Final Report for Citizens' Greener Evanston:
Community Perceptions and Opinions Regarding Offshore Wind Development near Evanston, IL

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Submitted by

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Contents

Acronyms

CV	Contingent valuation
CVM	Contingent valuation method
CCS	Carbon capture and sequestration
GLC/GLWC	Great Lakes Commission/Great Lakes Wind Collaborative
GLOW Council	Great Lakes Offshore Wind Council
MWh	Megawatt hour of electricity
SNRE	School of Natural Resources and Environment (The University of Michigan)
SP	Stated preference
WTA	Willingness to accept
WTG	Wind turbine generator
WTP	Willingness to pay

Executive Summary

Background

According to a report published by the U.S. Department of Energy in 2011, "since no wind turbines are installed in U.S. waters, there is a shortage of critical data on the environmental and [siting effects] of turbines ..." (U.S. Department of Energy January 2011). The siting process for wind farms both offshore and onshore is an iterative one that inherently requires concurrent participation from local stakeholders. Before this process even begins, data on the perceptions, goals, and opinions of relevant community stakeholders can aid the initiation of public engagement on the front end.

Additionally, one of Michigan's Great Lakes Offshore Wind Council's (GLOW Council) key lessons learned from their 2009 report states that "public opinion can be influenced by the perceived lack of opportunities for local input during the planning and development phase (DONG Energy et al. 2006,119); this suggests that a well-designed process for stakeholder participation, including local input, can improve the level of support and/or reduce opposition" (Great Lakes Offshore Wind Council 2009). These findings suggest that local input should be strongly encouraged with stakeholder education playing a core priority. To effectively educate local stakeholders, however, requires a foundational understanding of their current perceptions, opinions, uncertainties and concerns regarding offshore wind development.

The aim of this study is to provide data on local stakeholders' opinions and perceptions regarding offshore wind power for the Illinois region of Evanston, Rogers Park, and Wilmette. Analysis of this data allows for recommendations to encourage stakeholder participation and effectively educate the public regarding any development and permitting stages of future offshore wind development in the area.

Selection Process

In total 3,000 households were randomly selected from the communities of Evanston, Wilmette, and Rogers Park to participate in this study. To ensure the greatest participation possible given budgetary and resource constraints, this study used a five-point contact protocol in which: 1) participants were mailed an introductory letter inviting them to participate in the online survey, 2) follow-up reminder postcards were mailed to the same respondents one week later, and 3) in-person telephone calls were placed to encourage participation during the postcard mailings and over the subsequent four-week period. In a final effort to boost participation, two additional reminder postcards were mailed to all respondents who had not previously completed the survey or explicitly indicated disinterest in the study. The details of the selection process are summarized in Table 1.

Table 1. Survey Contact Protocol and Responses

Contact Protocol	*First*	*Second*	*Third*	*Fourth*	*Fifth*	*Total number of Respondents*	*Response Rate*
Survey community (Illinois)	**Survey invitations**	**Follow-up postcards**	**Follow-up phone calls**	**2nd postcards**	**Final postcards**		
Evanston	1500	1500	-	1095	1095	-	-
Rogers Park	750	750	-	529	529	-	-
Wilmette	750	750	-	536	536	-	-
Total	**3,000**	**3,000**	**2,150**	**2,160**	**2,160**	**n = 208**	**~7%**

Response Rate vs. Total Responses

A total response rate equivalent to approximately 7%, while low, is still comparable to similar academic studies in the literature. To account for differences in the initial sample population that impact the final response rate calculation, a better comparison appears in the final number of responses, referred to as *n* throughout this report. The best comparison is a study in which this report's methodology employed similar methodology and valuation approach. Published in Energy Policy journal in 2009, the article *Valuing a wind farm construction: A contingent valuation study in Greece* used a quota sample of 200 respondents (Koundouri, Yiannis and Kyriaki 2009). Another study published in Land Use Policy that looked at public attitudes to community-owned onshore wind projects in Scotland distributed a much smaller initial sample mailing (1,000 surveys) and received a total n = 106 responses (Warren and McFadyen 2008).

Survey Design

Careful attention was given to each stage of this study to avoid possible biases. All materials and questions were specifically worded to present information in as neutral a manner as possible in order to prevent numerous potential biases. Questions related to public attitudes and perceptions were modeled after surveys administered by Dr. Jeremy Firestone, and the GLOW council (Firestone, Kempton and Krueger 2009, Great Lakes Offshore Wind Council 2009). Questions related to economic valuation of coastal viewsheds were based on similar research in Greece (Koundouri, Yiannis and Kyriaki 2009).

