

**THE STRUCTURE AND STRENGTH OF PUBLIC ATTITUDES TOWARDS
WIND FARM DEVELOPMENT**

By

David Charles Bidwell

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Sociology

2011

ABSTRACT

THE STRUCTURE AND STRENGTH OF PUBLIC ATTITUDES TOWARDS WIND FARM DEVELOPMENT

By

David Charles Bidwell

A growing social science literature seeks to understand why, despite broad public support for wind energy, proposals for specific projects are often met with strong local opposition. This gap between general and specific attitudes is viewed as a significant obstacle to the deployment of wind energy technologies. This dissertation applies theoretical perspectives and methodological tools from social psychology to provide insights on the structure and strength of attitudes towards the potential development of commercial wind farm in three coastal areas of Michigan. A survey of attitudes was completed by 375 residents in these communities and structural equation modeling was used to explore the relationship among variables. The analysis found that attitudes towards wind farm development are shaped by anticipated economic benefits to the community, but expectations of economic benefit are driven by personal values.

Social psychology has long recognized that all attitudes are not created equal. Weak attitudes are fleeting and prone to change, while strong attitudes are stable over time and resistant to change. There are two fundamental paths to strong attitudes: repeated experience with an attitude object or the application of deeply held principles or values to that object. Structural equation models were also used to understand the strength of attitudes among the survey respondents. Both the anticipated effects of

wind farm development and personal values were found to influence the strength of attitudes towards wind farms. However, while expectations that wind farm development will have positive effects on the economy bolster two measures of attitude strength (collective identity and importance), these expectations are associated with a decline in a third measure (confidence).

A follow-up survey asking identical questions was completed by 187 respondents to the initial survey. Linear regressions models were used to determine the effects of attitude strength on the stability of attitudes towards wind farms. In this study, attitude strength did not have a major effect on the stability of attitudes. Perceived importance of the issue of wind farm development did result in slightly more stable attitudes towards renewable energy.

These survey results were compared to responses provided by 28 residents who completed surveys before and after participating in an informational session about commercial wind farm development. A regression analysis found that participation in an informational event changed the substance and quality of participants' attitudes. Attitudes towards wind farm development became more positive, and confidence in those attitudes grew stronger.

These findings suggest that the gap between general attitudes towards wind energy and attitudes towards specific wind farm proposals could be narrowed by providing information and opportunities for discussion in communities with potential for commercial wind farm development. Future research is needed to track local attitudes and attitude strength throughout a proposal and development process.

For Emily and Austin. And in memory of The Monkey.

ACKNOWLEDGMENTS

I would like to thank the members of my doctoral committee for their guidance and good humor through the process of developing this dissertation. They are Thomas Dietz (Chair), Joseph Arvai, Stan Kaplowitz, and Aaron McCright.

I also acknowledge the support I received from the Michigan State University Land Policy Institute, particularly its director, Soji Adelaja, and the project manager for its assessment of wind farm siting issues, Charles McKeown. Additional thanks go to Ben Calnin, who produced the issues booklet and other materials used for the public information events. The project was supported by a grant from Michigan Sea Grant, with additional support from the Michigan State University Office of Vice President for Research and Graduate Studies

In summer 2010, I received a Doctoral Dissertation Completion Grant from the Michigan State University Graduate School, for which I am very grateful. I also extend gratitude to Tammy Spangler of Sociology, who patiently helped me navigate the doctoral process.

TABLE OF CONTENTS

LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF ABBREVIATIONS	ix
INTRODUCTION	1
THE ROLE OF VALUES AND BELIEFS IN PUBLIC ATTITUDES TOWARDS WIND FARMS	6
STRENGTH OF ATTITUDES TOWARDS WIND ENERGY	37
EFFECTS OF INFORMATION ON GENERAL ATTITUDES TOWARDS WIND ENERGY	66
CONCLUSION	82
REFERENCES	88

LIST OF TABLES

Table 1: Response rates for preliminary survey	20
Table 2: Reliability of latent variables in model	21
Table 3: Unstandardized direct effects for parsimonious model	28
Table 4: Unstandardized total effects for parsimonious model	29
Table 5: Measures used in attitude strength analyses	49
Table 6: Unstandardized direct effects on attitude strength	55
Table 7: Unstandardized total effects on attitude strength	56
Table 8: Differences in mean scores of preliminary and follow-up attitudes towards potential wind farm development	59
Table 9: Effects of attitude strength on wind enthusiasm	60
Table 10: Effects of attitude strength on wind caution	61
Table 11: Comparison of ratings of control group and events participants	75
Table 12: Effects of events on wind enthusiasm	76
Table 13: Effects of events on attitude confidence	78

LIST OF FIGURES

Figure 1: Proposed, simplified theoretical model of wind farm attitudes	17
Figure 2: A parsimonious model of attitudes towards the development of commercial wind farms	27
Figure 3: A parsimonious model of the strength of attitudes towards potential wind farm development	54
Figure 4: Effects of preliminary attitudes on follow-up ratings of wind enthusiasm	77
Figure 5: Effects of preliminary confidence on follow-up ratings of confidence towards wind farm attitudes.	78

KEY TO ABBREVIATIONS

CFI	Comparative Fit Analysis
DE	Direct Effects
LPI	Michigan State University Land Policy Institute
MW	Megawatt
NEP	New Ecological Paradigm
NIMBY	Not in My Backyard
RMSEA	Root Mean Square Error of Approximation
SD	Standard Deviation
SEM	Structural Equation Modeling
TE	Total Effects
VBN	Values-Beliefs-Norms Model

INTRODUCTION

Attitudes have a major influence on our beliefs, feelings, and behaviors and thus form the roots of many social problems and conflicts (Chaiken, Wood, and Eagly 1996; Maio and Haddock 2007). A broad social psychology literature explores the many factors that shape our attitudes, strengthen or weaken those attitudes, and facilitate or prevent change in those attitudes (Maio et al. 2003). Research shows that some attitudes are inconsistent, prone to social influence, and swayed by subtle contextual changes. Other attitudes are deeply ingrained, shape related attitudes and behaviors, and resist conflicting evidence. In short: attitudes are complicated.

Attitudes about the environment are particularly complicated, perhaps because environmental issues are frequently characterized by complexity, uncertainty, and ambiguity. People are pulled and pushed in several directions by inconsistent information, known and unknown risks, and conflicting values and beliefs within their community. The study of environmental attitudes is a fundamental component of environmental sociology (Buttel 1987; Dunlap 1997; Dunlap and Marshall 2006; Mol 2006).

Although environmental sociology initially focused on describing and explaining environmental problems, in recent years the field has increased its interest in environmental reform (Buttel 2003; Dunlap and Marshall 2007). This work includes explorations of how attitudes contribute or distract from the adoption of “green” technologies. This dissertation contributes to this field by applying important themes

and tools from social psychology to understand public attitudes towards an issue emerging in many United States communities: the siting and development of electricity-generating wind farms.

Everyone has had the experience of learning a new word and then seeing it everywhere they go. I had that kind of experience with wind farms. Once I started to research wind energy issues, I noticed that wind turbines are all over popular media. Wind energy has become a powerful symbol of green sensibilities (Toke and P. A. Strachan 2006). Creating a pro-environment image these days, it seems, is as easy as placing a wind turbine or two on the horizon. I have seen them in car commercials. They are on a plastic cup my toddler received at the local diner, right behind the smiling recycling bin. And I recently purchased a box of wind turbine-shaped organic crackers. The marketing industry, at least, is convinced that wind energy evokes positive attitudes.

Perusing the news could create a very different impression of attitudes towards wind energy technology. Where wind farms are proposed, residents complain about spoiling of scenic views, risks to public health and safety, harm to birds and other wildlife, and the decline of tourism economies. Municipal governments often spring to action, passing ordinances designed to limit or eliminate wind farm development in these communities. Wind turbine siting stirs up a lot of negativity, and local opposition to the construction of wind turbines is viewed as a significant obstacle to the wider deployment of wind energy (Devine-Wright 2011; Walker et al. 2010; Wüstenhagen, Wolsink, and Bürer 2007).

The research reported in this dissertation centers on attitudes towards potential commercial wind farm development in coastal areas of Michigan. In 2008, the Michigan legislature passed a *renewable portfolio standard* (RPS). This law requires that 10 percent of the electricity generated in the state come from renewable sources by 2015. To the delight of some Michigan residents and the dismay of others, the RPS has spurred pressures to develop wind farms in the state.

Concerned about conflicts arising over wind farm development in areas near the Great Lakes, the Michigan State University Land Policy Institute (LPI) secured funding from Michigan Sea Grant to conduct an integrated assessment of issues related to the development of wind farms in coastal Michigan. As a geographic focus for this assessment, LPI selected three areas of the state that differed socially and economically, but which all have commercially viable wind resources: Bay County, Presque Isle County, and a four-county region of the Upper Peninsula (Keweenaw, Houghton, Baraga, and Marquette Counties). LPI staff mapped the wind farm development potential in each area and met with municipal leaders to provide them background information on wind energy and listen to their concerns. It used this feedback to refine a presentation and booklet about these issues, which were used in public information sessions in local communities.

In conjunction with this assessment, I conducted a two-wave survey of attitudes with a random sample of residents and attendees of the public information sessions. Participants in this research completed an initial survey of attitudes and were asked weeks later to complete a similar survey. The survey measured general attitudes

towards the potential development of a wind farm in or near the respondents' community. The survey also asked questions about anticipated effects of wind farms, fairness of the development process and outcomes, beliefs about environment and community, and general values. The data from these surveys forms the backbone of this volume.

The body of this dissertation is comprised of three interrelated articles. The first uses structural equation modeling (SEM) to explore the relationships of several factors to the general support of wind farm development within respondents' communities. The second applies a SEM analysis to identify factors that lead to or decrease the strength of attitudes towards potential wind farm development. The second article also uses more traditional regression analyses to gauge the effects of attitude strength on the stability of attitudes over time. The final article explores the effects of attending an informational session about wind farm development on both the substance and strength of these attitudes.

When taken as a whole, a relatively rich story emerges regarding the structure of attitudes among participants in this study. Overall, the perceived effects of development—particularly economic benefits—have a substantial influence on the high acceptance and strength of attitudes towards wind farms. These beliefs are strongly influenced by concern for the well-being of others. The confidence in attitudes that comes from personal experience, however, is lacking within these communities, but confidence can be elevated by providing residents with balanced information about wind farms and their potential effects. These findings have implications for how we

think about attitudes towards wind farms and other renewable energy technologies and how we choose to address conflicts over siting these facilities.

THE ROLE OF VALUES AND BELIEFS IN PUBLIC ATTITUDES TOWARDS WIND FARMS

Renewable sources of energy are widely viewed as a partial solution to three social problems: meeting the growing demand for energy, ensuring energy security, and reducing the emission of harmful air emissions (Szarka 2006). Public acceptance for the actual deployment of renewable energy technologies, however, has proven a serious challenge (Wüstenhagen et al. 2007). Proposals for one common form of renewable energy, commercial wind farms, are frequently met with forceful local opposition.

Conventional wisdom has blamed opposition to wind farms on a “not in my backyard” (NIMBY) response, portraying local community members as putting self-interest ahead of societal benefit (Wolsink 2007b). In recent years, many social scientists have dismissed the NIMBY explanation as shortsighted, noting that such canned explanations obscure the real reasons people support or oppose wind farm development. These scholars have urged a more nuanced understanding of public attitudes and motivations regarding wind farm development.

Some authors have suggested that conflicts over wind energy developments are explained by differences in underlying values and beliefs; however, there is a lack of empirical evidence for how values and beliefs influence attitudes towards wind farm development.

In this paper, I report the results from a study of public attitudes towards potential wind farm development in three areas of coastal Michigan. A survey of residents' attitudes included measures of values and beliefs that are well accepted in the environmental sociology literature. Structural equation modeling was used to reveal the relationships among general values, environmental beliefs, and several other factors believed to influence public attitudes towards wind farm development. What emerges is a picture of community members heavily influenced by underlying values, with their support of commercial wind farm development depending largely on a belief that wind farms will provide economic benefits to the community.

Wind Energy

According to the American Wind Energy Association, the generating capacity of wind energy systems in the United States grew more than 10,000 megawatts (MW) in 2009 alone, and now totals more than 35,600 MW. More than 14 states now have generating capacities greater than 1 gigawatt (1,000 MW).

Most of this capacity has come in the form of *wind farms*. A wind farm is a group of interconnected, large wind turbines that send electricity onto the electrical transmission grid. Wind farms are typically developed by private companies and investment groups, which sell the energy generated by them to public utility companies. This is a change from wind energy development of the past century, which was often characterized by single or small clusters of wind turbines developed by individuals or communities. Governmental policy intended to encourage wind energy has shifted the

development model in both Europe and the United States to focus on large-scale projects, supported by private corporations and investors (Tanzler 2010).

The scale of the technology has also changed over the past decade. To boost efficiency, wind turbines have become larger and larger. Capacities of 1-2 MW per turbine have become an industry standard for on-land wind farms. At a typical wind farm, located in Michigan, the 1.65 MW turbines are mounted on tube-shaped towers 262 feet (78 meters) tall (Wolverine Power Cooperative; www.wpsci.com; 12/9/2010). With blades that are 131 feet (40 meters) long, this means the total height of the structure is 393 feet (120 meters). These are big machines.

As the technical feasibility of wind power has become more widely accepted, “the question of its social acceptability has emerged as a key issue” (Szarka 2006:3045). Public opinion polls have found generally high levels of support for wind power (Ek 2005). A 2008 MIT survey on energy, for example, found that nearly 75 percent of people in the U.S. either support or strongly support the siting of a wind energy facility within 25 miles of their home (Ansolabehere and Konisky 2009). This was far greater than support for coal, natural gas, and nuclear facilities.

Yet, despite strong support for wind energy in principle, specific projects are frequently met with strong local opposition (Kintisch 2010). Evidence suggests that opposition groups have been successful at slowing, but not necessarily stopping, development projects (Aitken, McDonald, and Strachan 2008). Even if opposition has been unable to stop proposed projects, there is evidence that perceptions of public

opposition have shaped proposals and the wind energy industry in general (Walker et al. 2010). The juxtaposition of high public support for wind power in general with local opposition to specific projects—what Bell et al. (2005) call a “social gap”—is a common narrative within the field of renewable energy (Walker et al. 2010).

Wind Energy Social Science

As the number of wind farms has grown across Europe, North America, and Australia, a burgeoning social science literature has followed. I now review the major theories and findings found in this social science literature. First, I address the literature on the NIMBY response. Then, I summarize the key themes that have been identified as contributors to public attitudes towards wind farms, including underlying values and beliefs.

NIMBY

The gap between general public support and local opposition to wind farms is commonly attributed to a “not in my backyard” mindset within the public (Krohn and Damborg 1999). Known by the shorthand *NIMBY*, this explanation means that while a person views wind energy as beneficial to society, their self interest leads them to oppose the construction of a wind farm in their community (Kempton et al. 2005; Schively 2007; Wolsink 2007b; Devine-Wright 2004; Bell et al. 2005). *NIMBY* is generally seen as a pejorative (Kempton et al. 2005), implying that the selfishness of community members impedes “the attainment of social goals” (Wolsink 2007b:1200). For some, *NIMBY* is framed as an emotional and irrational response (Cass and Walker 2009a).

Many authors have discounted the NIMBY explanation (Devine-Wright 2009, 2004; Kempton et al. 2005; Swofford and Slattery 2010; Van der Horst 2007; Wolsink 2000). The NIMBY argument assumes that high public support of renewable energy technology *should* lead to broad acceptance for implementation of those technologies (Wüstenhagen et al. 2007; Wolsink 2007a). Some contend that the NIMBY label implies that those who oppose wind energy developments are deviant (Aitken 2010) and leads developers to disregard the substance of local opposition (Wolsink 2007a, 2000; Breukers and Wolsink 2007). Perhaps the most important reason to discount the NIMBY explanation is that it tells us nothing about *why* someone does not want a wind farm in his or her backyard. Nor does it explain why a person would support wind energy in general.

These critiques of the NIMBY concept garner calls for social science to take a more nuanced look at attitudes towards wind farms and the factors that underlie those attitudes. Researchers have not only urged that we better understand opposition to proposed projects, but that we also take a more critical look at the reported widespread support of wind power in general (Van der Horst 2007; Aitken 2010; Ellis, Barry, and Robinson 2007; Wüstenhagen et al. 2007). The notion of *qualified support* has become more accepted within the literature (Walker et al. 2010). Although there are strong advocates and opponents of wind energy, others exhibit conditional support for the technology (Breukers and Wolsink 2007). Even if a person is generally supportive of wind energy or other renewables, support for the construction of a wind farm in or near

one's is influenced by a number of factors, including perceived effects of the wind farm, fairness of the development, and underlying values and beliefs.

Perceived Effects

One possible explanation for attitudes toward wind farms is that people respond to the real or anticipated local effects of the developments. The 2008 Massachusetts Institute of Technology Energy Study found that perceived environmental harm and economic benefits shaped public attitudes towards all electricity sources, including wind (Ansolabehere and Konisky 2009). While some of the public response to wind farms may be based on exaggerated perceptions of impacts (Warren et al. 2005:866), the construction and operation of wind farms have real impacts on local communities (Breukers and Wolsink 2007; Wüstenhagen et al. 2007). Among renewable energy strategies, wind is considered to have the greatest impact on host communities (Hain et al. 2005), due to the diffuse nature of wind farm developments and size of modern turbines. Not all anticipated effects are negative, with common expectations that wind farm development will improve environmental conditions, create short- and long-term jobs, and contribute to the tax base of communities (Jessup 2010).

