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Citizens Views on Offshore Wind: Benefits, Challenges, and Information Gaps

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BENEFITS, CHALLENGES, AND INFORMATION GAPS

WEST MICHIGAN WIND ASSESSMENT ISSUE BRIEF #4

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The West Michigan Wind Assessment is a Michigan Sea Grant-funded project analyzing the benefits and challenges of utility-scale wind energy development in coastal west Michigan. More information about the project is available at <http://www.gvsu.edu/wind>.

Introduction

The technology for generating electricity using land-based wind turbines is established and widely used. The US Energy Information Administration reported that in 2009, wind turbines generated 10,886 megawatt-hours (MWh) of electricity [1] – enough to power 6.7 million homes [2]. Offshore locations, including the Great Lakes, offer exceptional wind resources with the potential to produce 50 gigawatts (GW) of electricity generating capacity [3]. One wind development firm has already proposed a wind farm offshore in Lake Michigan in West Michigan [4]. However there is considerable debate in the region over whether offshore wind energy development is appropriate and acceptable in coastal West Michigan. Tourism is a multi-billion dollar industry in Michigan with beach and waterfront activities among the most popular with shoreline visitors [5]. The West Michigan area in particular boasts miles of sandy beaches, quaint towns, and recreation opportunities ranging from charter fishing to kite surfing. With such popular tourism and recreational resources possibly at stake, the West Michigan Wind Assessment used a facilitated group discussion called a Delphi Inquiry to understand the conditions, if any, under which offshore wind energy development in Lake Michigan could be acceptable to residents of West Michigan. This issue brief summarizes the resulting thoughts and concerns expressed by the stakeholder participants in this Delphi Inquiry.

The Delphi Inquiry

The Delphi Inquiry (also known as a Delphi Method or Delphi Process) is “a qualitative method used to combine expert knowledge and opinion to arrive at an informed group consensus on a complex problem” [6]. The Delphi Inquiry is not a randomly sampled survey of public opinion. Instead it is a facilitated iterative discussion among participants with relevant knowledge of the subject in question. The Delphi Inquiry method has been used in many different fields, including management of the Grand Traverse Bay watershed [7] and wind turbine noise ordinances in Michigan [8].

Over the years Delphi Inquiries have used many approaches, but the foundation of this structured communication technique for complex problems usually involves the following:

- An opportunity for participants to contribute their views on the topic;
- A request for feedback from participants on these contributions;
- The compilation of feedback and then an assessment of the group judgment;
- An opportunity for participants to revise their views based on this compilation; and
- The possibility of consensus within an anonymous format [9].

The complex problem for the West Michigan Wind Assessment's Delphi Inquiry was: *Under what conditions, if any, would West Michigan communities find offshore wind energy development in Lake Michigan acceptable?*

This “big picture” problem was reduced into a series of smaller questions addressing:

- The benefits of offshore wind energy development in Lake Michigan;
- Ways in which communities in shoreline counties could capture those benefits;
- The challenges of offshore wind energy development in Lake Michigan;
- Ways to mitigate those challenges; and
- Topics about which residents would like more information.

Public meetings held during 2010 on offshore wind energy development in Michigan have indicated that coastal residents hold a wide range of views on offshore wind energy development [10] For example, some West Michigan residents espouse a preservationist perspective in which they believe it is inappropriate to build wind farms in Lake Michigan no matter what benefits might come to their coastal communities. The project team made sure that the Delphi Inquiry process was open to such perspectives.

Participants

The study area comprised five lakeshore counties: Allegan, Ottawa, Muskegon, Oceana, and Mason. Mason County was not part of the original West Michigan Wind Assessment study plan. It was included in the Delphi Inquiry because the Aegir Offshore Wind Energy Project was originally proposed for an area offshore from Mason and Oceana counties. The project has since been revised to include locations offshore from Muskegon and Ottawa counties.

During the summer of 2010, the project team created a list of possible Delphi Inquiry participants based on the following considerations:

- Participation from within all five counties in the study area;
- Geographic diversity within these five counties including both shoreline and inland communities;
- Diversity of professional expertise; and
- A minimum of 40 invited participants from each county to contribute to the Delphi Inquiry.