An online survey format was selected for its numerous advantages over traditional paper surveys. Online surveys offer flexibility in structure and question display logic, providing an expedited and easily digestible interface for participants. Additionally, online surveys can deliver heightened visual contrast for images when compared with printed images. While printed images generally contain a brightness ratio of 10:1, a modern computer screen can achieve ratios around 100:1; this ratio can greatly impact how a simulation is perceived (Horner + Maclennan; Envision 2006). Key disadvantages to paper surveys are the printing costs and, more importantly, postage fees needed for heavier parcels as well as return postage. Finally, while paper surveys require manual data entry for each response collected, there is no risk of data input errors by the researchers associated with an online questionnaire. While each format

of survey distribution has inherent limitations, an online survey instrument was best suited for this study.

Data Analysis Methods

To analyze the collected data, descriptive statistics were generated to include means, percentages, standard deviations, and standard errors for demographic and information sources. In order to explore the underlying factors that influence the likelihood of support for an offshore wind development scenario, a binary logistic regression was employed. This analysis employed a certainty-weighted binary dependent outcome of the likelihood of that a respondent would vote 'yes' for the hypothetical wind farm scenario as a function of the wind farm distance, the proposed theoretical impact on electricity rates, and respondent demographic characteristics.

Key Findings

- Roughly one-third (32%) of survey respondents currently supports offshore wind development in Evanston while approximately half (53%) have not yet formed an opinion. Of the undecided respondents, roughly half (45%) of those lean in favor of the idea, while only 12% oppose it and the remainder of respondents needs more information (Figure 1).
- Local newspapers provided the most popular source of information regarding offshore wind while public hearings and meetings provided the greatest extent of information to those that selected it as a source of information.
- The largest share of respondents (60%) thought that job creation and the local economy would *improve* as a result of offshore wind development near Evanston. Conversely, the largest share of respondents thought that aesthetics of the lake view would be *negatively* impacted (75%). A notable amount of uncertainty remains regarding other potential impacts of offshore wind development concerning whole spectrum of presented social, environmental, and economic issues; an opportunity exists to inform, educate, and engage the public about the possible positive and negative impacts from offshore wind development.
- The top three perceived "clean" electricity generated sources were solar, wind (land-based), and wind (offshore), respectively. When presented with a myriad of electricity generation sources, approximately 50%, 40% and 25% of respondents stated that they strongly support solar, land-based wind and off-shore wind, respectively. Less than 5% of respondents perceived traditional coal as a "clean" source of electricity generation while roughly 40% of respondents said that they "strongly oppose" this technology.
- Initial binary logistic regression results indicate explanatory variables for an offshore wind farm's distance from shoreline, respondents' annual household income, respondents' environmental organization membership status are statistically significant in determining the likelihood of support for the offshore wind farm scenario presented in the survey. For example, self-reported members of an environmental organization were 2.2 times (215%) more likely to support the offshore wind farm scenario than those respondents that were not environmental organization members, holding all other variables constant ($p<0.10$).

Conclusion

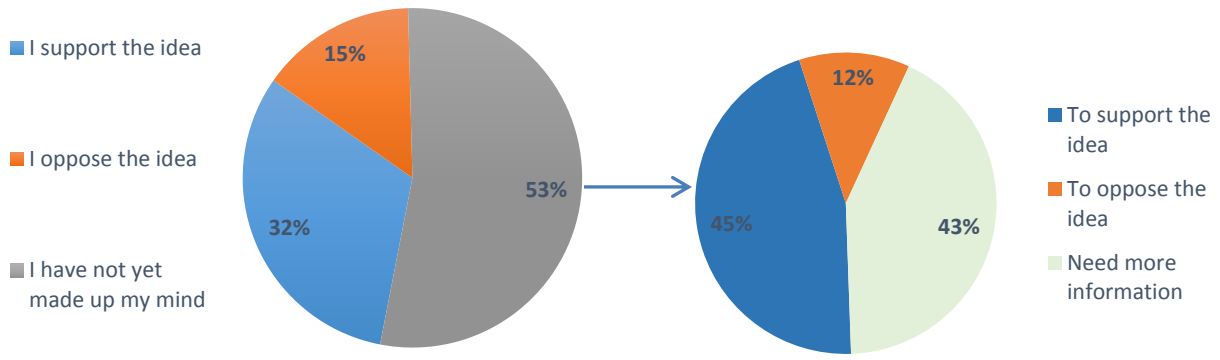

Figure 1. Current Opinions Regarding Offshore Wind Development near Evanston, Illinois (n = 208)

There remains significant opportunity to involve local community stakeholders in an iterative education process regarding offshore wind development impacts, benefits, and potential drawbacks. When asked if they currently hold an opinion about offshore wind development, over half of the respondents stated that they have not yet made up their mind, a third stated they are in support, while the remainder stated they oppose the idea (Figure 1). For those that have yet to form an opinion, nearly half stated they are leaning to support offshore wind farm development. Furthermore, consistent with other studies, survey participants were more likely to vote yes for the hypothetical proposed project as well as pay more in monthly electricity bills as the hypothetical project was sited further and further from shore.