Undesirable effects have received more attention as shapers of public opinion. Warren and Birnie (2009) offer a review of anticipated effects. Effects that are commonly cited as community concerns include disruptions to traffic, road damage, harm to wildlife, and habitat destruction during construction, in addition to changes in the viewscape, noise, and a decrease in property values during operation.

The effects of wind farms on the local landscape has been viewed as central to community opposition (Breukers and Wolsink 2007; Ladenburg 2008; Johansson and Laike 2007; Wolsink 2007b). Wind farms are frequently sited on upland, exposed areas that are highly valued for scenic quality (Warren et al. 2005; Warren and Birnie 2009). Some (Cass and Walker 2009b; Jessup 2010) propose that landscape issues underlie other stated reasons for opposing wind farms. They suggest that people claim reasons they view as more socially legitimate than aesthetic issues, which can be “taken as a matter of taste and opinion and not as something that can be quantified and measured” (Aitken et al. 2008: 789).

It may be shortsighted, however, to blame landscape-based opposition purely on aesthetics (Devine-Wright 2004). Jessup (Jessup 2010) concludes that the threat of wind farms to landscape is complex. It is not simply a question of wind farms spoiling a nice view. Rather, landscape has symbolic value (Kempton et al. 2005), and it may be the loss of this symbolic value that underlies much of the opposition to wind farm development. In short, people with a strong bond to their community may view wind farms as a form of “alien invasion” (Cass and Walker 2009:64).

The symbolic values of landscape have been framed via the concept of *place attachment* (Firestone, Kempton, and Krueger 2009; Wolsink 2007a). Devine-Wright (2009) and Cass and Walker (2009) employ place-attachment and place-identity theories to explain public opposition to renewable energy projects. Under this framework, opposition to proposed wind farms is an effort to protect place-based identities and

fend off disruption of place attachment. A proposal to construct a wind farm is seen as a threat to the part of one's identity that is tied to a personally valued landscape.

If the actual effects of wind energy drive public opinion, it stands to reason that one's proximity to a wind farm would be an important factor affecting public opinion. Several studies have linked attitudes towards wind energy and wind farms to the distance one lives from an existing or proposed project (Swofford and Slattery 2010). Findings from these studies have been inconsistent (Devine-Wright 2009, 2004), however, with some demonstrating there is greater support within communities near a wind energy development (Graham, Stephenson, and Smith 2009).

Fairness/Process

Some authors have addressed the role of perceived fairness or justice in shaping public attitudes towards wind farms (Wolsink 2007a; Wüstenhagen et al. 2007; Warren et al. 2005). Recognizing that the nature of renewable energy projects are not easily categorized, Walker and Devine-Wright (2008) offer a two-axis typology, based on *process* and the distribution of effects (*outcome*). The poles of the process axis are defined as "open and participatory" and "closed and institutional." The outcome axis, describing how benefits are distributed, is anchored by distant and private, versus local and collective. This typology can be used to describe actual developments, as well as the preferences of various stakeholders.

In terms of distributional fairness, community members may feel that outside interests are profiting or benefiting from the electricity produced, and providing little

benefit to the host community (Warren and Birnie 2009; Szarka 2006). One curious finding is that acceptance of offshore wind developments rose if residents believed the project was the first of many that would be developed in the region (Firestone and Kempton 2007; Firestone et al. 2009).

Scholars have also asserted that the development process has much to do with public attitudes towards wind farms (Devine-Wright 2004; Walker 1995; Schively 2007; van der Horst and Toke 2010). There are two components to procedural fairness. One is whether the decisions are made in an unbiased manner. The other is whether stakeholders are treated fairly. Note that research has shown that a significant portion of opposition is directed more towards the developers of the project than towards the wind farm itself (Ellis et al. 2007). Firestone and Kempton (2007) found that 22 percent of their respondents would be more likely to support offshore wind projects near Cape Cod if the projects were proposed by a local government instead of a private developer, as opposed to only 9 percent who would be less likely to support the project.

Values and Beliefs

Some scholars assert that the roots of conflict over wind farm development may best be explained by differences in underlying values among wind farm supporters and opponents (Warren and Birnie 2009; Ellis et al. 2007; Szarka 2004; Ek 2005). Several authors suggest that environmental values fuel both support and opposition (Warren and Birnie 2009; Warren et al. 2005; Jessup 2010), with global perspectives (pro-wind farm) contradicting local perspectives (anti-wind farm).

Despite the recognition that values and environmental beliefs might influence attitudes towards wind farms, however, researchers have conducted little empirical research into these relationships. The study reported here remedies this by applying established measures of values and environmental beliefs to the study of wind farm attitudes.

The Study of Values and Beliefs

The concepts of values and beliefs have deep roots in the field of environmental sociology and are viewed as predictors of environment-related behaviors and attitudes. A comprehensive review of this work is provided by Dietz, Fitzgerald, and Shwom (2005).

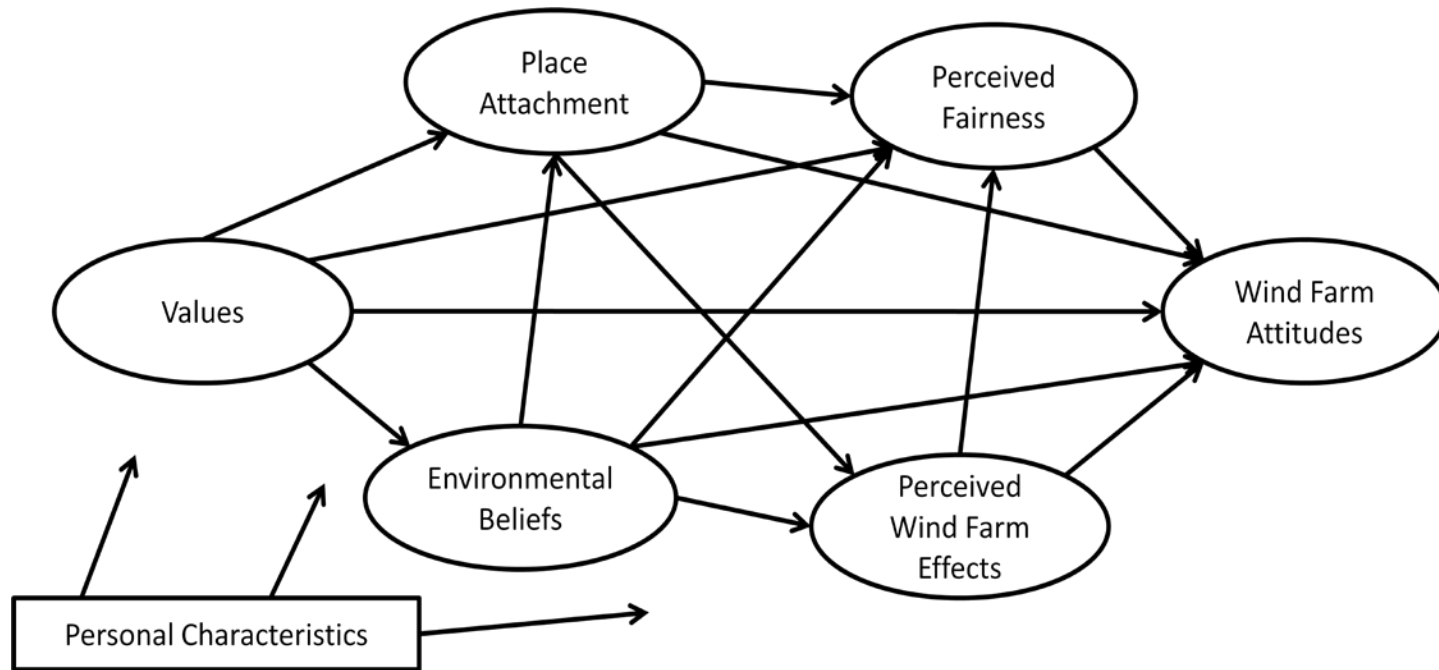
One approach popular in this literature is the values-belief-norms (VBN) model. In this model, values are viewed as “general guiding principles in life, and as such are likely guideposts for action in unfamiliar conditions, including the condition of forming attitudes about new social objects” (Stern, Kalof, et al. 1995:1615). The model holds that values influence environmental concerns (beliefs), which in turn influence attitudinal and behavioral norms. Using a modified Schwartz scale of values, this research has demonstrated that self interest (egoistic values), altruism towards humans (altruistic values), and altruism towards the non-human environment (biospheric values) are “the most fundamental determinants of environmental concern” (Dietz et al. 2005:356). Altruistic and biospheric values sometimes form a single factor that explains pro-environmental behavior (Stern, Kalof, et al. 1995). In VBN models, environmental

beliefs are generally measured using a version of the New Ecological Paradigm scale (NEP) developed by Dunlap and his collaborators (Dunlap and Van Liere 1978; Dunlap, Van Liere, Mertig, and Jones 2000b, 2000a). This scale can be used as a single measure to capture a respondent's worldview regarding the balance of nature, limits to growth, and human domination of nature (Dunlap, Van Liere, Mertig, and Jones 2000a). The VBN model has demonstrated utility in predicting attitudes towards environmental movements (Stern, Kalof, et al. 1995), environmental risk (Slimak and Dietz 2006), and nuclear energy (S. C. Whitfield et al. 2009).

In this study, I integrate a VBN framework into a simple model of residents' attitudes towards wind farm development (figure 1). In this model, values are viewed as antecedents to beliefs about wind farm effects and fairness, which influence attitudes in turn. By applying survey data to this model, I am able to shed light on important questions about public support or opposition for wind farms:

- Are underlying values and environmental beliefs significant predictors of attitudes towards wind farms?
- Do values and attitudes underlie other factors believed to influence attitudes towards wind farm attitudes?

Figure 1: Proposed, simplified theoretical model of wind farm attitudes.



Study Context

Several factors have contributed to a rise in wind farm development pressure in the State of Michigan, particularly in areas along the Great Lakes' coasts. A primary driver of this pressure is a renewable portfolio standard (RPS), passed in to law in 2008. This RPS requires that 10 percent of electricity sold in the state come from renewable sources by 2015. The law has led public utility companies to seek renewable sources of electricity, and private developers are looking for opportunities to supply this new market. The fact that the winds that buffet coastal areas of Michigan remain a largely untapped resource is another factor leading to interest in wind. According to the American Wind Energy Association (2010), Michigan has just over 140 MW of installed wind energy capacity. Given the growing wind energy industry in the United States, it is reasonable to expect that companies would seek to capture the wind resources in the state.

In 2009, Michigan Sea Grant provided funding to the Land Policy Institute (LPI) at Michigan State University to conduct an integrated assessment of issues related to siting wind farms in coastal areas of the state. As part of this study, LPI conducted a mail survey of residents in three areas of the state: Bay County, Presque Isle County, and a four-county area of the Upper Peninsula. Bay County is a relatively dense and urbanized area located at the base of Michigan's "thumb" which forms the Saginaw Bay of Lake Huron. The population of Bay County is 107,000, a third of which lives in Bay City. Presque Isle County sits in the northeast corner of Michigan's Lower Peninsula. A rural

county of 13,400 people, its largest population center is the small town of Rogers City. The study area in the Upper Peninsula is comprised of four counties--Marquette, Baraga, Houghton, and Keweenaw—that frame the Keweenaw Bay of Lake Superior. This area of Michigan is largely rural and forested, with two population centers around the cities of Houghton and Marquette. The total population of the four counties is roughly 112,000. These areas were selected to represent a diversity of geographic and demographic conditions. At the time data was collected for this study, Michigan had one of the highest rates of unemployment in the nation.

According to mapping conducted by LPI, each study area contains commercially developable wind resources. At the time of this survey, no projects had been officially proposed in any of the three areas. Bay County, however, is just across Saginaw Bay from Huron County, which hosts the largest extant wind farm in the state.

Methods and Measures

In early 2010, an eight-page mail survey was sent to 300 households in each of the three study areas (900 total surveys mailed total). The cover letter indicated that this was a research project being conducted by LPI at Michigan State University and asked that the survey be completed by the adult with a birthday closest to a specific date. Following components of the tailored design method (Dillman, Smyth, and Christian 2009) households in the sample were sent reminder post cards and replacement surveys to increase the response rate. After removing nonviable addresses,

the total sample for this study was 827 households. With 375 completed surveys, the response rate was 45.3 percent (table 1).

Table 1: Response rates for preliminary survey

Counties	Viable Sample	Completed	Response Rate(%)
Keweenaw/Houghton	142	66	46.5
Baraga/Marquette	143	44	30.8
Presque Isle	252	139	55.2
Bay	290	126	43.4
<i>Total</i>	<i>827</i>	<i>375</i>	<i>45.3</i>

The survey consisted of closed-end questions centered on themes from the literature: attitudes towards commercial wind farm development, perceived effects of wind farms, distributive and procedural fairness, and general values and environmental beliefs. Most of the questions asked respondents to consider how they would feel about a commercial wind farm development in or near their community, defined as the township, village, or city in Coastal Michigan where they live during all or part of the year. For most items, participants were asked to respond on a five-point scale. Basic demographic characteristics (sex, education, and household income) were also collected. Surveys were coded to indicate the community in which respondents resided.

Although there is extensive literature on support and opposition to wind energy projects, there has been little rigorous analysis of the factors that underlie opposition or support (Devine-Wright 2004; Firestone et al. 2009). Likewise, there has been little multivariate research that shows how different variables contribute to wind farm attitudes or interrelate with each other. The work of (Wolsink 2000, 2007b) is a notable

exception. He provides a model of resistance to local wind energy developments, which relies on general attitudes towards wind power, perceived landscape and other effects, fairness, and political efficacy. The research reported here builds on that work, using multiple items to measure underlying factors, and then constructing a statistical model that explains the contribution of different variables to respondents' wind farm attitudes.

I now review the measures used to capture the variables in the model. The model makes extensive use of latent variables, discovered through exploratory factor analysis and validated through confirmatory factor analyses. To assess the reliability of these latent variables, Chronbach's alpha was calculated (see table 2).

Table 2: Reliability of latent variables in model.

Latent Variable	Reliability (Chronbach's alpha)	Items
Wind Enthusiasm	.891	Wind farm as energy source
		Wind farm constructed in community
		State support offshore wind farms
		State support community wind farms
Wind Caution	.760	State support energy conservation
		State study wind farm effects
		State support non-wind renewables
NEP	.822	Ecological crisis is exaggerated
		Nature strong enough to cope
		Soon experience ecological catastrophe
		Balance of nature is delicate
		Earth is spaceship with limited resources
		Humans are abusing the environment
Traditional Values	.765	Family security, safety for loved ones
		Honoring elders, showing respect
		Self-discipline, resistance to temptation
Biospheric Values	.893	Unity with nature, fitting into nature
		Protect environment, preserving nature
		Respecting earth, harmony with species

Table 2 (cont'd)

Egoistic Values	.731	Influential, having impact on people
		Authority, right to lead or command
		Wealth, material possessions, money
Altruistic Values	.792	World at peace, free of conflict
		Social justice, care for the weak
		Equality, equal opportunity for all
Procedural Fairness	.934	Access to information
		Minimization of effects
		Opportunities to voice concerns
		Technical requirements for design
		Studies of proposed sites
		Consideration of community values
Distributive Fairness	.890	Economic
		Cost
		Construction impacts
		Health effects
		Environmental
Landscape Dist. Fairness	.882	Noise
		Visual
Landscape Effects	.781	Effects on Scenic Views
		Effects on Noise
		Effects on Wildlife
Economic Effects	.836	Economic development
		Jobs
		Tax base
Place Attachment	.922	Best place to do things I enjoy
		Better places I would rather be
		Miss it when I am away too long
		Feel happiest when there
		Favorite place to be
		No other place can compare
		It is a reflection of me

Wind Farm Attitudes

Based on questions in the 2008 Massachusetts Institute of Technology Energy Survey, respondents were asked to rate their level of support or opposition to the construction of three types of electricity-generating facilities (coal-fired power plant,

nuclear power plant, and commercial wind farm) in or near their community. Following questions asked by Firestone and Kempton (2007), respondents were asked to indicate the degree to which they would encourage or discourage construction of a commercial wind farm in or near their community. Respondents were also asked to indicate the degree to which they would support certain actions as priorities of policy makers in Michigan. These included other forms of wind energy and energy policy.

Exploratory factor analysis of these measures revealed two factors, which were verified in confirmatory factor analysis. The first is *Wind Farm Enthusiasm*. Four items, support for commercial wind farms as a source of electricity and support for development of wind farms in or near one's community, as well as support for offshore wind farms and community-owned wind farms, come together with a reliability of 0.891 (Chronbach's alpha). This scale reveals a latent attitude towards wind power in general.

A second factor, which I will call *Wind Farm Caution*, is comprised of three items from a list of possible priorities for Michigan state government: promoting conservation, promoting other (non-wind) forms of alternative energy, and studying the effects of commercial wind farms. This factor does not necessarily demonstrate outright opposition to wind farms; rather, it reveals a level of caution regarding the development of commercial wind farms and a preference to address energy issues in another way. This factor has a reliability of 0.764 (Chronbach's alpha).

Because these two factors may be causally interrelated, the correlation of their error terms ($r=0.173$) was estimated in the model.

Wind Farm Effects

Following questions developed by Firestone and Kempton (2007), respondents were asked to indicate the degree to which a commercial wind farm would negatively or positively affect twelve environmental, social, and economic aspects of their community.