The invited participants possessed a diversity of professional expertise, including marina managers, religious leaders, fishing charter captains, engineers, business development authorities, township supervisors, county board members, tribal governments, college professors, shoreline property owner associations, local utilities, and many others. This participant diversity was not

random, but was purposefully selected so that a broad range of perspectives would be represented in the Delphi Inquiry. The number of invited participants ranged from 41 in Ottawa County to 26 in Oceana County. Since the goal of 40 invited participants per county was difficult to reach in rural Oceana and Mason counties, these counties were merged into one group. In total, 35 people participated in four online discussion rounds; the size of each group ranged from six people in Allegan County to twelve people in Muskegon County, representing a broad mix of professional backgrounds (Figure 1).

Providing background information on the problem to the participants is standard practice in a Delphi Inquiry [6]. The project team sent all participants two pre-publication draft issue briefs, one on the economic and social dimensions of offshore wind energy, and the other on environmental and technical dimensions. These issue briefs synthesized the state of the science on offshore wind energy development. Final versions of these and other issue briefs are or will be made publicly available through the West Michigan Wind Assessment web site (www.gvsu.edu/wind).

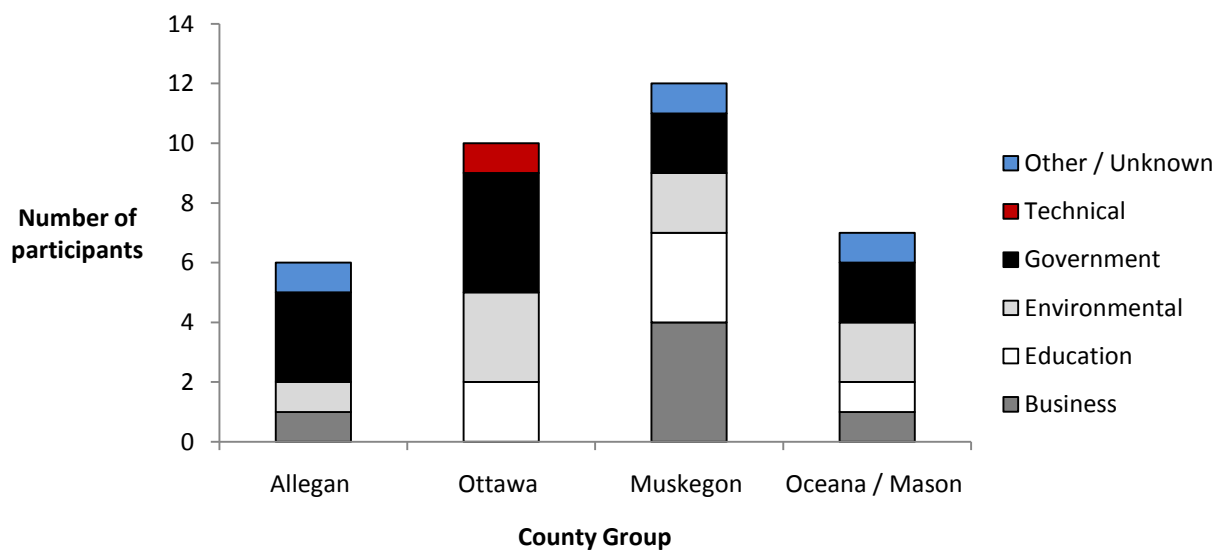


Figure 1: Participation in the Delphi Inquiry.

Facilitating the Discussion

The Delphi Inquiry for this project comprised three rounds of questions (Figure 2). The questionnaire was administered through a web-based tool (Zoomerang). Participants logged into the online survey under a self-generated code name to ensure anonymity. Each county group participated in its own separate Delphi Inquiry with its own developing set of concerns.

