answered by an average of 564 people, an average response rate of 96%. From this we might infer that of the 20% declining to state their position on the Cape Wind project, 4% were skipping most questions at that point, and 16% were undecided on the project or otherwise refused to answer this question. We also note that the average income of respondents to this survey was higher than average Cape Cod and islands demographics; therefore the sample may be slightly biased toward opponents to the project. Although we did not have sufficient data to adjust for this sampling bias, the income effect did not appear strong enough to change the result of plurality opposition to the project.

4. The Nantucket Sound overall is highly biologically diverse, but the developer claims that the Shoals themselves are not. This claim can be independently evaluated once the project's EIS is released.

5. Whereas most states' ownership extends to the mean high tide line, Massachusetts is one of a handful of low tide states. Nevertheless, even in low tide states, the public retains some rights between the mean and low tide lines.

6. Although the Federal government has, for example, through legislation, granted Massachusetts jurisdiction to regulate the management of commercial fisheries in Nantucket Sound.

7. There is a recently recognized "broader array of important air pollutants and associated health impacts" not yet quantified (Davis, Krupnick, & McGlynn, 2000, 14), and not considered here.

8. At higher fractions of generation (say, over 20% \pm 10%), wind requires storage or some other method to manage fluctuating generation (Kelly & Weinberg, 1993; Kempton & Tomic, 2005); the total resource cited assumes turbine platforms for deeper water (> 20 m) that are not yet available.

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