The anticipated impacts of commercial wind farms fell on two factors: economic impacts and landscape change. Three items comprise the *economic impacts* factor: economic development, jobs, and tax base (Chronbach's $\alpha = 0.836$). Higher scores on this factor indicate a belief that commercial wind farm development would have a positive effect on a community's economy. Similarly, higher scores on the *landscape change* factor indicate expectations that a commercial wind farm would have a positive impact on the community landscape. Three items make up this factor: wildlife, noise, and scenic views (Chronbach's $\alpha = 0.781$). The bivariate correlation between these two scales was 0.454.

Distributive and Procedural Fairness

Questions about fairness were informed by the literature on justice. For distributive fairness, respondents were asked to rate the fairness of seven potential types of effects. For procedural fairness, respondents were asked to indicate their level of satisfaction with six aspects of the current laws or standards for wind farm development. Following the framework of Blader and Tyler (2003), these items included aspects of both decision quality and treatment of stakeholders.

Measures of perceived distributive and procedural fairness of commercial wind farm development load on three factors. Six measures of *procedural fairness*, both the quality of the decision process and the treatment of stakeholders, form a single factor (Chronbach's alpha= 0.934). Distributive fairness forms two separate factors: *community fairness* (5 items, Chronbach's alpha= 0.890) and *landscape fairness* (2 items, Chronbach's alpha= 0.882).

Place Attachment

The degree of attachment to the community in which they live was measured using seven items from the *place attachment* scale used by Stedman (2006). The scale showed high reliability (Chronbach's alpha= 0.922).

Values and Beliefs

General values were measured using the abbreviated Schwartz Value Survey developed by Stern, Dietz, and Guagnano (1995, 1998). Responses to the values scale loaded with high reliability on four typical latent factors: traditional (Chronbach's alpha= 0.765), biospheric (Chronbach's alpha= 0.893), egoistic (Chronbach's alpha= 0.731), and altruistic (Chronbach's alpha= 0.792). Although some studies do not distinguish between altruistic and biospheric values, and their error terms are highly correlated in this study ($r=0.812$), they have distinct effects on some variables and were kept separate for analysis.

Environmental beliefs were measured using a seven-item version (S. Whitfield, Dietz, and Rosa 1999) of the New Ecological Paradigm (NEP) scale (Dunlap, Van Liere, Mertig, and Jones 2000b; Dunlap and Van Liere 1978), which has been used to indicate overall environmental concern (Stern, Dietz, et al. 1995). The NEP scale showed high reliability in this study (Chronbach's $\alpha = 0.822$).

Results

Path analysis and structural equation modeling were used to evaluate the relationships among variables in this study. Structural equation modeling assumes a causal path; paths in this analysis are based on relationships assumed in the theoretical literature. Using AMOS 17.0 software, I first created a saturated model. Latent variables were constructed through the inclusion of the individual measures listed in the previous section. Correlations among exogenous variables were included in the model. For some theoretically related latent variables, correlations between errors of prediction were also included.

Non-significant pathways between variables ($p > .05$) were then removed to achieve a parsimonious model (figure 2; see table 3 for unstandardized direct effects). Two common measures of model fit indicate that this is an acceptable model (CFI=.930; RMSEA=.046).

Figure 2: A parsimonious model of attitudes towards the development of commercial wind farms.

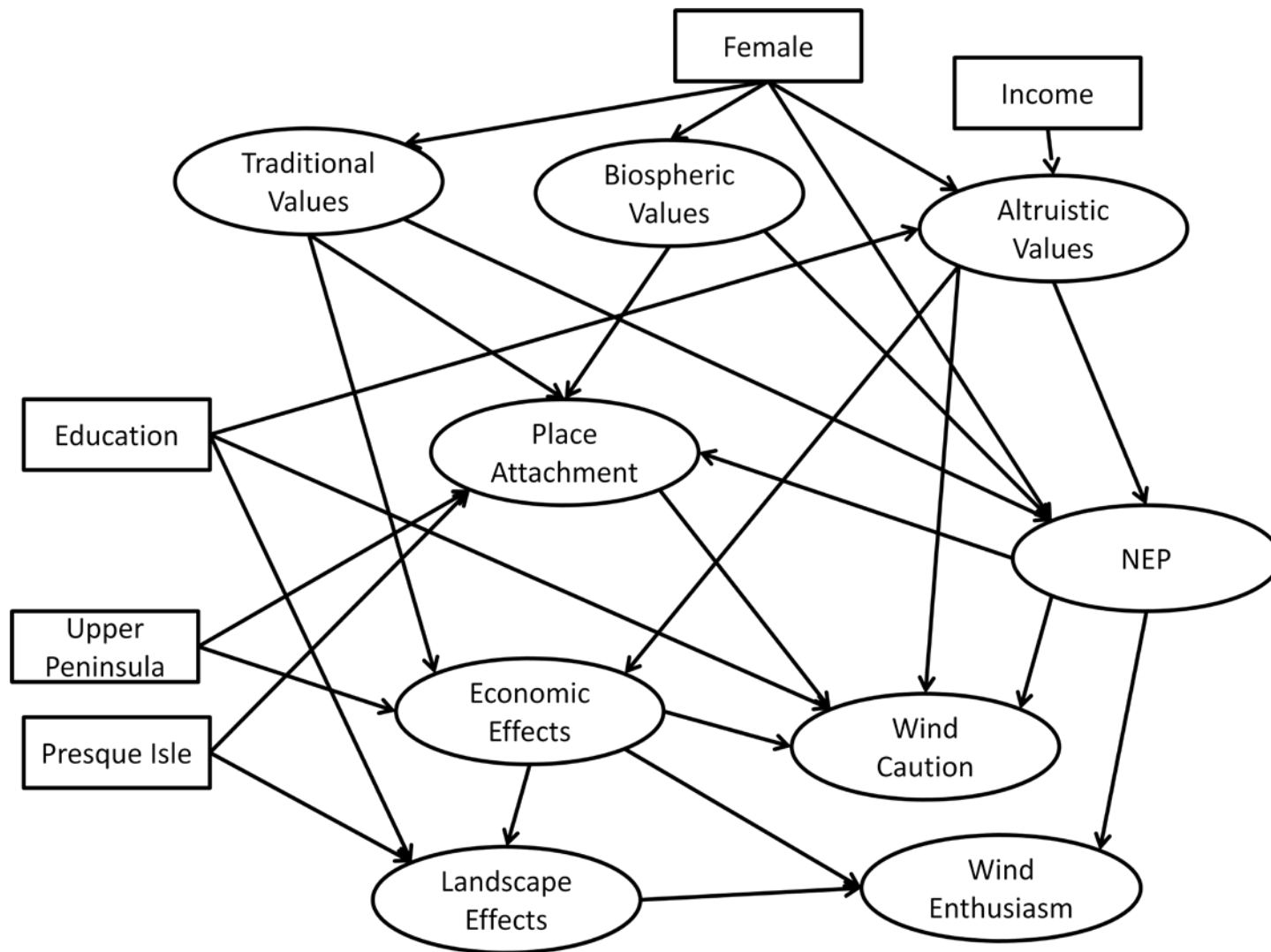


Table 3: Unstandardized direct effects for parsimonious model. Rows are dependent variables; columns are predictors.

	income	Female	education	Upper Peninsula	Presque Isle	biospheric	altruistic	traditional	NEP	place attachment	Economic effects	landscape change
biospheric	---	.276	---	---	---	---	---	---	---	---	---	---
altruistic	-.129	.326	---	---	---	---	---	---	---	---	---	---
traditional	---	.088	---	---	---	---	---	---	---	---	---	---
NEP	---	.188	---	---	---	.569	.382	-.975	---	---	---	---
place attachment	---	---	---	.506	.421	.231	---	.298	-.211	---	---	---
Economic effects	---	---	---	-.393	---	---	.331	-.483	---	---	---	---
landscape change	---	---	-.157	---	---	---	---	---	---	---	.625	---
wind caution	---	---	.086	---	---	---	.276	---	.237	.129	.249	---
wind enthusiasm	---	---	---	---	---	---	---	---	.254	---	.866	.249

Table 4: Unstandardized total effects for parsimonious model. Rows are dependent variables; columns are predictors.

	income	female	education	Upper Peninsula	Presque Isle	biospheric	altruistic	traditional	NEP	place attachment	economic effects	landscape change
biospheric	---	.276	---	---	---	---	---	---	---	---	---	---
altruistic	-.129	.326	---	---	---	---	---	---	---	---	---	---
traditional	---	.088	---	---	---	---	---	---	---	---	---	---
NEP	-.049	.384	---	---	---	.569	.382	-.975	---	---	---	---
place attachment	.010	.009	---	.506	.421	.111	-.081	.503	-.211	---	---	---
economic	-.043	.065	---	-.393	---	---	.331	-.483	---	---	---	---
landscape change	-.027	.041	-.157	-.246	---	---	.207	-.302	---	---	.625	---
wind caution	-.057	.198	.086	-.033	.054	.149	.439	-.286	.209	.129	.249	---
wind enthusiasm	-.056	.164	-.039	-.402	---	.145	.435	-.741	.254	---	1.021	.249

In the following text, direct effects (DE) are distinguished from total effects (TE). Total effects represent both direct and indirect influence of a predictor variable on a dependent variable (table 4). All reported coefficients are unstandardized.

Wind Farm Attitudes

The two latent factors on wind attitudes, *wind farm caution* and *wind farm enthusiasm*, serve as the primary dependent variables for this analysis. To examine the average ratings of these latent variables, the ratings of individual items were summed and averaged. Overall, there were high levels of support for both of these factors, with wind farm enthusiasm receiving a mean score of 3.92 (on a 5-point scale), and wind farm caution receiving a mean rating of 4.11 (on the same scale). The parsimonious model provides a good understanding of the influences on these variables. Based on squared multiple correlations, the model explains 67.9 percent of the variance in ratings of wind farm enthusiasm and 41.8 percent of wind farm caution.

Respondent Characteristics

The only significant ($p=.005$) direct relationship between personal characteristics and wind farm attitudes is the influence of education on wind farm caution. Higher education attainment slightly raises scores of wind farm caution ($DE=0.086$).

Via their influence on other variables, however, characteristics of respondents have notable total effects on wind farm attitudes. Dummy variables were created for sex and for place of residence. Women had marginally higher scores than men on both wind farm

enthusiasm ($TE=0.164$) and wind farm caution ($TE=0.198$). Residing in the Upper Peninsula has a substantial negative effect on enthusiasm ($TE= -0.402$), compared to living in Bay County. Other effects on wind farm attitudes were very small.

It is also notable that residents in the Upper Peninsula ($TE= 0.506$) and Presque Isle County ($TE= 0.421$) have higher levels of place attachment than residents of the more urbanized Bay County.

Wind Farm Impacts

Anticipated effects on the local economy have the single greatest effect on attitudes towards commercial wind farms. Total effects of economic impacts on wind power enthusiasm are 1.021. Although the effects are not as strong, perceived economic impacts also influence wind farm caution ($TE= 0.249$).

Interestingly, perceived economic impacts also have a large effect on perceived landscape change ($TE= 0.625$). In other words, belief that commercial wind farms will have an economic benefit influences one's belief that wind farms will have a positive effect on the local landscape. Anticipated effects on the landscape have a smaller, but still positive, effect ($TE= 0.249$) on wind power enthusiasm.

Place Attachment

Place attachment contributes to ratings of wind farm caution, with a total effect of 0.129. This means that people with higher identification with their place of residence were

more supportive of a cautious approach to wind farm development. Place attachment was not a significant predictor of wind farm enthusiasm.

Distributive and Procedural Fairness

Although the three fairness factors have significant relationships with other variables in the model, they are not significant predictors of wind farm enthusiasm or caution. Thus, these variables were eliminated from the final model.

Values and Beliefs

Of the eight possible relationships between the values factors and wind farm enthusiasm and caution, only one value has a significant direct effect. Altruistic values have a positive effect ($DE = 0.276$) on wind farm caution. Through their influence on other variables, however, these values have notable total effects on wind farm viewpoints. Wind farm enthusiasm is bolstered by biospheric ($TE = 0.149$) and altruistic ($TE = 0.435$) values, while being mitigated by traditional values ($TE = -0.741$). Traditional values ($TE = -0.286$) also decrease wind farm caution, while biospheric ($TE = 0.149$) and altruistic ($TE = 0.439$) values raise ratings of this variable.

Values also have substantial effects on other variables in the model. Altruistic values predict a belief that wind farms will have a positive economic effect on communities ($TE = 0.331$), but traditional values diminish this belief ($TE = -0.483$). Naturally, biospheric values are a major contributor ($TE = 0.569$) to environmental beliefs, as measured by the NEP scale. Altruistic values also have a positive effect on NEP ($TE = 0.382$), while traditional values have a large,

negative influence on NEP scores (TE= -0.975). Egoistic values did not have a significant effect on other variables, so this measure was dropped from the model.

Higher scores on the NEP scale have a positive relationship with wind farm enthusiasm (TE= 0.254) and wind farm caution (TE= 0.209). Also note that NEP scores have a significant negative effect on place attachment (TE= -0.211). This is most interesting in comparison to the effects of biospheric values, which boost place attachment scores (TE= 0.111).

Discussion

Consistent with other wind energy social science, this study showed a high level of support for wind farms within the general public. While some personal characteristics (sex, education, and area of residence) have minor influences on wind farm enthusiasm, perceived impacts of wind farms—economic impacts, specifically—are the dominant predictor of this factor (TE= 1.021). In fact, the lower levels of enthusiasm among Upper Peninsula residents (TE= -0.402) can be attributed to a strong skepticism of the economic benefits of wind farms. Residing in the Upper Peninsula leads to expectations that wind farms will have negative effects on economic variables (TE= -0.393), compared to those living in Bay County. This focus on economics may reflect the narrative of renewable energy in the State of Michigan, where the renewable portfolio standard passed in 2008 was promoted largely as a jobs-creation program.

This could easily be misinterpreted as demonstrating that self-interest drives attitudes towards wind farms. By looking a bit more closely at the data, however, one sees that views of anticipated effects are driven largely by underlying values. Altruistic values increase expectations for the economic benefits of wind farm development (TE= 0.331). On the other

hand, traditional values underscore skepticism of wind farms' economic benefits ($TE = -0.483$). Traditional values are often associated with anti-environmental views (and had a highly negative association with NEP scores). Egoistic values did not have a significant relationship with wind farm attitudes. It appears that rather than self-interest, support for wind farm hinges on an underlying concern for others. Perhaps people with altruistic values see wind farm development as a means to benefit their communities during difficult economic times.

The power of this belief is evident in its influence on how wind farms will affect the landscape in the community. Anticipated economic effects are, by far, the leading indicator of how respondents feel about the effects on wind farms on the landscape ($TE = 0.625$). This lends support to Warren et al (2005), who suggest that positive or negative views of wind farms might affect perceptions of impacts. Kaplowitz (1977) demonstrates the relationship between perceived economic benefits and moral judgment, with moral actions viewed as carrying greater payoffs. This finding is also consistent with research in risk perceptions (A. S. Alhakami and Slovic 1994; Finucane et al. 2000), which finds that when people view an object or activity as beneficial, they see it as less risky.

General environmental beliefs, as measured by the NEP, also contribute to respondents' enthusiasm for wind farms ($TE = 0.254$). In turn, NEP scores are buoyed by stronger biospheric values ($TE = 0.569$). This lends support to the assertion by Toke and Strachan (2006) that the wind turbine has become a common symbol of modern "green" sensibilities.

Why then is disagreement over wind farms sometimes characterized as pitting environmentalist against environmentalist? In addressing these "green on green" conflicts,

Warren et al. (2005:867) suggest that a “perceptual gulf defined by individuals’ values and beliefs separates those in favor and those against.” The items in the NEP reflect a general, or perhaps more global, environmental perspective. The place attachment scale may provide a better measure of connections to a local environment. Note that in this study, higher NEP scores have an inverse relationship to scores on place attachment ($TE = -0.211$). Place attachment is explained in part by higher traditional values ($TE = 0.503$), whereas traditional values have a large, negative influence on the NEP ($TE = -0.975$). It might be sounder, therefore, to view opposition to wind farms as fueled by general conservatism, rather than by a local environmental ethic.

It will be surprising to some, perhaps, that measures of perceived fairness did not contribute significantly to attitudes towards wind farm development in this model. This is not to say that fairness does not matter in wind farm development. Because this survey was conducted in areas highly suitable for wind farms but where no wind farm projects have been formally proposed, the concept of wind farm development might be too abstract for respondents to form a notion of distributive or procedural fairness. According to Johansson and Laike (2007), attitudes towards wind energy in general and specific projects will understandably differ, as they are different attitude objects and carry a very different set of associations in the minds of community members. This may be an important factor in explaining the difference between general attitudes towards wind farm development and community attitudes towards specific projects. An actual plan for wind farm development is more likely to trigger perceptions of fairness—or the lack thereof.

Conclusions

This study reveals that while underlying values may have few direct effects on attitudes towards wind farms, they have substantial and important indirect effects via general environmental beliefs and beliefs regarding the likely economic outcomes of wind farm development. Altruistic values have a buoying effect on wind farm attitudes, while values of traditionalism diminish wind farm support. It may be that the “social gap” identified by Bell et al. (2005) is largely a gap between underlying values.

STRENGTH OF ATTITUDES TOWARDS WIND ENERGY

Many institutions and individuals advocate for society's transition from fossil fuels to renewable sources of energy (aka, *renewables*). Renewables are widely viewed as a solution to multiple social problems: satisfying the growing need for energy, building energy security by reducing reliance on energy imports, and reducing greenhouse gas emissions (Szarka 2006). Yet public opposition to the deployment of renewable energy technologies is widely viewed as a significant obstacle to this transition (Devine-Wright 2011a; 2011b).