In Round 1, participants were asked to respond to five open ended questions:

1. What are the key benefits to local communities, if any, of offshore wind energy development in Lake Michigan?
2. How can West Michigan communities best capture these benefits?
3. What are the key challenges facing offshore wind energy development in Lake Michigan?
4. Are there ways of mitigating these challenges, if any?
5. What topics do communities need more information regarding offshore wind energy development in Lake Michigan?

The questionnaire instructions clearly stated that a response such as, “offshore wind energy development is unacceptable under any conditions” is an appropriate response to any of the questions above. This instruction was included to address specific concerns that the Delphi Inquiry was open to all points of view regarding offshore wind energy development in Lake Michigan. This is illustrated in the example question below:

Based on your understanding of offshore wind energy development, what would you identify to West Michigan communities as the most important benefits of wind energy development in Lake Michigan? Please list up to three benefits, in no particular order. An acceptable answer is “There are no benefits from offshore wind energy development in Lake Michigan for West Michigan communities.”

In Round 2, participants reviewed the statements of all group members and selected three statements which, in their view, were most important. The statements were organized based on the five categories (benefits, challenges, etc.) presented in Round 1. Statements that were selected by 50% or more of the participants advanced to Round 3. For example a statement regarding the benefits of offshore wind energy was:

Offshore wind energy is a cleaner alternative to fossil fuels and nuclear energy.

In Round 3, the Delphi participants were simply asked to indicate whether they agreed with the statements that were advanced from Round 2. As in the previous rounds, the statements were organized by category (benefits, challenges, etc.). Each of the five categories also included an alternative statement indicating that offshore wind energy development in Lake Michigan was unacceptable. The alternative statement was included whether or not such a statement was identified and advanced from previous rounds. For example in the benefits category, one of the benefit statements was:

Offshore wind energy development in Lake Michigan would be more acceptable to West Michigan communities if it reduces pollution and reduces dependence on fossil fuels and nuclear energy.

The alternative statement for the benefit category was:

There are no benefits to local communities from offshore wind energy development in Lake Michigan.

Round 3 began the process of obtaining consensus for the advanced statements. The goal of a Delphi Inquiry was to arrive at an informed group consensus on a complex challenge. There is no standard definition of “consensus” in the literature or how to define consensus in the Delphi method. For this project, consensus was defined as 80% agreement on a statement by Delphi participants in Round 3. That is, if a statement was affirmed by at least 80% of the participants in Round 3, it was concluded that consensus was reached for that statement.

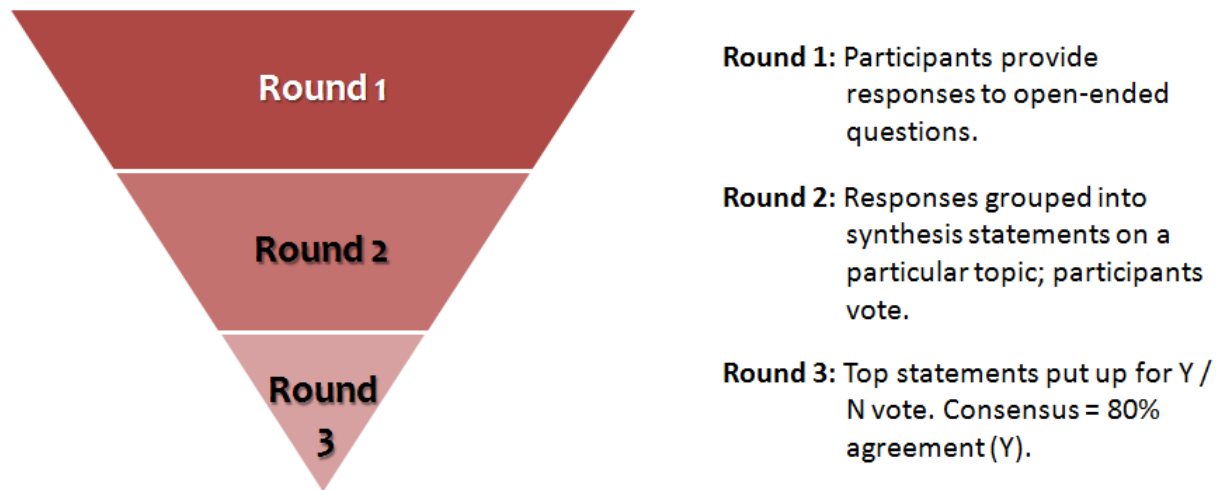


Figure 2: The Delphi Inquiry process used in this project.