I. Introduction

Wind power is poised to provide a clean, robust and renewable power generation source in the U.S. national energy portfolio. Unlike conventional fossil fuels, wind-derived electricity produces zero greenhouse gas emissions throughout its use phase and has the least life cycle environmental impact of any major electricity generation (Kondili and Kaldellis 2012). Utilizing this inexhaustible resource creates vast opportunities to generate employment and create regional supply chains. Wind power offers the chance to provide a renewable supply to the generation mix, generate economic stimulus, and mitigate global climate change.

Wind project developers in the past several years have begun to focus more intently on offshore regions in the Great Lakes to expand wind development for various reasons (Scandia Wind 2009). First, more continuous wind coupled with higher annual wind velocities provides a more reliable generation output. Also, increased distances from population centers offers opportunities to mitigate noise impacts on local residents and visual obstructions in day-to-day life. The Department of Energy and National Renewable Energy Laboratory forecast 54GW of power could come from offshore wind over the next 20 years,

which accounts for 20% of the total anticipated wind capacity projected by 2030 (Musial and Ram 2010). Offshore wind projects have been deployed predominantly in the past two decades in developed European countries (Musial and Ram 2010). However, various obstacles have stalled offshore wind deployment in the United States, and as of this writing, no offshore wind farm exists in domestic freshwater or saltwater areas. While there remains a myriad of factors that have arguably contributed to the lack of American offshore wind deployment from economic feasibility to permitting, this research project and case study in Evanston, Illinois focuses on one of the key factors required for successful future offshore wind development: the determinants of community support or opposition to local offshore wind development.

This study focused on community-level offshore wind power perceptions by administering an online survey to a random, systematic sample of residents in Evanston, Wilmette and Rogers Park, Illinois. Specifically, the key research objectives included identifying how information sources influence opinions concerning offshore wind development opinions, estimating what associations exist between demographic factors and current opinions, and identifying a general sense of the three communities' responsiveness to hypothetical aesthetic and price impacts.

These findings are relevant to state and local policymakers, private developers, community planners, community advocate groups, and other key stakeholders. Ultimately, this study's objective is to provide a case study in Evanston, Illinois and present findings regarding the current public opinion towards Great Lakes' offshore wind development through consideration of various social, demographic, and economic factors.

II. Literature Review

As previously mentioned, there are currently no offshore wind farms anywhere within the United States; as a consequence, relatively little research regarding public perceptions or the economic impacts of offshore wind developments exists. Nonetheless, this research draws heavily upon leading research not only conducted in Europe but also near the East Coast and studies regarding offshore wind development in the Great Lakes, specifically.

Perhaps the most notable study in the Great Lakes region is the report prepared by the State of Michigan's Great Lakes Offshore Wind (GLOW) Council in October 2010. Governor Jennifer Granholm created the council in 2009 to investigate issues surrounding offshore wind development within Michigan's Great Lakes and identify recommendations that would facilitate sound methods for evaluating offshore wind project proposals in a manner which encouraged public engagement in the process. The council identified the most appropriate and least appropriate sites for placement of offshore wind projects by using a set of 22 criteria that included bathymetry, biological importance, and scenic vistas among others (Great Lakes Offshore Wind Council 2009). The GLOW Council's report found that offshore wind farms should be no fewer than six miles from the shoreline (Great Lakes Offshore Wind Council 2009).

Although this report identified favorable locations for wind power developments, the final siting recommendations are limited to the State of Michigan as the report did not assess the coastal suitability in neighboring states. Regardless, the tools that the council employed to identify these areas are freely available and can serve as a guide for those interested. Furthermore, the GLOW Council's recommendations for general permitting processes, public engagement and compensation have much broader applications (Great Lakes Offshore Wind Council 2009).