A growing social science literature addresses the public acceptability of renewables, much of it focused on conflicts over proposed clusters of electricity-generating wind turbines (i.e., wind farms). A key theme in this literature is why there is local opposition to projects given the wide public appeal of wind energy. Relying primarily on surveys of public attitudes, researchers have captured important insights on the complex factors that underlie local opposition to wind farms, including perceived effects of proposed developments, fairness of the development process, and strong emotional and symbolic attachment to place.

There has been little research, however, to better understand general attitudes towards potential wind energy development in areas where a project has not yet been proposed. The research reported here aims to reveal the nature and range of those attitudes.

It is widely acknowledged within social psychology that all attitudes are not created equal (Krosnick and Abelson 1992; Visser, Bizer, and Krosnick 2006). At one end of a continuum, attitudes are held with great certainty and fervor. At the other end, attitudes are simply a "passing fancy, or in the extreme... a mere fabrication aimed at giving the appearance of

knowledgeably about an issue where little actually exists” (Bassili 2008:237). Social psychologists address these qualitative differences in reported attitudes via the concept of *attitude strength*.

If attitudes towards renewables are not strong—if they are held with little conviction—it would not be surprising that public support is inconsistent and wanes in the face of a specific wind farm proposal. Strong attitudes should be more stable over time and more resistant to change.

In this paper, I explore the strength of attitudes towards potential commercial wind farm developments in coastal areas of Michigan. Structural equation models reveal that strength of attitudes in this context depends on both personal experience with the issues and underlying values. In particular, altruistic values fuel a belief that wind farm development will bring economic benefits to communities. That belief that wind farms will be economically beneficial is linked to ratings of importance and of strong collective identities regarding wind farm development. However, those same altruistic values and beliefs that wind farms will benefit the landscape have a negative influence on attitude confidence. More research is needed to understand whether strong attitudes contribute to the overall stability of attitudes over time or when confronted with a specific project proposal.

Wind Energy Social Science

Public opposition has been problematized as an obstacle to the wider deployment of renewable energy technology. Social scientists have taken a keen interest in public attitudes towards renewable technologies, and a growing literature explores the roots of public

opposition. Perhaps because it is one of the most widely deployed technologies, wind energy has been a primary focus of this literature.

As the technical feasibility of wind power has become more widely accepted, “the question of its social acceptability has emerged as a key issue” (Szarka 2006:3045). Public opinion polls have found generally high levels of support for wind power (Ek 2005). A 2008 Massachusetts Institute of Technology survey on energy, for example, found that nearly 75 percent of people in the United States either support or strongly support the siting of a wind energy facility within 25 miles of their home (Ansolabehere and Konisky 2009). This was far greater than support for coal, natural gas, and nuclear facilities.

Yet, despite strong support for wind energy in principle, specific projects are frequently met with strong local opposition (Devine-Wright 2011; Kintisch 2010). The juxtaposition of high public support for wind power in general with local opposition to specific projects—what Bell et al. (2005) call a “social gap”—is a common narrative within the field of renewable energy (Walker et al. 2010). The bulk of wind energy-focused social science research has identified factors that drive opposition to wind energy projects. This work includes strong critiques of NIMBY (not-in-my-backyard) explanations (Devine-Wright 2004, 2009; Wolsink 2000) and centers on three primary explanations: perceived effects of wind farms (including to the visual landscape), fairness of the planning process, and differences among underlying values and beliefs (Bell et al. 2005; Breukers and Wolsink 2007; Devine-Wright 2005; Ellis et al. 2007; Krohn and Damborg 1999; Pasqualetti 2000; Szarka 2004; Wolsink 1989). Little attention has been given to the nature of the public’s generally positive attitudes towards wind farms and other renewables.

Attitude Strength

In social psychology scholarship, an *attitude* is considered to be a person's evaluative response to an *attitude object* (Eagly and Kulesa 1997). An attitude object can be a concrete thing, such as a chair or another person, or a mental concept, such as a nationality or philosophical tradition. In the research reported here, the possible development of commercial wind farms serves as an attitude object.

Crano and Prislin (2006) call attitudes the “crown jewel of social psychology” (360), because the connection between attitudes and behavior is a central assumption of the discipline. That is, the discipline has long held that attitudes tell us something about how people will behave or respond in relevant conditions. The link between reported attitudes and behavior, however, has been called into question because research has demonstrated an inconsistent relationship between reported attitudes and behavior (Bassili 2008).

Measuring attitudes is a tricky business; survey responses can be misleading. Since the 1960s, scholars have raised concerns over the instability of responses to surveys of public attitudes (Converse 2000; Converse 1964; Kinder 1998). Individuals' responses to survey questions often change over time, revealing unstable—or even contradictory—attitudes. Perspectives on response instability owe much to the work of political scientist Philip Converse, who asserted that the “mass public contains significant proportions of people who, for lack of information about a particular dimension of controversy, offer meaningless opinions that vary randomly in direction during repeated trials over time” (Converse 1964:243). In other words, survey methods lead some people to provide “top-of-the-head” responses (Zaller and Feldman

1992) that are largely “unformed” in the minds of respondents (Lindeman 2002). Some attitudes, however, appear to be quite stable (Lavine et al. 1998).

Differences in attitude stability are often attributed to varying *attitude strength*. Strong attitudes are described as sharing four features (Crano and Prislin 2006; Krosnick and Petty 1995; Lavine et al. 1998; Petty, Haugtvedt, and Smith 1995b): 1) greater persistence of the attitude over time; 2) resistance of the attitude to change; 3) greater impact of the attitude on other judgments; and 4) greater consistency between attitudes and behavior. Krosnick and Abelson (1992) use the term “crystallization” to describe strong attitudes: “numerous studies have shown that strong attitudes are in fact more firmly crystallized and have more impact on cognition and behavior than weak attitudes” (178). Therefore, strong attitudes are a better predictor of action and subsequent attitudes. Weaker attitudes have less impact, due to instability (Eagly and Chaiken 1995).

What determines the strength of an attitude? Attitude strength is related to the cognitive characteristics of human attitudes. There are two dominant views of attitudes: a traditional perspective and a constructionist perspective. Lavine et al (1998) distinguishes these perspectives as *attitudes-as-stable-constructions* and *attitudes-as-temporary-constructions*, respectively. The traditional perspective has sometimes been called the “filing cabinet” model of attitudes (Tourangeau, Rips, and Rasinski 2000), because it views attitudes as preexisting, stable constructs that are stored in the memory and retrieved when an individual is confronted with an attitude object. However, this perspective is challenged by evidence that attitudes are often inconsistent over time and are prone to various contextual effects.

Contrasting the filing cabinet perspective are constructionist models of attitudes, which do not see attitudes as long-lasting entities; rather, attitudes are viewed as temporary constructions spurred by confrontation with an attitude object (e.g., asked a question on a survey). This perspective has become widely accepted in social psychology (Crano and Prislin 2006). Per constructionist perspectives, a person retrieves a “haphazard assortment of beliefs, feelings, impressions, general values, and prior judgments” (called *considerations*) when asked to report an attitude about an attitude object (Tourangeau et al. 2000). The probability that any particular consideration will be retrieved depends on its psychological accessibility in the given situation. Lavine et al (1998) note three important implications to the constructionist perspective. First, an individual is not expected to hold a single, true attitude towards any specific object; rather, a range of potential attitudes is possible. Second, attitudes arise from a “computational” process, not from simple retrieval of a preformed attitude. Finally, this computational process is influenced by external contexts and personal introspection.

According to Eagly and Kulesa (1997:129), “Attitudes are strong to the extent that they are well embedded in an existing attitudinal structure.” There are two dominant types of cognitive configurations that elicit attitude strength: intra- and inter-attitudinal structures (Eagly and Chaiken 1995). Intra-attitudinal structures are formed via repeated exposure to an attitude object. Experience with an object—either through direct interaction or through frequent discussions or thought—can lead to a dense mental network regarding the object. When confronted with the object, portions of this network of past feelings and experiences are called upon to form an attitude. Because this network is well developed, responses to the attitude object are relatively consistent, regardless of context. For example, if a particular song

is associated with many positive experiences and feelings, hearing that song in any situation in the future is likely to elicit a positive attitudinal response.

In terms of wind energy, feelings towards wind turbines or wind farms gained through a person's personal exposure to the technology—whether viewing wind farms directly, reading articles, or discussing wind-energy issues with friends—would create an intra-attitudinal structure that contribute to strength of attitudes towards potential wind farm developments in his or her community.

This does not mean that people cannot have strong attitudes towards something with which they have little or no prior experience. The second path to strong attitudes is *inter-attitudinal* structure. In these cognitive structures, beliefs or past experiences are generalized to a new or unfamiliar attitude object. Some influences are hierarchical, in which general principles or beliefs subsume attitudes towards more specific objects. For example, someone with a negative attitude towards country music is likely to dislike a specific song that comes from a singer widely identified as a country artist.

Abstract principles that guide our beliefs and experiences are often called *values* (Maio et al. 2003). Through inter-attitudinal structure, a person's *values* contribute to the strength of attitudes. Eagly and Kulesa (1997) note that general values play a strong role in determining attitudes of controversial social issues, and there is an extensive literature exploring values as predictors of environment-related attitudes (Dietz et al. 2005). Underlying values regarding the environment, the community, or fair treatment provide inter-attitudinal structures that could influence the strength of a person's attitudes towards wind farms.

Few studies of wind farm attitudes have addressed the strength of wind farm attitudes directly. In their study of attitudes towards potential wind energy development off the shore of Massachusetts, Firestone and Kempton (2007) asked participants to self-assess the likelihood that they would change their opinions based on new information. In their study, 26.8 percent of supporters and 38 percent of opponents indicated they would not change their minds. Although some skepticism towards this kind of self-report is warranted, these responses could indicate stronger attitudes among opponents of the Cape Cod proposal. Van der Horst (2007) also suggests that people opposed to wind farms will hold stronger attitudes. More importantly, Van der Horst hypothesizes that although the public expresses positive attitudes towards renewable energy, those attitudes are weak and easily changed when people are confronted with proposed projects. Studies of wind farm attitudes, however, have not employed measures of attitude strength from the social psychological literature.

Measuring Attitude Strength

Krosnick and Abelson provide a succinct argument for the measurement of attitude strength alongside measures of attitude (1992: 177):

“Although it is very common to see attitudes measured in surveys, it is rare for a survey to measure the strength of those attitudes. And yet it seems patently obvious that not all attitudes are alike. Some are strong, in the sense that they have profound effects on individuals’ cognition and behavior, and resist even the strongest pressures towards change. And other attitudes are weak, vulnerable to situational pressures, and with little if any impact on an individual’s thinking or action. Thus, it would seem that any attempt to use attitudes to understand

cognition and behavior certainly ought to take into account variation in strength across attitudes. Yet, despite this obvious rationale for doing so, the vast majority of surveys have not attempted to measure this attribute of attitudes at all.”

The complexity of measuring attitude strength may be an obstacle to researchers incorporating strength measurements into surveys. Strength is a latent characteristic of attitudes, with no clear, direct unit of measurement. Many features thought to indicate the cognitive structure surrounding an attitude have been used as indicators of attitude strength. Visser et al (2006) describe several of these, which they call strength-related *attributes*: importance, knowledge, accessibility, certainty, ambivalence, structural consistency, extremity, intensity, and elaboration. Prislin (1996) found that a single measure of strength can indicate attitude stability, but the critical measure varies for different attitude objects. While it is common for studies to use a single predictor or combine several variables into a single measure of latent attitude strength (Krosnick and Abelson 1992), recent literature recommends the use of confirmatory factor analysis to build measurement scales on a case-by-case basis (Bassili 2008; Krosnick and Petty 1995; Visser et al. 2006).

Moreover, if we consider persistence, resistance, and attitude-behavior consistency to be consequences of attitude strength, then any variable that contributes to these qualities could be considered a predictor of attitude strength. Some researchers have urged that the pool of attitude strength predictors be expanded to include social influences (Crano and Prislin 2006; Stets and Biga 2003). Although not a central theme in attitude research, some scholars recognize the relationship between *collective identity* and attitudes, noting “When someone

expresses an attitude we feel we have learned something about who that person is, and when we express attitudes ourselves we feel we are communicating something about who we are” (Hogg and Smith 2007:89). As far back as Kelley’s (1955) research, social psychologists have found that priming the salience of an issue-relevant identity can strengthen resistance to attitude change. Recently, Hogg and Smith (2007) have demonstrated that the degree to which an individual identifies with a group can boost congruence between attitudes and behaviors supported by that group. Therefore, the research reported here uses the strength of group identification in regards to wind farm development as an additional indicator of attitude strength.

This study examines the attitudes of residents in three regions of coastal Michigan towards the potential development of commercial wind farms in or near their community. Analysis of survey data is used to explore strength of those attitudes and determine the extent to which general attitudes towards wind farms are driven by intra-attitudinal versus inter-attitudinal structure. The effect of attitude strength on the stability of those attitudes is also examined.

Study Context and Methods

Interest in wind farm development in the State of Michigan has risen sharply in recent years, particularly in areas along the Great Lakes’ coasts. A primary driver of this development pressure is a renewable portfolio standard (RPS), passed in to law in 2008, which requires that 10 percent of electricity sold in the state come from renewable sources by 2015. This law has led public utility companies to seek renewable sources of electricity, and private developers are

looking for opportunities to supply this new market. Much of the commercially viable wind is found near the coasts of the Great Lakes, which form the majority of the state's perimeter.

In 2009, Michigan Sea Grant provided funding to the Land Policy Institute (LPI) at Michigan State University to conduct an integrated assessment of issues related to siting wind farms in coastal areas of the state. As part of this study, LPI conducted a mail survey of residents in three areas of the state: Bay County, Presque Isle County, and a four-county area of the Upper Peninsula. Bay County is a relatively dense and urbanized area located at the base of Michigan's "thumb" which forms the Saginaw Bay of Lake Huron. The population of Bay County is 107,000, a third of which lives in Bay City. Presque Isle County sits in the northeast corner of Michigan's Lower Peninsula. A rural county of 13,400 people, its largest population center is the small town of Rogers City. The study area in the Upper Peninsula is comprised of four counties--Marquette, Baraga, Houghton, and Keweenaw—that frame the Keweenaw Bay of Lake Superior. This area of Michigan is largely rural and forested, with two population centers around the cities of Houghton and Marquette. The total population of the four counties is roughly 112,000. These areas were selected to represent a diversity of geographic and demographic conditions. According to mapping conducted by LPI, each study area contains commercially developable wind resources. At the time of this survey, no projects had been officially proposed in any of the three areas. Bay County, however, is just across Saginaw Bay from Huron County, which hosts the largest extant wind farm in the state.

In early 2010, an eight-page mail survey was sent to 300 households in each of the three study areas (900 total surveys mailed total). The cover letter indicated that this was a research project being conducted by LPI at Michigan State University and asked that the survey be

completed by the adult with a birthday closest to a specific date. Following components of the tailored design method (Dillman, Smyth, and Christian 2009) households in the sample were sent reminder post cards and replacement surveys to increase the response rate. After removing nonviable addresses, the total sample for this study was 827 households. With 375 completed surveys, the response rate was 45.3 percent.

The survey consisted of closed-end questions centered on themes from the literature: attitudes towards commercial wind farm development, attitude and identity strength, and general values and environmental beliefs. Most of the questions asked respondents to consider how they would feel about a hypothetical commercial wind farm being developed in or near their community, defined as the township, village, or city in Coastal Michigan where they live during all or part of the year. For most items, participants were asked to respond on a five-point scale. Basic demographic characteristics (sex, education, and household income) were also collected.

A second wave of the survey was sent to the initial 375 respondents six to eight weeks after completion of the first survey. This survey was slightly shorter but all of the questions asked also appeared on the initial survey. Of these, 187 viable surveys were returned for a 50 percent response rate in the second wave. The surveys were coded to allow comparison of responses on the first- and second-wave surveys.

Two separate analyses were conducted on this survey data. First, statistical models were created to understand the causes of attitude strength in regards to wind farm development. A second analysis used standard linear regression models to explore the effects of attitude strength on the stability of attitudes towards wind farms.

Strength of Attitudes Towards Potential Wind Farm Development

The following measures from the surveys were used to analyze the degree and causes of attitude strength among the survey respondents (table 5).

Table 5: Measures used in attitude strength analyses

Latent Variable	Reliability (Chronbach's alpha)	Items
Wind Enthusiasm	.891	Wind farm as energy source
		Wind farm constructed in community
		State support offshore wind farms
		State support community wind farms
Wind Caution	.760	State support energy conservation
		State study wind farm effects
		State support non-wind renewables
Traditional Values	.765	Family security, safety for loved ones
		Honoring elders, showing respect
		Self-discipline, resistance to temptation
Biospheric Values	.893	Unity with nature, fitting into nature
		Protect environment, preserving nature
		Respecting earth, harmony with species
Egoistic Values	.731	Influential, having impact on people
		Authority, right to lead or command
		Wealth, material possessions, money
Altruistic Values	.792	World at peace, free of conflict
		Social justice, care for the weak
		Equality, equal opportunity for all
Economic Effects	.836	Effects on economic development
		Effects on jobs
		Effects on tax base
Landscape Effects	.781	Effects on scenic views
		Effects on noise
		Effects on wildlife
Confidence	.806	Confident about views
		Knowledge about renewable energy
		Knowledge about wind farms
		Discussed issues related to wind farms
Identity Strength	.725	Fit into this group
		Neighbors view as this kind of person
		Similarity of views to others in group

Attitude Strength

The initial survey included eight Likkert-style items on attributes of attitude strength. These measures were based on questions used in previous social psychological studies (Barden and Petty 2008; Boninger, Krosnick, and Berent 1995; Pomerantz, Chaiken, and Tordesillas 1995). Exploratory and confirmatory factor analysis revealed a four-item latent factor including two measures of perceived knowledge about wind farms, one measure of certainty, and one measure of thoughtfulness. This latent factor, which I have labeled *confidence*, has a reliability of 0.806 (Chronbach's alpha). This factor is an indicator of intra-attitudinal structure, because it depends largely on the degree to which respondents have considered wind farm development issues.