Results

The participants in each of the county groups were able to reach consensus on at least one statement in Round 3 (Table 1). For example, Allegan County arrived at consensus on twelve statements, while the Oceana/Mason counties group reached consensus on only one. Most of the consensus statements were related to the categories of “challenges” and “information gaps” of offshore wind energy development (Figure 3). Only one consensus statement, from the Allegan County group, included consensus on the environmental benefits of offshore wind energy development. In terms of the topics most of the consensus statements were related to visibility concerns and economics (Figure 4).

Statement type	County			
	Allegan	Ottawa	Muskegon	Oceana/Mason
Round 3 statements	21	15	16	9
Final Consensus	12	5	8	1

Table 1: Number of consensus statements arrived at by each county group.

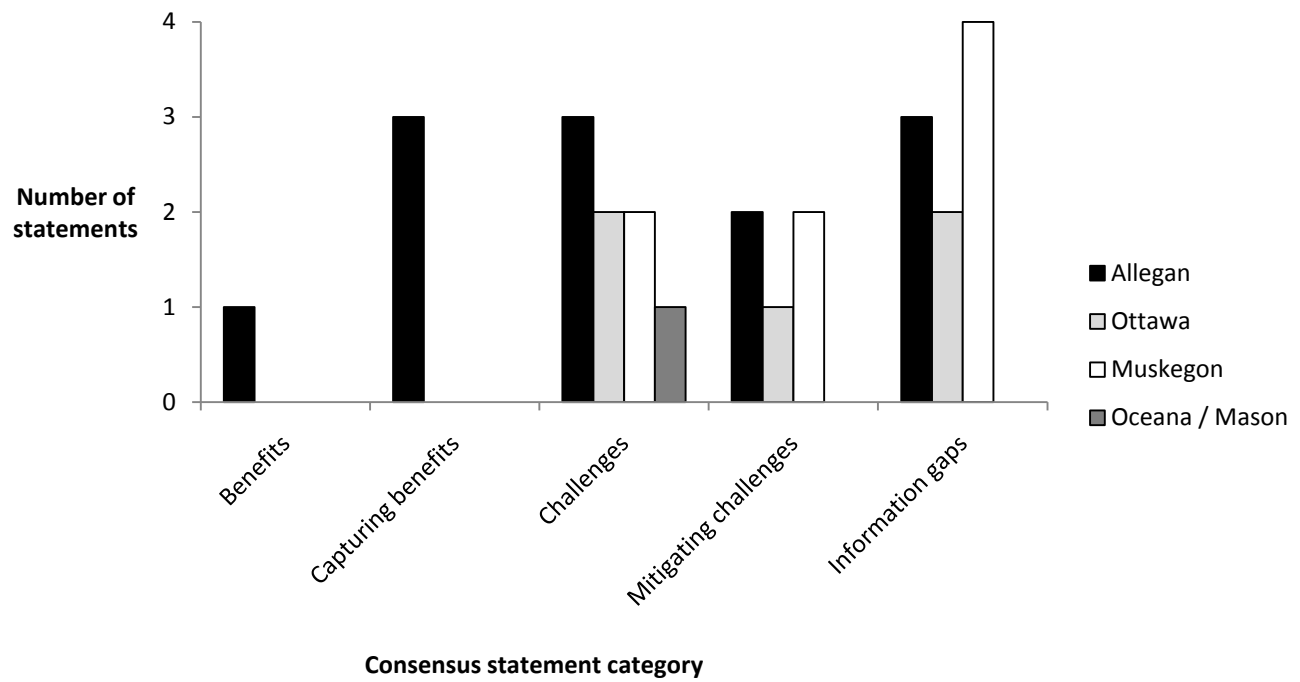


Figure 3: Most consensus statements related to challenges and information gaps.