Respondents were also asked to choose from a list of seven identities (e.g., business person, environmentalist, or wind farm opponent) the "one kind of person that *best* describes how you view yourself with regards to commercial wind development." Respondents were allowed to specify an identity not included in the list. Because individuals likely have different definitions of how people in these groups view the development of wind farm issues, the identity selected by respondents is not a variable in this analysis. This study is concerned only with the *strength* of collective identity with regards to wind farm development.

Strength of identity was measured via three items adapted from Hogg and Hains (1996) (see also Reid and Hogg (2005) and Terry, Hogg, and White (1999)). Respondents were asked to think about the identity selected and indicate how well he or she fits into the group, how important it is that neighbors view him or her as this kind of person, and the perceived similarity of his or her views with other members of this group. The three items formed a single

latent factor with high reliability (Chronbach's $\alpha = 0.725$). Because issue-relevant collective identities have been connected to greater resistance to attitude change, this factor is included as a measure of attitude strength. Following the theory that collective identities form a cognitive template that steer the formation of subsequent attitudes (M. Hogg and J. Smith 2007; Terry et al. 1999), I propose that identity-based attitude strength is derived from inter-attitudinal structure.

I also include a single measure of importance, which did not attach to other measures with a high degree of reliability, in this analysis. The degree to which an attitude object is viewed as having personal importance is a common indicator of attitude strength (Bassili 2008; Bizer and Krosnick 2001; Prislin 1996).

Values

Values are typically viewed as an important driver of inter-attitudinal structure, because they are viewed as strongly held principles, which shape subsequent attitudes and behaviors (Dietz et al. 2005; Maio et al. 2003). Respondents' general values were measured using the abbreviated Schwartz Value Survey developed by Stern, Dietz, and Guagnano (1995; Stern et al. 1998). Responses to the values scale loaded with high reliability on four typical latent factors: traditional (Chronbach's $\alpha = 0.765$), biospheric (Chronbach's $\alpha = 0.893$), egoistic (Chronbach's $\alpha = 0.731$), and altruistic (Chronbach's $\alpha = 0.792$). Although some studies do not distinguish between altruistic and biospheric values, and their errors of prediction are highly correlated in this study ($r=0.812$), they have distinct effects on some variables and were kept separate for analysis.

Wind Farm Effects

Following questions developed by Firestone and Kempton (2007), respondents were asked to indicate the degree to which a commercial wind farm would negatively or positively affect twelve environmental, social, and economic aspects of their community. The anticipated impacts of commercial wind farms fell on two factors: economic impacts and landscape change. Three items comprise the *economic impacts* factor: economic development, jobs, and tax base (Chronbach's $\alpha = 0.836$). Higher scores on this factor indicate a belief that commercial wind farm development would have a positive effect on a community's economy. Similarly, higher scores on the *landscape change* factor indicate expectations that a commercial wind farm would have a positive impact on the community landscape. Three items make up this factor: wildlife, noise, and scenic views (Chronbach's $\alpha = 0.781$). The bivariate correlation between these two scales was .454.

Other Measures

Several other measures are included in this analysis. These include simple demographic characteristics, including education level and sex. Surveys were also marked to indicate whether they came from residents in the three study areas: Bay County, Presque Isle County, or the Upper Peninsula.

Finally, participants were asked "Has a commercial wind farm been proposed in or near your community?" Respondents could answer "yes," "no," or "uncertain." Although specific projects had not been proposed in any of the study areas, Bay County is adjacent to the county in which large commercial wind farms had been developed; these residents may be familiar

with these wind farm developments and consider them to be located near their community.

Results

Path analysis and structural equation modeling were used to evaluate the relationships among variables in this study. Structural equation modeling assumes a causal path; paths in this analysis are based on relationships assumed in the theoretical literature. Using AMOS 17.0 software, I first created a saturated model. Then, non-significant pathways ($p > .05$) were removed to achieve a parsimonious model (figure 3). Two common measures of model fit indicate that this is an acceptable model for this data (CFI= .927; RMSEA= .046).

For the purpose of comparison, average ratings are provided for some of the latent variables in this model. In these cases, individual items were summed and averaged to arrive at an overall mean. However, the individual items remained as separate variables in the structural equation model.

In the following text, direct effects (DE) are distinguished from total effects (TE) (tables 6 and 7). Total effects represent both direct and indirect influence of a predictor variable on a dependent variable.

The key dependent variables in this analysis are the three measures of strength. The mean rating for the single measure of importance is 3.43 on a five-point scale. Based on R-square values, the structural equation model explains 45.3 percent of the variance in this measure. The effects of altruistic (TE= 0.236) and traditional values (TE= -0.342) on importance are entirely indirect, mediated by their effects on perceived economic effects of wind farm development. Egoistic (DE= 0.156) and biospheric values (DE= 0.217) have direct positive effects on importance. The greatest effects on importance came from perceived economic

Figure 3: A parsimonious model of the strength of attitudes towards potential wind farm development.

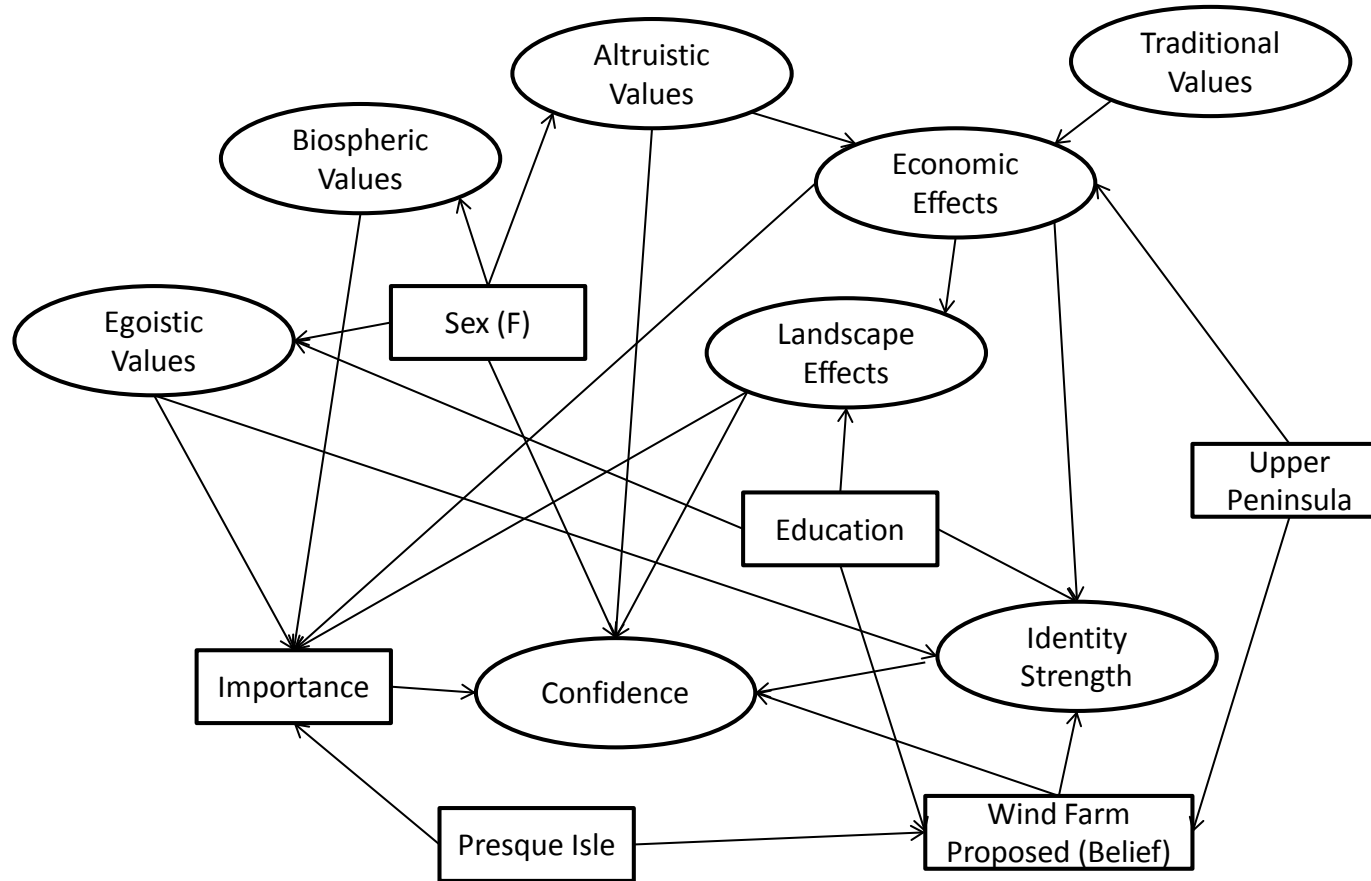


Table 6: Unstandardized direct effects on attitude strength. Columns are predictors; rows are dependent variables.

	proposed	female	education	Upper Peninsula	Presque Isle	altruistic	traditional	biospheric	egoistic	economic	landscape change	importance	Identity Strength
proposed	---	---	.041	-.189	.249	---	---	---	---	---	---	---	---
altruistic	---	.349	---	---	---	---	---	---	---	---	---	---	---
traditional	---	.089	---	---	---	---	---	---	---	---	---	---	---
biospheric	---	.265	---	---	---	---	---	---	---	---	---	---	---
egoistic	---	.292	-.120	---	---	---	---	---	---	---	---	---	---
economic	---	---	---	-.395	---	.299	-.434	---	---	---	---	---	---
landscape change	---	---	-.159	---	---	---	---	---	---	.631	---	---	---
importance	---	---	---	---	.187	---	---	.217	.156	.616	.273	---	---
identity strength	.204	---	.120	---	---	---	---	---	.146	.175	---	---	---
confidence	.362	-.179	---	---	---	-.231	---	---	---	---	-.173	.192	.362

Table 7: Unstandardized total effects on attitude strength. Columns are predictors; rows are dependent variables.

	proposed	Female	education	Upper Peninsula	Presque Isle	altruistic	traditional	biospheric	egoistic	economic	landscape change	importance	Identity Strength
proposed	---	---	.041	-.189	.249	---	---	---	---	---	---	---	---
altruistic	---	.349	---	---	---	---	---	---	---	---	---	---	---
traditional	---	.089	---	---	---	---	---	---	---	---	---	---	---
biospheric	---	.265	---	---	---	---	---	---	---	---	---	---	---
egoistic	---	.292	-.120	---	---	---	---	---	---	---	---	---	---
economic	---	.066	---	-.395	---	.299	-.434	---	---	---	---	---	---
landscape change	---	.042	-.159	-.250	---	.189	-.274	---	---	.631	---	---	---
importance	---	.155	-.062	-.312	.187	.236	-.342	.217	.156	.788	.273	---	---
Identity Strength	.204	.054	.111	-.108	.051	.052	-.076	---	.146	.175	---	---	---
confidence	.435	-.217	.070	-.124	.144	-.200	-.046	.042	.083	.105	-.121	.192	.362

impacts (TE= 0.788). Landscape impacts had a smaller, but also positive, effect (TE= 0.273) on importance. Compared to Bay County, living in the Upper Peninsula had a negative effect on importance (TE= -0.312); although this effect is indirect via resident's belief that a wind farm project had not been proposed in or near their community.

Collective identity also shows signs of moderate strength within the sample. To compare the average ratings of the strength variables, the individual items comprising latent variables were summed and averaged. Collective identity has an average score of 3.42. The model explains 19.5 percent of variance in identity strength. Egoistic (DE= 0.146) values have positive influences on identity strength. Anticipated economic benefits of wind farm development have a positive influence (TE= 0.175) on identity strength, as does belief that a project has been proposed in or near the respondents' community (TE= 0.204). Education level has a moderate positive effect on identity strength (TE= 0.111).

The ultimate measure of attitude strength in this model is confidence, which has the lowest average rating (2.93) of the three strength measures. The model explains 26.4 percent of the variance in confidence. The other two strength measures have a significant influence on ratings of confidence. Direct effects of importance on confidence were 0.192; direct effects of identity strength on confidence are 0.362. The influence of egoistic (TE= 0.083) values on confidence are entirely indirect, while altruism has direct negative effects (DE= -0.231). Anticipated economic effects have a positive relationship to confidence (TE= 0.105) via their influence on importance and identity strength, while perceived beneficial landscape effects reduce confidence (TE= -0.121). Level of education has small positive impacts (TE= 0.070) on

confidence, while being female reduces confidence ($TE = -0.217$). Belief that a wind farm has been proposed in or near their community had a positive effect ($TE = 0.435$) on confidence.

Stability of Wind Energy Attitudes

A primary feature of strong attitudes is the stability of those attitudes over time. Stability is determined by comparing responses to the same questions after a time lag. While it is assumed that this comparison reveals the inherent instability of weak attitudes, it is also possible that responding to the first survey spurs participants to think, discuss, and read about wind energy. Measures of respondents' attitudes towards wind farm development are critical variables in the analysis of stability.

Wind Farm Attitude Measures

Based on questions in the 2008 Massachusetts Institute of Technology Energy Survey, respondents were asked to rate their level of support or opposition to the construction of three types of electricity-generating facilities (coal-fired power plant, nuclear power plant, and commercial wind farm) in or near their community. Following questions asked by Firestone and Kempton (2007), respondents were asked to indicate the degree to which they would encourage or discourage construction of a commercial wind farm in or near their community. Respondents were also asked to indicate the degree to which they would support certain actions as priorities of policy makers in Michigan. These included other forms of wind energy and energy policy.

Exploratory factor analysis of these measures revealed two factors, which were verified via confirmatory factor analysis. The first is *Wind Farm Enthusiasm*. Four items, support for

commercial wind farms as a source of electricity and support for development of wind farms in or near one's community, as well as support for offshore wind farms and community-owned wind farms, come together with a reliability of 0.891 (Chronbach's alpha; table 1). This scale reveals a latent attitude towards wind power in general.

A second factor, which I will call *Wind Caution*, is comprised of three items from a list of possible priorities for Michigan state government: promoting conservation, promoting other (non-wind) forms of alternative energy, and studying the effects of commercial wind farms. This factor does not demonstrate outright opposition to wind farms; rather, it reveals an interest in renewable energy, a level of caution regarding the development of commercial wind farms, and a preference to address energy issues in another way. This factor has a reliability of 0.764 (Chronbach's alpha).

Results

Individual items in each of the two latent factors for wind farm attitudes were summed and averaged to arrive at a single score for these latent variables. The mean score for each of these latent attitudes was somewhat lower in the follow-up survey than the preliminary survey (table 8). The difference between preliminary (3.99) and follow-up ratings (3.85) of wind farm enthusiasm is statistically significant ($p=.001$); the difference between the scores of wind farm caution (4.13, 4.07) was not ($p=.170$).

Table 8: Differences in mean scores of preliminary and follow-up attitudes towards potential wind farm development.

	N	Preliminary Mean	Follow-Up Mean	t-score	significance
Wind Farm Enthusiasm	183	3.99	3.85	3.230	.001
Wind Farm Caution	183	4.13	4.07	1.377	.170

Standard linear regression models were used to test the stability of wind farm enthusiasm and wind farm caution (tables 9 and 10). Wind farm attitudes from the follow-up survey serve as the dependent variables in these analyses. Wind farm attitudes from the preliminary survey serve as the primary predictor in the regression models. In this way, the amount of variability in follow-up attitudes explained by preliminary attitudes reflects the stability of attitudes towards wind farms. As expected, preliminary attitudes are highly significant predictors ($p < 0.001$) of follow-up attitudes for both wind farm enthusiasm and caution. The R-square for the dependent variable follow-up wind farm enthusiasm is .700; for wind farm caution it is .403. Thus, wind farm enthusiasm can be viewed as relatively stable, with preliminary attitudes explaining 70 percent of the variability in follow-up responses. For wind farm caution, however, preliminary attitudes explain only 40 percent of follow-up responses.

Table 9: Effects of attitude strength on wind enthusiasm. Dependent variable is the rating of wind enthusiasm on the follow-up survey.

Model	R-Square (sig change between models)	Predictors	Unstand. Coefficient	Sig.
1	.700	constant	.086	
		Preliminary enthusiasm	.946	<.001
2	.706 ($p = .344$)	constant	.243	
		preliminary enthusiasm	.796	<.001
		enthusiasm*importance	.016	.223
		enthusiasm*confidence	.011	.505
		enthusiasm*identity	.005	.710

Table 10: Effects of attitude strength on wind caution. Dependent variable is the rating of wind caution on the follow-up survey.

Model	R-Square (sig change between models)	Predictors	Unstand. Coefficient	Sig.
1	.403	constant	1.403	
		preliminary caution	.645	<.001
2	.432 (p=.027)	constant	1.570	
		preliminary caution	.531	<.001
		caution*importance	.027	.003
		caution*confidence	.005	.680
		caution*identity	-.013	.350

In second models for each of these latent attitudes, terms were calculated for the interaction of preliminary attitudes and each attitude strength variable (confidence, importance, and identity strength). This analysis seeks to understand how the strength of preliminary attitudes raise or lower the influence of those attitudes on follow-up attitudes. If the strength of an attitude raises its stability, one can expect that stronger initial attitudes would have more influence on follow-up attitudes than would weaker attitudes. Note that attitude strength is not included as a separate predictor in these models, because there is no theoretical argument that the strength of an attitude has an independent effect on subsequent attitudes. Attitude strength is of interest only insofar as it moderates the effects of preliminary attitudes.

Contrary to expectations, adding the interaction terms to the regressions on wind farm enthusiasm do not contribute significant explanatory power ($p = .344$) to the initial model (see Table 9).

The addition of the interaction terms contributes a small (0.029), yet statistically significant ($p = .027$), amount of explanatory power to the model for wind farm caution. This

effect is due to the interaction of the single measure of importance, which has the only significant ($p = .003$) regression coefficient (0.027) of the three interaction terms (see Table 10). Because the interaction is positive, we can conclude that rating wind farm issues of higher importance strengthens the influence of preliminary attitudes towards renewable energy on follow-up attitudes on the same measures. In other words, as we would expect, higher ratings of importance create attitudes towards renewable energy that are somewhat more stable over time.

Discussion

Although the evidence suggests that confidence, identity strength, or importance do not contribute much to attitude stability in this study, there are several interesting findings regarding the nature of attitudes towards potential wind farm development in the study areas and what drives strength of those attitudes. Overall, attitudes towards wind farms were moderately strong, with all three strength measures hovering around the mid-point of the 5-point scale.

Belief that wind farms will be economically beneficial has the largest influence of any variable on this study's measures of attitude strength. This belief boosts scores of importance ($TE = 0.788$) and identity strength ($TE = 0.175$). Although this could be construed as an indicator of self interest as a cause of attitude strength among the respondents, it is important to note that altruistic values are associated with a belief in economic benefits ($TE = 0.299$), while traditional (often associated with conservative beliefs) diminish this belief ($TE = -0.434$). Those with altruistic values might see wind farms as a way to buoy the economic conditions of the entire community—and important issue during economically tough times in Michigan.

While belief in economic benefits contributes somewhat to confidence ($TE = .105$), this effect is entirely indirect via its effect on importance and identity strength. Interestingly, while altruistic values contribute to beliefs in economic benefit, altruistic values have a negative effect on confidence ($TE = -0.200$). Surprisingly, the belief that wind farms will have a positive impact on landscape features also has a negative influence on confidence ($TE = -0.121$).

Confidence, which is measured in this model by reported knowledge and the degree to which respondents have discussed issues related to alternative energy and wind farms, provides insights on the intra-attitudinal structure of views towards wind farms. Of the three measures of attitude strength in this study, confidence was the lowest on average. Note that the belief that a wind farm has been proposed in or near one's community contributed more heavily to confidence ($TE = 0.435$) than to identity strength ($TE = .204$). This can be explained by assuming that people who believe a wind farm has been proposed in their community would spend more time discussing and thinking about the issues, leading to more highly developed intra-attitudinal structures.

In this study, there was little evidence that attitude strength contributed to attitude stability. The only statistically significant relationship revealed was a small effect of perceived importance of the issues on the strength of wind farm caution. A reason these variables largely failed to predict stability could be the degree of strength or weakness in the attitudes of the population studied. This research initially assumed that there would be a degree of instability in attitudes; however, it may be that the moderate levels of attitude strength demonstrated within the population sampled were sufficient to create stability in attitudes towards wind farms. There also could be too little variation in attitude strength to reveal an effect. To

examine the variation in these variables, I calculated the coefficient of relative variation (SD/mean): importance ($1.13/3.43=0.329$), identity strength ($.866/3.42=0.253$), and confidence ($.831/2.93=0.284$) and found these coefficients to be rather small.

Conclusion

This research reveals that the strength of attitudes towards wind farms among residents of coastal Michigan are influenced by both intra- and inter-attitudinal cognitive structures. Altruistic values contribute to beliefs about the economic benefits of wind power, which in turn increase scores of importance and identity strength. Higher ratings of the same value, however, diminish confidence. It seems that while the inter-attitudinal structure of general values and beliefs provide some degree of strength regarding wind farm development, it does not boost respondent's confidence in their attitudes.

The lower average rating of confidence overall might indicate that there is little intra-attitudinal structure regarding wind farms in these communities. While values and beliefs may underscore general attitudes towards wind farms, those general attitudes are based on little personal experience with the issues.

Overall, this research does indicate that measuring the strength of public attitudes towards wind farms would provide a more complete understanding of those attitudes. In this study, it is found that ratings of importance and identity strength were moderate and fueled largely by values and beliefs about economic benefits, while confidence in attitudes towards wind farms is relatively lower than other strength measures and heavily influenced by the belief that a wind farm has been proposed in the respondents' community. Attitude strength may be

an important conceptual tool in explaining public support or opposition to wind energy and other renewable forms of energy generation.

While this study did not find a strong relationship between measures of attitude strength and attitude stability over time, it does indicate a promising area for future research. It would be interesting to track attitudes in a community throughout the process of planning and development of a wind farm to see how attitude strength affects the change in attitudes when confronted by personal experience. This research reveals a relative lack of intra-attitudinal structure, which should develop as people in the community attend public meetings, discuss the proposed plan with family and friends, and read about the project in local newspapers. Tracing changes in attitudes, relative to various degrees of attitude strength, would be particularly revealing.

EFFECTS OF INFORMATION ON GENERAL ATTITUDES TOWARDS WIND ENERGY

Although public attitudes towards wind energy and other forms of renewable energy (renewables) are largely positive (Ansolabehere and Konisky 2009; Ek 2005), local opposition to specific projects is widely viewed as a significant obstacle to the broader adoption of renewable technologies (Devine-Wright 2011; Walker et al. 2010; Wüstenhagen et al. 2007). Advocates of renewables have been frustrated by this apparent “social gap” between broad public support for wind energy and the slow deployment of the technology (Bell et al. 2005).

At the heart of this frustration is an assumption about relationships among attitudes: that specific attitudes are—or should be—shaped by general attitudes. From this perspective, support for wind farms is part of a conditional statement (if A, then B). Positive attitudes towards wind energy form the antecedent (A), and support for specific wind energy developments (e.g., wind farms) are the consequent (B). Perhaps this is why the social gap is so frustrating for some; they view opposition to wind farms as contrary to a rule of logic.

Johansson and Laike (2007) reject this conditional logic. They state that attitudes towards wind energy in general and attitudes towards specific projects will understandably differ, as they are different attitude objects. Each carries a different set of associations in the minds of community members. Where people may consider issues such as energy security and environmental quality when thinking about wind energy in general, they think about specific impacts—e.g., noise, construction traffic, and a changed landscape—when a wind farm is proposed in or near their community. It is unrealistic, they argue, to expect consistency across these attitudes. While it is true that the general concept of wind energy would stir very

different thoughts than a specific project, it seems imprudent to assume that general attitudes towards wind energy would have no influence on responses to specific proposals.

Social psychology has, in fact, long recognized that one attitude can influence another. Relationships among attitudes are the result of *inter-attitudinal structures* (Eagly and Chaiken 1995; Eagly and Kulesa 1997). That is, these attitudes are part of a mental network, in which one attitude is triggered by interaction with a different, but related, attitude object. Often, as is assumed in the social gap framework, there is a causal relationship among attitudes. A general attitude towards a concept or category shapes attitudes towards specific cases. It is not unreasonable to believe there would be some connection between general attitudes towards wind energy or renewables and responses to a specific wind farm proposal. All attitudes are not created equal (Krosnick and Abelson 1992; Visser et al. 2006), however. The degree to which a general attitude influences a specific attitude depends on the strength with which the general attitude is held. A strongly held general attitude will have greater influence over specific attitudes.

Social scientists have produced an extensive literature on public attitudes towards wind farms, offering explanations for this social gap and suggestions for how to close it. This literature focuses almost exclusively on how the characteristics of wind farms and the processes used to develop them fuel opposition. Researchers have identified several reasons for local opposition to proposed projects, including the perceived effects of wind farms on the landscape, the fairness of development processes and outcomes, and conflicts of underlying values among stakeholders (Bell et al. 2005; Devine-Wright 2004; Ellis et al. 2007; Firestone and Kempton 2007; Toke, Breukers, and Wolsink 2008; Wolsink 1989). They also suggest several

ways to close the gap: public education, participatory decision making, and a shift towards community ownership and control of wind farms (Bell et al. 2005; Devine-Wright 2011; Hindmarsh and Matthews 2008; Loring 2007; Szarka 2006; Walker 1995; Warren and McFadyen 2010).

Van der Horst (2007) suggests a different path to understanding the social gap: "...It is not only people's expressed reasons for opposing local projects that may be questioned, but also their expressed support in principle for renewables technologies would merit some closer examination" (Van der Horst 2007:2711). Van der Horst suggests that general attitudes towards wind energy are often too weak to have substantial influence on local attitudes when a wind farm project is proposed. This is a different perspective on the social gap, because it places some responsibility for the gap on the antecedent (general attitudes) rather than looking entirely to the consequent (responses to a wind farm proposal).

This shift in perspective would have important ramifications for how we think about interventions to close the social gap. Instead of focusing all attention on the wind farm development process, it suggests that efforts could be directed towards strengthening general support for wind energy and other renewables.

According to the literature on public attitudes, one path to a stronger attitude is greater knowledge about the object of that attitude (Krosnick and Petty 1995; Prislin 1996; Visser et al. 2006). While objective measures of knowledge have shown this relationship, so has the perception of being knowledgeable. In other words, it is not necessary to have deep knowledge about a subject to have a strong attitude towards it; believing you are knowledgeable is enough to strengthen attitudes. Research has also shown that the amount of thinking a person has

done about an object also strengthens attitudes. The amount of thought involved in forming an attitude is called *elaboration* (Barden and Petty 2008). Here again, just the perception of greater elaboration (i.e., belief you have given a great deal of thought to an issue) is enough to strengthen attitudes towards that issue (Petty, Haugtvedt, and S. M. Smith 1995a). Therefore, providing people with opportunities to discuss and learn more about wind energy should strengthen general attitudes towards it.

This paper examines how participation in an informational session on wind farms effects the attitudes of residents in communities where the development of commercial wind farms is possible but where specific projects have not yet been proposed. It finds that participation in this event changed general attitudes towards wind farms in both substantive and qualitative ways.

Study Context and Methods

This article reports findings from a study of attitudes towards the potential development of commercial wind farms in coastal Michigan. Interest in wind farm development in the State of Michigan has risen sharply in recent years, particularly in areas along the Great Lakes' coasts. A primary driver of this development pressure is a renewable portfolio standard (RPS), passed in to law in 2008, which requires that 10 percent of electricity sold in the state come from renewable sources by 2015. This law has led public utility companies to seek renewable sources of electricity, and private developers are looking for opportunities to supply this new market. Much of the commercially viable wind is found near the coasts of the Great Lakes, which form the majority of the state's perimeter.

In 2009, Michigan Sea Grant provided funding to the Land Policy Institute (LPI) at Michigan State University to conduct an integrated assessment of issues related to siting wind farms in coastal areas of the state. To narrow the geographic scope of this assessment, three study areas were selected: Bay County, Presque Isle County, and a four-county area of the Upper Peninsula. Bay County is a relatively dense and urbanized area located at the base of Michigan's "thumb" which forms the Saginaw Bay of Lake Huron. The population of Bay County is 107,000, a third of which lives in Bay City. Presque Isle County sits in the northeast corner of Michigan's Lower Peninsula. A rural county of 13,400 people, its largest population center is the small town of Rogers City. The study area in the Upper Peninsula is comprised of four counties--Marquette, Baraga, Houghton, and Keweenaw—that frame the Keweenaw Bay of Lake Superior. This area of Michigan is largely rural and forested, with two population centers around the cities of Houghton and Marquette. The total population of the four counties is roughly 112,000. These areas were selected to represent a diversity of geographic and demographic conditions. According to mapping conducted by LPI, each study area contains commercially developable wind resources (<http://www.landpolicy.msu.edu/WPT/>). At the time of this survey, no projects had been officially proposed in any of the three areas. Bay County, however, is just across Saginaw Bay from Huron County, which hosts the largest extant wind farm in the state.

Data reported in this study comes from three activities: a mail survey of a random sample of residents in the study areas, an identical survey administered to a convenience sample that participated in one of four information sessions, and a follow-up mail survey of all participants. The surveys consisted of closed-end questions centered on attitudes towards

commercial wind farm development. Most of the questions asked respondents to consider how they would feel about a commercial wind farm development in or near their community, defined as the township, village, or city in Coastal Michigan where they live during all or part of the year. Questions were also provided to gauge the strength with which the respondents held their attitudes towards wind farms.

Preliminary Mail Survey

In early 2010, an eight-page mail survey was sent to 300 households in each of the three study areas (900 total surveys mailed total). The cover letter indicated that this was a research project being conducted by LPI at Michigan State University and asked that the survey be completed by the adult with a birthday closest to a specific date. Following components of the tailored design method (Dillman et al. 2009) households in the sample were sent reminder post cards and replacement surveys to increase the response rate. After removing nonviable addresses, the total sample for this study was 827 households. With 375 completed surveys, the response rate was 45.3 percent.

Informational Events

Informational events were held in four locations: Hancock (Houghton County), Marquette (Marquette County), Rogers City (Presque Isle County), and Bay City (Bay County). Two events were held in the Upper Peninsula, due to large distances covered by that study area. Invitations to the event were mailed to a random sample of 300 residents in each study area (900 total invitations); however, due to low participation rates, the participants are not a representative sample of the study areas. A few residents also attended after learning of the

events through word of mouth. Therefore, the participants in these events are considered a convenience sample. A total of 60 individuals participated in the events.

Upon arrival, each participant was provided a packet containing an illustrated issues booklet, a county-specific map of wind resources and data, an explanation of informed consent, and an 8-page survey. Each event began with an introduction to the project and the review of a statement regarding informed consent to participate in a research project. Participants were then provided approximately 15 minutes to complete the preliminary survey of attitudes towards commercial wind farm development.

The majority of the event was dedicated to reviewing the issues booklet. A Land Policy Institute specialist in renewable energy led this review, using slides to illustrate each page. Opportunities to ask questions or provide comments were provided throughout the presentation.

The issues booklet was developed by the Land Policy Institute and refined through initial meetings with municipal officials and other stakeholders from the study areas. The booklet and presentation consisted of four sections: (1) wind farm basics, (2) wind energy development pressures, (3) the wind farm siting process, and (4) the effects of wind farms. The first section introduced participants to wind energy, the transmission and distribution electrical grids, and the basic components of a generic wind turbine and commercial wind farm. The second section provided a context to the pressures for wind energy development in Michigan, including an overview of the electricity market, wind resources, current and proposed wind energy systems in the state, and the renewable portfolio standard. The next section presented a 10-step wind farm siting and development process (adapted from a fact sheet by the American Wind Energy

Association), and a summary of federal and state regulations that affect the location of wind farms. The final section of the booklet and presentation discussed potential effects of commercial wind farm developments. These include visual effects, noise, shadow flicker, impacts to birds and other wildlife, effects of construction, effects to home values, and other projected tax base and other economic effects. This section also included a brief introduction to local zoning authority in Michigan and examples of wind-farm related ordinances.

The presentation concluded with a review of a map showing the location of commercially viable wind resources in the county (as determined by the Land Policy Institute's Wind Prospecting Tool, a GIS-based computer model). Data for the projected wind development capacity for the county was also provided.

Follow-up Survey

An abbreviated form of the original survey was sent to all of the initial respondents from the control group and attendees of the information sessions. Of 375 control group members, 172 viable follow-up surveys were received, for a response rate of 46 percent. The 60 events participants returned 28 viable follow-up surveys for a response rate of 47 percent.

Measures

The following section explains the measures that were constructed to capture the study participant's general attitudes towards wind farms and the strength with which they held those attitudes.

General Attitudes towards Wind Farms

Based on questions in the 2008 Massachusetts Institute of Technology Energy Survey, respondents were asked to rate their level of support or opposition to the construction of three

types of electricity-generating facilities (coal-fired power plant, nuclear power plant, and commercial wind farm) in or near their community. Following Firestone and Kempton (2007), respondents were also asked to indicate the degree to which they would encourage or discourage construction of a commercial wind farm in or near their community. Respondents also indicated the degree to which they would support certain actions to be priorities of Michigan policy makers. These priorities included support for other forms of wind energy.

Exploratory factor analysis of these measures revealed, and confirmatory factor analysis verified, revealed a latent variable that I call *wind farm enthusiasm*. Four items, support for commercial wind farms as a source of electricity and support for development of wind farms in or near one's community, as well as support for offshore wind farms and community-owned wind farms, formed a single factor with a reliability of 0.879 (Chronbach's alpha).

Attitude Strength

The initial survey included eight Likert-style items on attributes of attitude strength. These measures were based on questions used in previous social psychological studies (Barden and Petty 2008; Boninger et al. 1995; Pomerantz et al. 1995). Exploratory and confirmatory factor analysis revealed a four-item latent factor including two measures of perceived knowledge about wind farms, one measure of certainty, and one measure of thoughtfulness. This latent factor, which I label *confidence*, has a reliability of 0.817 (Chronbach's alpha).

Results

These analyses are confined to participants who completed both the preliminary and follow-up surveys.

Comparison of Control Group and Events Participants

Individual items were summed and averaged for each latent variable, and t-tests were used to compare the mean ratings of events participants to those of the control group (table 11). Event participants had higher preliminary ratings of wind enthusiasm (4.21) than members of the control group (3.99); however, this difference is not statistically significant ($p=0.170$). Initial ratings of confidence were also higher among event participants (3.30) than control group members (2.99). This difference approaches statistical significance ($p=.071$).