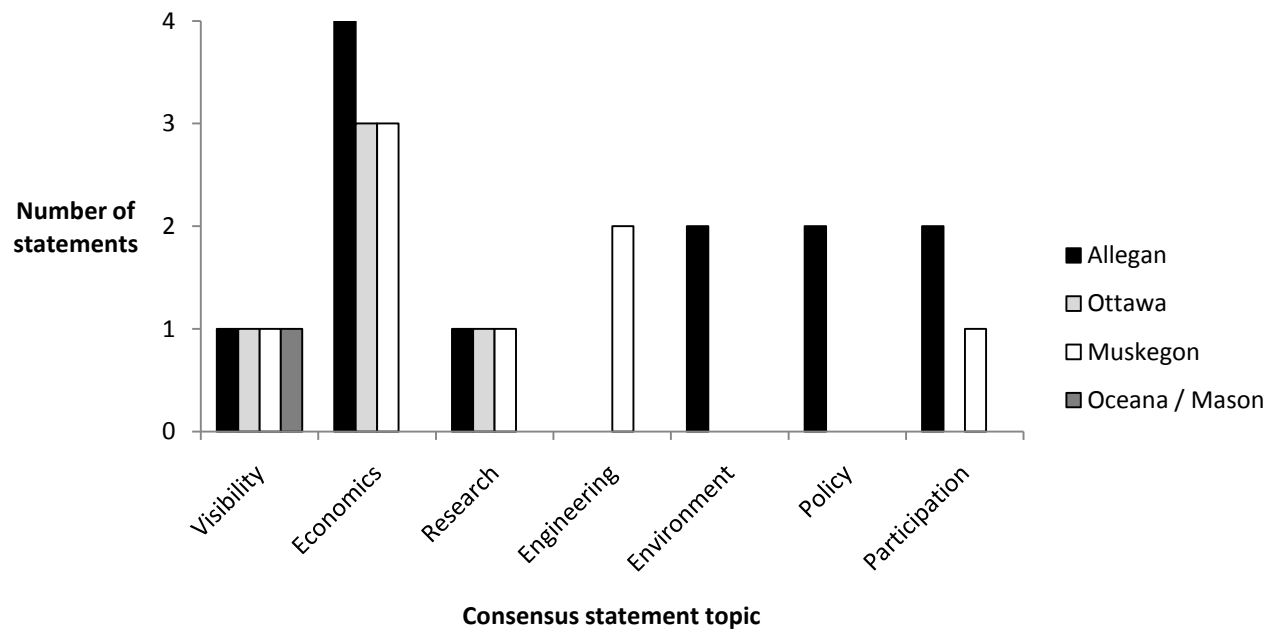


Figure 4: Most consensus statements were associated with economics and wind farm visibility.

Benefits of offshore wind energy development in Lake Michigan

Only the Allegan County group arrived at consensus on a statement related to the benefits of offshore wind energy development in Lake Michigan. This group identified the primary benefit as **reducing pollution and dependence on fossil fuels and nuclear energy**.

Capturing the benefits

The Allegan County group was also the only group reaching consensus on statements related to ways that local communities could capture the benefits of offshore wind energy development in Lake Michigan. These methods were identified by the Allegan County group as:

- Providing more **complete details** on offshore wind energy development **that anticipates the information needs of local residents**;
- **Establishing state and local energy policies**, including wind energy, and coordinating local planning efforts; and
- Soliciting and arranging **for input from all sides** of the issue and encouraging **an open, flexible approach** to offshore wind energy development.