Differences between the control group and events participants were significant on responses to the follow-up survey. Follow-up wind enthusiasm ratings of events participants (4.29) were significantly ($p=.001$) higher than those of the control group (3.85). Likewise, events participants had significantly higher ($p<.01$) levels of confidence (3.42) than the control group (2.99) in the follow-up survey.

Table 11: Comparison of ratings of control group and events participants.

Variable	Control mean (n=172)	Events mean (n=28)	Sig. (2-tailed)
Preliminary Enthusiasm	3.99	4.21	$p=.170$
Follow-Up Enthusiasm	3.85	4.29	$p=.001$
Preliminary Confidence	2.98	3.30	$p=.071$
Follow-up Confidence	2.99	3.42	$p=.006$

Preliminary vs. Follow-up Scores on Wind Enthusiasm

A linear regression model was developed to determine the effects of preliminary attitudes, events participation, and attitude strength on follow-up attitudes (table 12). Follow-up wind enthusiasm ratings served as the dependent variable. As expected, preliminary attitudes were a significant predictor of follow-up attitudes ($p<.001$), explaining nearly 67 percent of the variance in follow-up attitudes.

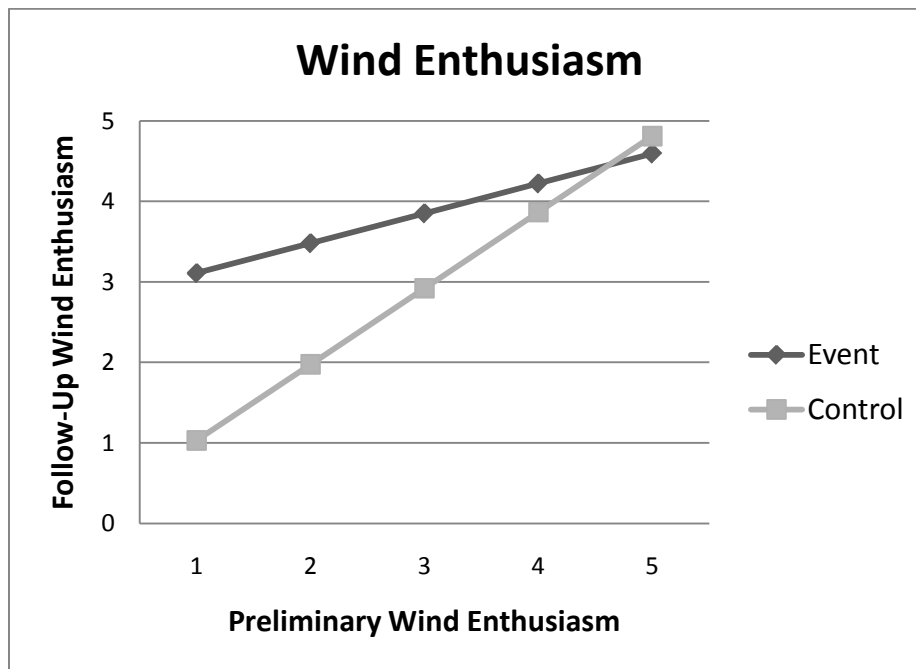
Table 12: Effects of events on wind enthusiasm. Dependent variable is the average rating of wind enthusiasm in the follow-up survey.

Model	R-Square (sig change between models)	Predictors	Unstand. Coefficient	Sig.
1	.667	constant	.306	
		preliminary enthusiasm	.898	p<.001
2	.674 (p=.041)	constant	.308	
		preliminary enthusiasm	.889	p<.001
		events participation	.239	P=.041
3	.698 (p<.001)	constant	.085	
		preliminary enthusiasm	.945	p<.001
		events participation	2.653	p<.001
		enthusiasm*events	-.574	p<.001

Participation in the informational events is also a significant predictor of follow-up attitudes (p<.001), resulting in greater support for wind farms. I also added the interaction of event participation and preliminary attitudes to the model to see if the effects of event participation differed for people with different levels of preliminary support (figure 4). This interaction was negative and statistically significant (p<.001). This means that the greater the preliminary enthusiasm, the less the effect of participation. Each of these variables contributed significant additions to the R-square value of the model (combined R-square change of .031).

To see if initial confidence significantly moderated the effects of preliminary wind enthusiasm, an interaction term (confidence*enthusiasm) was also added to the regression model. This interaction was not significant (p=.161) and did not contribute significantly to the overall variance explained by the model.

Figure 4: Effects of preliminary attitudes on follow-up ratings of wind enthusiasm. Shows the interaction of preliminary attitudes with event participation.



Preliminary vs. Follow-Up Levels of Confidence

A separate regression model was developed to investigate the effects of preliminary confidence and event participation on subsequent levels of confidence (table 13). Preliminary confidence is a statistically significant predictor ($p < .001$) of follow-up confidence, explaining 42 percent of the variance. Both the participation in an event and the interaction of event participation with initial confidence were also significant ($p = .004$, $p = .015$ respectively) and added a combined .026 to the R-square of the model (table 13).

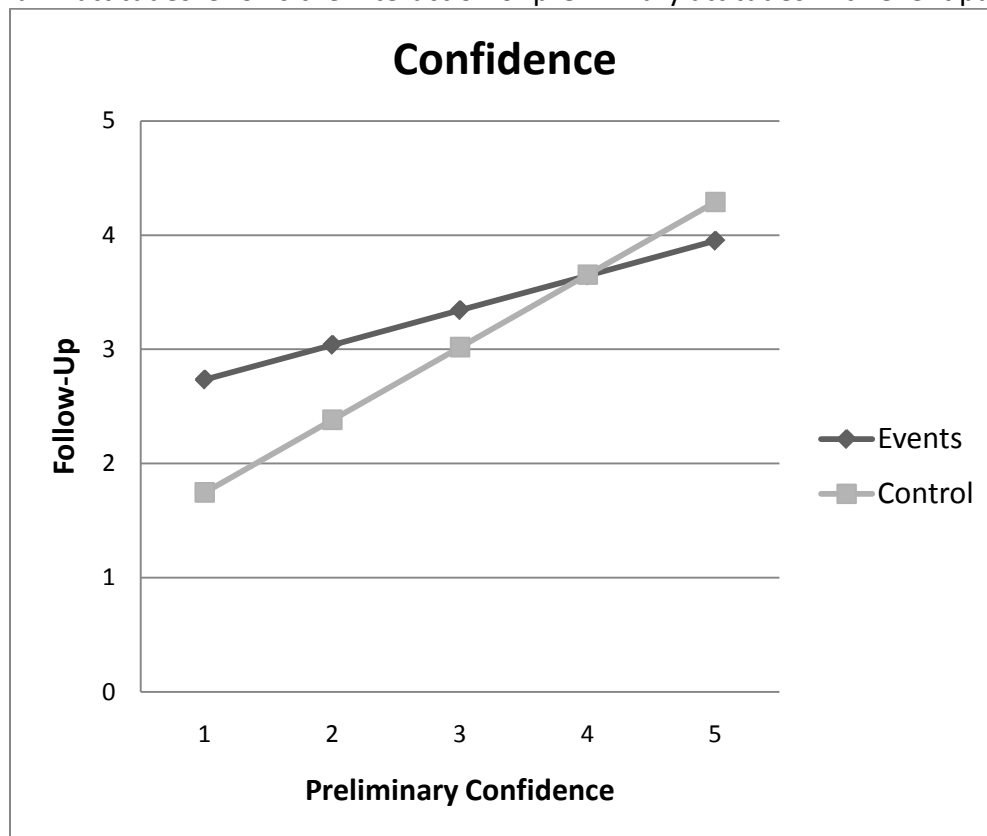
Discussion

Participation in the information events affected follow-up attitudes towards potential wind farm development and the strength of those attitudes. Participation in the informational

Table 13: Effects of events on attitude confidence. The dependent variable is the respondent's average rating of confidence in the follow-up survey.

Model	R-Square (sig change between models)	Predictors	Unstand. Coefficient	Sig.
1	.424	constant	1.242	
		preliminary confidence	.603	p<.001
2	.435 (p=.040)	constant	1.253	
		preliminary confidence	.589	p<.001
		events participation	.236	P=.041
3	.451 (p=.015)	constant	1.111	
		preliminary enthusiasm	.636	p<.001
		events participation	1.320	P=.004
		enthusiasm*events	-.332	P=.015

Figure 2: Effects of preliminary confidence on follow-up ratings of confidence towards wind farm attitudes. Shows the interaction of preliminary attitudes with event participation.



event had particularly large influence on those who were less enthusiastic towards wind farms prior to the event (figure 5). Ceiling effects on ratings of wind enthusiasm may be partly responsible for the interaction of preliminary attitudes and participation in an event.

Participants had relatively high levels of enthusiasm (4.21) prior to the event; if they had already rated the items in this measure at the highest end of the scale, it would be difficult for their enthusiasm scores to rise in the follow-up survey. The fact that those with the highest level of pre-test enthusiasm showed *lower* follow-up ratings could also be attributed to a *regression to the mean* whereby random influences that pushed these people in a positive direction in the preliminary survey had a less positive influence in the follow-up survey.

To the extent that this interaction does not merely reflect sampling error, it lends some support to the notion that general attitudes towards wind farms have not been well-informed (Warren et al. 2005). Participants who were most negative towards wind farms were mostly likely to be moved towards greater support when they learned more about the technology and its potential effects.

However, there is no guarantee that all forms of information-based interventions would raise general enthusiasm for wind farm development in all communities. Moreover, this result raises concerns about deficit model thinking regarding public opposition to wind farms. Some scholars have sharply criticized interventions recommended in the wind energy social science literature as exemplifying the “deficit model,” (Aitken 2010; Haggett 2011; Wolsink 2011). The logic of the “deficit model” underlies many experts’ views of public opposition to new technologies. Experts believe that if members of the public only had a better understanding of the technology—or the problem it addresses—they would support it. When faced with public

opposition, deficit model thinking generally leads to one of two approaches to addressing opposition: public education or dismissal of public concerns.

The deficit model has been roundly criticized in studies of public understanding of science (Bauer, Allum, and Miller 2007; Sturgis and Allum 2004). Yet, others have encouraged a second look at the role of knowledge and information in shaping attitudes towards new technologies (Sturgis and Allum 2004). These scholars recognize that while greater knowledge is not necessarily “a lever of positive attitudes,” knowledge affects the quality of those attitudes (Bauer et al. 2007; Evans and Durant 1995). According to the social psychology literature, perceived knowledge builds more consistent attitudes, which are less susceptible to change (Barden and Petty 2008; Lavine et al. 1998).

The research reported here supports the notion that greater knowledge and elaboration resulting from information events can strengthen attitudes. Participation in these events raised confidence of attitudes towards wind farm development (figure 2). This was particularly true among those with lower initial confidence. While there was a slight decline in the confidence of those who displayed high initial confidence, this could also result from ceiling effects (those with the highest confidence could only decrease, not increase, ratings of confidence).

Conclusion

This research demonstrates that a well-designed, comprehensive informational event can influence both the substance and strength of general attitudes towards wind farm developments. This finding supports the idea that closing the social gap in the implementation of wind energy and other renewable technologies. Providing opportunities for people in communities with viable wind resources to learn about and discuss issues related to wind farm

development may create a greater consistency between general attitudes and attitudes towards proposed developments.

A natural follow-up to this research would be to track the responses to a proposed wind farm in a community where attitudes had been strengthened among the residents. It would also be helpful to look at different modes of interaction with residents (e.g., more deliberative processes) to see if they are more or less effective in shaping the quality of attitudes.

Conclusion

An extensive social science literature addresses what has been called the “social gap” in the deployment of wind energy technology. It explores why, despite broad public support for wind energy and other renewables, people often oppose wind farm developments proposed for their community. The literature provides data and hypotheses for how characteristics of community members, the process of wind farm development, and wind energy technology contribute to opposition. Instead of focusing on resistance to wind farm proposals, this dissertation examines the other side of the gap—general public support for the technology.

The three articles that comprise this dissertation provide important insights into how residents view the potential development of wind farms in or near their communities. Consistent with other studies of attitudes towards wind energy, there was broad general support for the construction of wind farms in coastal Michigan. Unlike past studies, this research digs more deeply into this support, identifying the antecedents and exploring the quality of those attitudes.

In this research, the greatest driver of support was a belief that wind farm development would have economic benefits. Perceived economic benefits were also associated with high ratings of importance and strong collective identities regarding issues related to wind farm development. Although this could be construed as evidence that self-interest underlies general support for wind farms in the study areas, the belief that wind farms would have positive economic impact were buoyed by altruistic values. In other words, concern for the welfare of other people was connected to positive attitudes towards wind farms and the strength of these

attitudes. Traditional values, linked to a more conservative worldview, led to skeptical views regarding the benefits of wind farms and lower support.

General environmental beliefs were associated with greater support of wind farm development. The measure of environmental beliefs used in this study, however, captured a more global environmental ethic. Strong attachment to their coastal community was not associated with this measure of environmental beliefs; rather, it was connected to the traditional values that diminish support for wind farm development. Therefore, it might be more sound to view opposition to wind farms as fueled by general conservatism, rather than by a local environmental ethic.

It is also notable that while altruistic values bolstered support for wind farms and some measures of strength of that support, they diminished confidence in wind farm attitudes. Overall, confidence had the lowest rating of the three measures of attitude strength. This may indicate that the quality of attitudes towards wind farms is caused more by general values and beliefs than by personal experience or careful consideration of the issues.

All told, this research supports the model of “qualified support” suggested by Bell et al. (2005). From this perspective, public support for wind energy is not viewed as monolithic or unconditional. While the public may support wind energy in principal, members of the public will not support every wind farm proposal, regardless of its specific features. My research in Michigan shows that general support for wind farm development depends strongly on perceived economic benefits, driven in large part by altruistic values. This research also shows that confidence in the belief that wind farms will have economic benefit is relatively thin. It is

not difficult to imagine public support waning if members of the public perceive a proposed wind farm project as lacking communal benefits.

Social scientists not only provide explanations for attitudes towards wind energy; they also recommend approaches to close the gap between general public support and local opposition. Bell et al. (2005) identify two broad options for addressing the gap: “Insofar as the social gap is the product of qualified support for wind energy, policy makers must decide whether they need to improve people’s access to better information and understanding or modify developments in response to people’s concerns” (471). Recent scholarship has focused on the latter, providing suggestions for how to modify the character of developments and the development process. Two approaches dominate the literature. The first is to engage community members in siting and planning wind farm developments (Cass and Walker 2009a; Breukers and Wolsink 2007; Ellis et al. 2007; Loring 2007; Wolsink 2007a, 2000). The second is to shift towards local ownership and control of wind energy development (Bolinger 2005; Breukers and Wolsink 2007; Hain et al. 2005; Devine-Wright 2005; Tanzler 2010; Toke 2010; Toke and Strachan 2006).

The former option—improving access to information and understanding—has been criticized in recent years as representing “deficit model” thinking (Aitken 2010; Haggett 2011; Wolsink 2011). In the “deficit model,” public opposition is viewed as stemming from some shortfall in knowledge. Recent scholarship views this approach as disrespectful, as well as ineffective. Yet, others have encouraged a second look at the role of knowledge and information in shaping attitudes towards new technologies (Sturgis and Allum 2004). These scholars recognize that while greater knowledge is not necessarily “a lever of positive

attitudes,” knowledge affects the quality of those attitudes (Bauer et al. 2007; Evans and Durant 1995).

My research in coastal Michigan found that attending an information session about wind farm development changed both attitudes towards wind farms and the strength of those attitudes. Note, however, that the information sessions were not intended to persuade participants to support wind energy or wind farms. Instead, the sessions offered a wide range of information about the mechanics of wind farms, the typical development process, and oft-cited effects of wind farm development. In this case, this information resulted in somewhat higher levels of support for wind energy. Perhaps more importantly, the information session resulted in greater levels of confidence in participants’ attitudes towards potential wind farm development. These results indicate that general, balanced outreach in communities where wind farm development is feasible can change the quality of attitudes in that community. Further research is needed to see if higher levels of confidence result in greater consistency between general attitudes and public responses to specific wind farm proposals.

It would also be useful to learn if this pattern applies to other environmental issues as well. For example, recent research has found a drop in some measures of concern over global climate change (McCright and Dunlap 2011). Advocates of climate change mitigation and adaptation have expressed no small angst over a reported decline in concern, particularly since concern had risen for several years. Yet, little attention has been paid to the strength of attitudes. If attitudes towards climate change are not well-developed or supported by intra-attitudinal structures, the instability of those attitudes may be less of a surprise.

Although attitudes towards environmental issues are complicated, it is reasonable to assume that general attitudes should have some influence on specific attitudes. To better understand the link (or gap) between general and specific attitudes, it is advised to give a closer look to the structure and strength of general attitudes. Moreover, those who want to create greater consistency between general and specific attitudes should not dismiss the utility of providing information to communities prior to specific proposals, as it can build intra-attitudinal structures and confidence in attitudes.

REFERENCES

REFERENCES

- Aitken, M. 2010. "Why we still don't understand the social aspects of wind power: A critique of key assumptions within the literature." *Energy Policy* 38:1834-1841.
- Aitken, M., S. McDonald, and P. Strachan. 2008. "Locating 'power' in wind power planning processes: the(not so) influential role of local objectors." *Journal of Environmental Planning and Management* 51(6):777-799.
- Alhakami, A.S., and P. Slovic. 1994. "A psychological study of the inverse relationship between perceived risk and perceived benefit." *Risk Analysis* 14(6):1085-1096.
- Ansolabehere, S., and D. M Konisky. 2009. "Public attitudes toward construction of new power plants." *Public Opinion Quarterly* 73(3):566-577.
- Barden, J., and R. E Petty. 2008. "The mere perception of elaboration creates attitude certainty: Exploring the thoughtfulness heuristic." *Journal of Personality and Social Psychology* 95(3):489-509.
- Bassili, J. N. 2008. "Attitude strength." P. 237-260 in *Attitudes and attitude change*, edited by W.D Crano and R. Prislin. New York: Psychology Press.
- Bauer, M. W, N. Allum, and S. Miller. 2007. "What can we learn from 25 years of PUS survey research? Liberating and expanding the agenda." *Public Understanding of Science* 16(1):79.
- Bell, D., T. Gray, and C. Haggett. 2005. "The 'social gap' in wind farm siting decisions: explanations and policy responses." *Environmental Politics* 14(4):460-477.
- Bizer, G. Y, and J. A Krosnick. 2001. "Exploring the structure of strength-related attitude features: The relation between attitude importance and attitude accessibility." *Journal of Personality and Social Psychology* 81(4):566.
- Bolinger, M. A. 2005. "Making European-style community wind power development work in the US." *Renewable and Sustainable Energy Reviews* 9(6):556-575.
- Boninger, D. S, J.A. Krosnick, and M.K. Berent. 1995. "Origins of attitude importance: Self-interest, social identification, and value relevance." *Journal of Personality and Social Psychology* 68(1):61-61.
- Breukers, S., and M. Wolsink. 2007. "Wind power implementation in changing institutional landscapes: An international comparison." *Energy Policy* 35(5):2737-2750.

- Buttel, F. H. 1987. "New directions in environmental sociology." *Annual Review of Sociology* 13:465–488.
- Cass, N., and G. Walker. 2009a. "Emotion and rationality: The characterisation and evaluation of opposition to renewable energy projects." *Emotion, Space and Society* 2(1):62–69.
- Cass, N., and G. Walker. 2009b. "Emotion and rationality: The characterisation and evaluation of opposition to renewable energy projects." *Emotion, Space and Society* 2(1):62–69. Retrieved July 29, 2010.
- Chaiken, S., W. Wood, and A. H Eagly. 1996. "Principles of persuasion." Pp. 702–742 in *Social Psychology: Handbook of Basic Principles*, edited by E.T. Higgins and A.W. Kruglanski. New York: Guilford Press.
- Crano, W. D, and R. Prislin. 2006. "Attitudes and persuasion." *Annual Review of Psychology* 57:345–374.
- Devine-Wright, P. 2004. "Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy." *Wind Energy* 8(2):125–139.
- Devine-Wright, P. 2005. "Local aspects of UK renewable energy development: exploring public beliefs and policy implications." *Local Environment* 10(1):57–69.
- Devine-Wright, P. 2011. *Renewable energy and the public: From NIMBY to Participation*. Washington, DC: Earthscan.
- Devine-Wright, P. 2009. "Rethinking NIMBYism: The role of place attachment and place identity in explaining place-protective action." *Journal of Community & Applied Social Psychology* 19(6):426–441.
- Dietz, T., A. Fitzgerald, and R. Shwom. 2005. "Environmental values." *Annual Review of Environmental Resources* 30:335–372.
- Dillman, D. A, J. D Smyth, and L. M Christian. 2009. *Internet, mail, and mixed-mode surveys: The tailored design method*. 3rd ed. Hoboken, N.J.: John Wiley and Sons.
- Dunlap, R. E. 1997. "The evolution of environmental sociology." *The international handbook of environmental sociology* 21–39.
- Dunlap, R. E, and B.C. Marshall. 2006. "Environmental Sociology." Pp. 329–340 in *21st century sociology: a reference handbook*, edited by C. D Bryant and D. L Peck. Sage Publications (CA).
- Dunlap, R. E, and K. D Van Liere. 1978. "A Proposed Measuring Instrument and Preliminary Results: The 'New Environmental Paradigm.'" *Journal of Environmental Education* 9(1):10–19.

- Dunlap, R.E., K.D. Van Liere, A.G. Mertig, and R.E. Jones. 2000a. "Measuring endorsement of the new environmental paradigm: a revised NEP scale." *Journal of social issues* 56(3):425–442.
- Dunlap, R.E., K.D. Van Liere, A.G. Mertig, and R.E. Jones. 2000b. "New trends in measuring environmental attitudes: measuring endorsement of the new ecological paradigm: a revised NEP scale." *Journal of social issues* 56(3):425–442.
- Eagly, A. H, and S. Chaiken. 1995. "Attitude strength, attitude structure, and resistance to change." P. 413–432 in *Attitude strength: Antecedents and consequences*, edited by R. E Petty and J. A Krosnick. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Eagly, A. H, and P. Kulesa. 1997. "Attitudes, attitude structure, and resistance to change." P. 122–153 in *Environment, ethics, and behavior: The psychology of environmental valuation and degradation*, edited by M.H. Bazerman, D.M. Messick, A.E. Tenbrunsel, and K.A. Wade-Benzoni. San Francisco: The New Lexington Press.
- Ek, K. 2005. "Public and private attitudes towards 'green' electricity: the case of Swedish wind power." *Energy Policy* 33(13):1677-1689.
- Ellis, G., J. Barry, and C. Robinson. 2007. "Many ways to say 'no', different ways to say 'yes': applying Q-Methodology to understand public acceptance of wind farm proposals." *Journal of Environmental Planning and Management* 50(4):517–551.
- Evans, G., and J. Durant. 1995. "The relationship between knowledge and attitudes in the public understanding of science in Britain." *Public Understanding of Science* 4(1):57-74.
- Finucane, M. L, A. Alhakami, P. Slovic, and S. M Johnson. 2000. "The affect heuristic in judgments of risks and benefits." *Journal of Behavioral Decision Making* 13(1):1–17.
- Firestone, J., and W. Kempton. 2007. "Public opinion about large offshore wind power: Underlying factors." *Energy Policy* 35(3):1584–1598.
- Firestone, J., W. Kempton, and A. Krueger. 2009. "Public acceptance of offshore wind power projects in the USA." *Wind Energy* 12(2):183–202.
- Graham, J.B., J.R. Stephenson, and I.J. Smith. 2009. "Public perceptions of wind energy developments: Case studies from New Zealand." *Energy Policy* 37(9):3348–3357.
- Haggett, C. 2011. "'Planning and persuasion': Pubic engagement in renewable energy decision-making." Pp. 15-27 in *Renewable Energy and the Public*, edited by P. Devine-Wright. Washington, DC: Earthscan.
- Hain, J. J., G. W. Ault, S. J. Galloway, A. Cruden, and J. R. McDonald. 2005. "Additional renewable energy growth through small-scale community orientated energy policies." *Energy policy* 33(9):1199–1212.

- Hindmarsh, R., and C. Matthews. 2008. "Deliberative speak at the turbine face: community engagement, wind farms, and renewable energy transitions, in Australia." *Journal of Environmental Policy & Planning* 10(3):217–232.
- Hogg, M. A, and S. C Hains. 1996. "Intergroup Relations and Group Solidarity: Effects of Group Identification and Social Beliefs on Depersonalized Attraction* 1." *Journal of Personality and Social Psychology* 70(2):295–309.
- Hogg, M., and J. Smith. 2007. "Attitudes in social context: A social identity perspective." *European Review of Social Psychology* 18(1):89–131.
- van der Horst, D., and D. Toke. 2010. "Exploring the landscape of wind farm developments; local area characteristics and planning process outcomes in rural England." *Land Use Policy* 27(2):214–221.
- Jessup, B. 2010. "Plural and hybrid environmental values: a discourse analysis of the wind energy conflict in Australia and the United Kingdom." *Environmental Politics* 19(1):21–44.
- Johansson, M., and T. Laike. 2007. "Intention to respond to local wind turbines: the role of attitudes and visual perception." *Wind Energy* 10(5):435–451.
- Kaplowitz, S. A. 1977. "The influence of moral considerations on the perceived consequences of an action." *Journal of Conflict Resolution* 21(3):475.
- Kelley, H. H. 1955. "Salience of membership and resistance to change of group-centered attitudes." *Human Relations* 8:275–289.
- Kempton, W., J. Firestone, J. Lilley, T. Rouleau, and P. Whitaker. 2005. "The offshore wind power debate: Views from Cape Cod." *Coastal Management* 33(2):119–149.
- Kintisch, E. 2010. "Out of Site." *Science* 329(5993):788.
- Krohn, S., and S. Damborg. 1999. "On public attitudes towards wind power." *Renewable Energy* 16(1):954–960.
- Krosnick, J. A, and R. P Abelson. 1992. "The case for measuring attitude strength in surveys." Pp. 177–203 in *Questions about questions: inquiries into the cognitive bases of surveys*, edited by J.M. Tanur. New York: Russel Sage Foundation.
- Krosnick, J. A, and R. E Petty. 1995. "Attitude strength: An overview." P. 1–24 in *Attitude strength: Antecedents and consequences*, edited by R.E. Petty and J.A. Krosnick. Mahwah, NJ: Erlbaum Associates.
- Ladenburg, J. 2008. "Attitudes towards on-land and offshore wind power development in Denmark; choice of development strategy." *Renewable Energy* 33(1):111–118.

- Lavine, Howard, Joseph W. Huff, Stephen H. Wagner, and Donna Sweeney. 1998. "The Moderating Influence of Attitude Strength on the Susceptibility to Context Effects in Attitude Surveys." *Journal of Personality and Social Psychology* 75(2):359-373.
- Lindeman, M. 2002. "Opinion quality and policy preferences in deliberative research." P. 195–221 in *Research in Micropolitics: Political Decisionmaking, Deliberation and Participation*, edited by M.X. Delli-Carpini, L. Huddy, and R. Shapiro. Greenwich, CT: JAI Press.
- Loring, J.M. 2007. "Wind energy planning in England, Wales and Denmark: Factors influencing project success." *Energy Policy* 35(4):2648–2660.
- Maio, G. R, and G. Haddock. 2007. "Attitude change." P. 565–586 in *Social psychology: Handbook of basic principles*, vol. 2, edited by E.T. Higgins and A.W. Kruglanski. New York: Guilford Press.
- Maio, G. R, J. M Olson, M. M Bernard, and M. A Luke. 2003. "Ideologies, values, attitudes, and behavior." in *Handbook of Social Psychology*, edited by J. Delamater. New York: Kluwer Academic.
- McCright, A. M, and R. E Dunlap. 2011. "The Politicization of Climate Change: Political Polarization in the American Public's Views of Global Warming." *The Sociological Quarterly* 52(2).
- Mol, A. P.J. 2006. "From Environmental Sociologies to Environmental Sociology?" *Organization & environment* 19(1):5.
- Pasqualetti, M. J. 2000. "Morality, space, and the power of wind-energy landscapes." *Geographical Review* 90(3):381–394.
- Petty, R. E, C. P Haugtvedt, and S. M Smith. 1995a. "Elaboration as a determinant of attitude strength: Creating attitudes that are persistent, resistant, and predictive of behavior." *Attitude strength: Antecedents and consequences* 4:93–130.
- Petty, R.E., C.P. Haugtvedt, and S.M. Smith. 1995b. "Elaboration as a determinant of attitude strength: Creating attitudes that are persistent, resistant, and predictive of behavior." P. 93–130 in *Attitude strength: Antecedents and consequences*, vol. 4, edited by R.E. Petty and J.A. Krosnick. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Pomerantz, E. M, S. Chaiken, and R. S Tordesillas. 1995. "Attitude strength and resistance processes." *Journal of Personality and Social Psychology* 69:408–408.
- Prislin, R. 1996. "Attitude stability and attitude strength: One is enough to make it stable." *European Journal of Social Psychology* 26(3):447–477.

- Reid, S.A., and M.A. Hogg. 2005. "A Self-Categorization Explanation for the Third-Person Effect." *Human Communication Research* 31(1):129-161.
- Schively, C. 2007. "Understanding the NIMBY and LULU phenomena: reassessing our knowledge base and informing future research." *Journal of planning literature* 21(3):255.
- Slimak, M. W, and T. Dietz. 2006. "Personal values, beliefs, and ecological risk perception." *Risk Analysis* 26(6):1689–1705.
- Stern, P. C, T. Dietz, and G. A Guagnano. 1998. "A brief inventory of values." *Educational and Psychological Measurement* 58(6):984-1001.
- Stern, P. C, T. Dietz, and G. A Guagnano. 1995. "The new ecological paradigm in social-psychological context." *Environment and Behavior* 27(6):723-743.
- Stern, P. C, L. Kalof, T. Dietz, and G. A Guagnano. 1995. "Values, Beliefs, and Proenvironmental Action: Attitude Formation Toward Emergent Attitude Objects1." *Journal of Applied Social Psychology* 25(18):1611–1636.
- Stets, J. E, and C. F Biga. 2003. "Bringing identity theory into environmental sociology." *Sociological Theory* 21(4):398–423.
- Sturgis, P., and N. Allum. 2004. "Science in society: re-evaluating the deficit model of public attitudes." *Public Understanding of Science* 13(1):55-74.
- Swofford, J., and M. Slattery. 2010. "Public attitudes of wind energy in Texas: Local communities in close proximity to wind farms and their effect on decision-making." *Energy Policy* 38(5):2508-2519.
- Szarka, J. 2004. "Wind power, discourse coalitions and climate change: breaking the stalemate?" *European Environment* 14(6):317–330.
- Szarka, J. 2006. "Wind power, policy learning and paradigm change." *Energy Policy* 34(17):3041–3048.
- Tanzler, D. 2010. "Gone with the wind? Prospects of community-owned wind energy in the United States." Pp. 168-182 in *Wind Power and Power Politics*, edited by P.A. Strachan, D. Toke, and D. Lal. New York: Routledge.
- Terry, D. J, M. A Hogg, and K. M White. 1999. "The theory of planned behaviour: Self-identity, social identity and group norms." *British Journal of Social Psychology* 38(3):225–244.
- Toke, D. 2010. "Wind-power outcomes: Myths and reality." Pp. 18-36 in *Wind Power and Power Politics*, edited by P.A. Strachan, D. Toke, and D. Lal. New York: Routledge.

- Toke, D., S. Breukers, and M. Wolsink. 2008. "Wind power deployment outcomes: How can we account for the differences?" *Renewable and Sustainable Energy Reviews* 12(4):1129–1147.
- Toke, D., and P.A. Strachan. 2006. "Ecological modernization and wind power in the UK." *European Environment* 16(3):155–166.
- Tourangeau, R., L. J Rips, and K. A Rasinski. 2000. *The psychology of survey response*. Cambridge: Cambridge University Press.
- Van der Horst, D. 2007. "NIMBY or not? Exploring the relevance of location and the politics of voiced opinions in renewable energy siting controversies." *Energy policy* 35(5):2705–2714.
- Visser, P. S, G. Y Bizer, and J. A Krosnick. 2006. "Exploring the latent structure of strength-related attitude attributes." *Advances in experimental social psychology* 38:1–67.
- Walker, G. 1995. "Renewable energy and the public." *Land Use Policy* 12(1):49-59.
- Walker, G., N. Cass, K. Burningham, and J. Barnett. 2010. "Renewable energy and sociotechnical change: imagined subjectivities of the public and their implications." *Environment and Planning A* 42:931–947.
- Walker, G., and P. Devine-Wright. 2008. "Community renewable energy: What should it mean?" *Energy policy* 36(2):497–500.
- Warren, C. R, and R. V Birnie. 2009. "Re-powering Scotland: Wind Farms and the 'Energy or Environment?' Debate." *Scottish Geographical Journal* 125(2):97–126.
- Warren, C. R, C. Lumsden, S. O'Dowd, and R. V Birnie. 2005. "'Green On Green': Public perceptions of wind power in Scotland and Ireland." *Journal of Environmental Planning and management* 48(6):853–875.
- Warren, C. R, and M. McFadyen. 2010. "Does community ownership affect public attitudes to wind energy? A case study from south-west Scotland." *Land Use Policy* 27(2):204–213.
- Whitfield, S., T. Dietz, and E. A. Rosa. 1999. "Environmental Values, Risk Perception and Support for Nuclear Technology." *Human Ecology Research Group, George Mason University, Fairfax, Virginia*.
- Whitfield, S.C., E.A. Rosa, A. Dan, and T. Dietz. 2009. "The future of nuclear power: Value orientations and risk perception." *Risk Analysis* 29(3):425–437.
- Wolsink, M. 1989. "Attitudes and expectancies about wind turbines and wind farms." *Wind engineering* 13(4):196–206.

- Wolsink, M. 2011. "Discourses on the implementation of wind power: Stakeholder views on public engagement." Pp. 15-27 in *Renewable Energy and the Public*, edited by P Devine-Wright. Washington, DC: Earthscan.
- Wolsink, M. 2007a. "Planning of renewables schemes: Deliberative and fair decision-making on landscape issues instead of reproachful accusations of non-cooperation." *Energy Policy* 35(5):2692–2704.
- Wolsink, M. 2000. "Wind power and the NIMBY-myth: institutional capacity and the limited significance of public support." *Renewable Energy* 21(1):49–64.
- Wolsink, M. 2007b. "Wind power implementation: The nature of public attitudes: Equity and fairness instead of 'backyard motives'." *Renewable and Sustainable Energy Reviews* 11(6):1188–1207.
- Wüstenhagen, R., M. Wolsink, and M. J Bürer. 2007. "Social acceptance of renewable energy innovation: an introduction to the concept." *Energy Policy* 35(5):2683–2691.
- Zaller, J., and S. Feldman. 1992. "A simple theory of the survey response: Answering questions versus revealing preferences." *American journal of political science* 36(3):579–616.