Key challenges facing offshore wind energy development

Every county group, including the Oceana/Mason group, reached consensus on at least one statement related to the challenges of offshore wind energy development in Lake Michigan. All groups reached consensus on a statement similar to the one below (the county group(s) which reached consensus on the statements in listed in parentheses):

Before offshore wind energy development in Lake Michigan could be considered acceptable, proposed projects must **recognize concerns about aesthetics and reduce possible related impacts on coastal businesses and property values** (*Allegan, Ottawa, Muskegon, Oceana/Mason*)

Other “challenge” consensus statements related to economics and engineering included responses to this statement: *Before offshore wind energy development in Lake Michigan could be considered acceptable:*

- The **economic and financial costs** of offshore wind energy must be analyzed, including utility costs, construction and maintenance costs, and outsourcing concerns (*Ottawa, Muskegon, Allegan*);
- Project developers must demonstrate that **local communities will be net beneficiaries** (i.e. the benefits are greater than the costs) from offshore wind energy development (*Allegan*); and
- Certain **engineering and design challenges must be overcome**, including the technical/economic feasibility, safe placement, transmission, and ice on and around the turbines (*Muskegon*).

Mitigating the challenges

All of the county groups, except Oceana/Mason, arrived at consensus on approaches to mitigating the challenges of offshore wind energy development in Lake Michigan. The mitigation approaches ranged from additional research and development to policy and public participation. Below are the responses to the statement: *A way to mitigate the challenges of offshore wind energy development in Lake Michigan and make it more acceptable is to:*

- Conduct **more research**, including lessons learned from communities where full-scale offshore wind farms or pilot projects have been built (*Ottawa, Muskegon*);
- Encourage **more assertive leadership on renewable energy issues**, especially from state government and local utilities (*Allegan*);
- **Encourage public participation** by hosting town hall meetings on offshore wind energy development (*Muskegon*); and
- Provide more diverse **opportunities for targeted education and outreach efforts** (*Allegan*).

Information gaps

The county groups arrived at consensus on more statements related to information gaps than any other aspect of offshore wind energy development. Questions about economic impacts dominated the responses to the statement: *Offshore wind energy development in Lake Michigan might be considered more acceptable if communities had more information about:*

- **Turbine visibility** and potential effects on **shoreline property values and tourism** (*Muskegon*);
- **The full costs and benefits** of offshore wind energy development compared to onshore development and fossil fuels (*Muskegon, Allegan*);
- The transparent **evaluation of risks and opportunities** of offshore wind energy development, especially with respect to job creation (*Ottawa, Allegan*);
- The economic **impacts on utility rate-payers**, including subsidies for offshore development (*Muskegon*);
- The **technical feasibility** of such projects, including year-round operation and production potential (*Muskegon*); and
- The comprehensive **environmental impacts**, including effects on wildlife, fishing, recreational boating, and shipping (*Allegan*).

Evaluation

The final round of the Delphi Inquiry included questions about the Delphi process itself. Of the 28 participants who answered the wrap-up questions, 6 (21%) reported being more knowledgeable about offshore wind energy development as a result of the Delphi Inquiry. None of the respondents from the Oceana/Mason group reported that their level of knowledge of offshore wind energy had changed. Six (21%) of the respondents find offshore wind energy development in Lake Michigan more acceptable after going through the Delphi Inquiry process, while 2 (8%) find it less acceptable now (Table 2). Ninety three percent of participants agreed that the project team acted openly and transparently in administering the Delphi Inquiry.

<i>Change in Acceptance</i>	Oceana/Mason	Muskegon	Ottawa	Allegan
I find offshore wind energy in Lake Michigan more acceptable now.	3 (43%)	1 (14%)	0 (0%)	2 (33%)
My opinion of offshore wind energy development in Lake Michigan has not changed .	4 (57%)	5 (71%)	8 (100%)	3 (50%)
I find offshore wind energy development in Lake Michigan less acceptable now.	0 (0%)	1 (14%)	0 (0%)	1 (17%)

Table 2: Changes in acceptance of offshore wind energy resulting from the Delphi Inquiry.

Discussion

As expected, each county group clearly had a range of opinions about offshore wind energy development in Lake Michigan, yet all the groups were able to reach consensus on at least one statement. Although some people held the view that offshore wind energy development in Lake Michigan is unacceptable under any circumstances, no group developed a consensus around this statement. For example, the least degree of consensus was found in the Oceana/Mason group. The group was split 50-50 on several statements, such as whether “there are no benefits to offshore wind energy development in Lake Michigan” and “the challenges to offshore wind energy development in Lake Michigan are so great that it could never be considered acceptable.” This suggests that many group members could be open to the idea of offshore wind energy development in Lake Michigan as long as certain conditions are met.

The one topic that every group agreed on, as demonstrated by the highest percentage in agreement overall, was concern about the visual impact of an offshore wind farm. In some groups this concern was expressed as a challenge and other groups identified it as an information gap, but the sentiment was consistent.

Economics was another common theme among the consensus statements. These statements were found mostly among the “challenge” and “information gap” categories. These spanned topics such as how offshore development will impact electricity rates, affect employment, and shoreline property values.

Allegan County was the only group to reach a consensus about the benefits of offshore wind energy development and ways in which local communities can capture those benefits. The only benefit on which consensus was reached in any group was about the potential to reduce pollution and fossil fuel consumption. Participants from counties outside of Allegan were unable to agree that offshore wind energy development offers any benefits to local communities. This suggests that if future offshore wind projects in Lake Michigan are to be acceptable to local communities, the projects must provide some benefits to the communities and those benefits need to be clearly articulated.

The Delphi Inquiry proved to be an appropriate technique for stimulating discussion and improving the level of knowledge among participants. Outside of the Oceana/Mason group, nearly 30% of the participants reported feeling more knowledgeable about offshore wind energy. One participant in the Allegan group felt less knowledgeable, which may be indicative of the complexity of the issue.

The Oceana/Mason group, where the Aegir Offshore project was originally proposed, expressed the least level of consensus and no change in the level of knowledge compared to the start of the Delphi Inquiry. The Delphi Inquiry did not change the opinions of most participants toward offshore wind energy in Lake Michigan, but among those that did change, most moved toward a more favorable opinion. The vast majority of participants agreed that the project team administered the Delphi Inquiry in a transparent and open manner, which suggests that this is an appropriate tool for engaging the public in a discussion of a complex and controversial issue.

The West Michigan Wind Assessment project team has written a series of issue briefs summarizing the state of the science about wind energy development from environmental, social, and economic perspectives. The team used the Delphi Inquiry results to tailor its outreach efforts to address the most pressing concerns and information gaps as suggested by the participants.

It is important not to draw too broad a conclusion from this Delphi Inquiry. The participants were selected based on their professional expertise in business, government, and engineering, or for their location-based knowledge as residents of coastal communities. The participants were not a random sample of the population, so the conclusions cannot be applied to the population as a whole. This is not a flaw in the process but rather the nature of the Delphi Inquiry technique. The Delphi Inquiry results do suggest, however, that informed professionals with wide-ranging views can reach agreement on certain aspects of a controversial topic like offshore wind energy development. The Delphi Inquiry results can help inform future research projects, public opinion polls, and policy decisions.

Conclusions

The individual consensus statements from the four county groups can be aggregated to answer the “big picture” question which introduced this brief. According to the results of this Delphi Inquiry, offshore wind energy development in Lake Michigan could be acceptable to the participants if:

- **It reduces pollution and dependence on fossil fuels;**
- **The visual impact is minimal;**
- **Property values and tourism are not significantly harmed;**
- **Coastal communities benefit from the projects;**
- **The public has ample opportunity to participate in the siting process;**
- **Projects do not lead to substantial utility rate increases;**
- **Projects do not harm wildlife, recreation, and fishing activities; and**
- **Technical challenges are overcome, such as ice build-up and transmission.**

The Delphi Inquiry participants generated consensus statements on a variety of relevant topics. The Delphi Inquiry process proved to be a useful method for facilitating a group discussion on what has become an emotionally charged issue in West Michigan. The groups were most in agreement on the challenges and information gaps related to offshore wind energy development in Lake Michigan. Economic concerns dominated the discussion in these areas. There was little agreement on the benefits of offshore wind energy development. The results of the process can assist local decision-makers in understanding the issues to be considered in siting wind energy developments as well as provide a road map for future investigations on the public acceptance of offshore wind farms in the Great Lakes and beyond.

Acknowledgements

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