In addition to the GLOW report, Grand Valley State University's Erik Nordman has also conducted important research in the Lake Michigan area regarding the perceptions of residents in coastal communities about proposed offshore wind turbines. One key difference between Nordman's research and the work conducted by the GLOW council is that whereas the GLOW council focused on general public engagement through public hearings and numerous public comment periods, Nordman deliberately sought out nonrandom samples through a qualitative research method known as the Delphi Inquiry (Nordman, et al. 2011). The purpose of this method is to select a diverse set of individuals with varying expertise. Although little consensus was ultimately reached in the focus groups, the method did prove quite useful in facilitating discussion on this increasingly contentious issue (Nordman, et al. 2011).

Dr. Jeremy Firestone is one of the leading researchers of public perception regarding offshore wind in the U.S. He has conducted numerous studies relating to support and opposition of offshore wind projects off the Atlantic coast, such as the Cape Wind project near Cape Cod. Firestone has used multiple survey techniques, including mail-based and in-person surveys (Lilley, Firestone and Kempton 2010). One of the most important findings from Firestone's research emphasizes paying careful attention to the reasons behind opposition. As Firestone and other researchers have noted, suggesting that the NIMBY phenomenon alone accounts for all opposition is entirely too simplistic (Wolsink 2000, Devine-Wright 2005, Firestone and Kempton 2007). Firestone's results show that while visual impacts of wind turbines are an important factor in opposition, they rank behind the most important issue, which is concern for environmental impacts and damage to marine life. His results also suggest that if the public had a better understanding of all of the positive and negative environmental impacts coupled with improved control planning and oversight, then overall support for the projects could be improved (Firestone and Kempton 2007). These findings are consistent with research in Greece (Koundouri, Yiannis and Kyriaki 2009).

Another researcher on the East Coast, and a co-advisor for this study, is Dr. Craig Landry. Landry has conducted telephone and online surveys investigating the impact of hypothetical wind farm scenarios on the perception of local residents and tourists in North Carolina. Landry has employed economic conjoint methods to understand the perceived values of a coastal viewshed. His research suggests that while residents are averse to placement of wind turbines one mile off the coast, this aversion is no longer present at four miles (Landry, et al. 2012). Diminishing aversion as distance from the coast increases is consistent with other studies. However, four miles offshore is closer than other research suggests, and this acceptability appears to vary significantly geographically. For example, Firestone's research found that six miles offshore was acceptable for 78% of residents in Delaware, compared with

only for 25% of residents in Cape Cod (Ladenburg and Dubgaard 2007, Firestone, Kempton and Krueger 2009). Another notable finding is that while some residents consider wind farms to have a negative visual impact, others actually consider them to add value to the viewshed (Landry, et al. 2012).

III. Research Methodology

Research Questions

This study attempted to answer, address and explore the following overarching objectives:

- Gauge and measure current opinions regarding offshore wind development near Evanston, Illinois in Evanston, Rogers Park and Wilmette, Illinois
- Test residents' decision-making processes to vote 'for' or 'against' hypothetical, offshore wind farm scenarios at varying distances via a contingent valuation method (CVM) survey
- Analyze information sources, demographic characteristics, and opinion variables that could explain local opposition/support for current offshore wind farm development and the CVM votes
- Estimate the non-market value of the lake shore viewshed impact through a stated preference, willingness to pay (SP WTP)

While the SP WTP piece is not included in this report, this information will be available to Citizens' Greener Evanston in the future reports published though our School of Natural Resources and Environment.

Survey Structure

Found in Appendix B.0, the survey was divided into five sections in order to group similar content and to ease cognitive burden.

Section 1: Information Sources

- The first section introduced respondents to the survey, inquired about their information sources (that is, through which media they have learned about wind energy) and the extent to which they used these media sources to obtain information.

Section 2: Offshore Wind Opinions in Evanston

- The second section recorded opinions about current support for offshore wind development near Evanston and perceived impacts regarding a wide array of pre-defined environmental, economic, and social impacts.

Section 3: A Hypothetical Scenario

- The third section introduced the contingent valuation portion of the survey in which respondents were faced with a hypothetical scenario that an offshore wind project was proposed near Evanston's shoreline. Each respondent was presented with a scenario in which they had to "vote" for the proposed wind project at three offshore distances. A photograph of the current view at Evanston's Northwestern University Beach was presented followed by three

simulations of the hypothetical wind farm at three, six, and ten miles offshore (Appendix A.1 – A.3). Each respondent was also presented with a pre-defined price impact on monthly electricity rates that remained the same for all distances. The Contingent Valuation (CV) section below further discusses this section's methodology.

Section 4: Demographics

- General socio-economic and demographic questions were asked in this section including questions about age, income, education level, and employment.

Section 5: General Electricity Opinions

- The final section solicited opinions about support for renewable and conventional electricity generation sources and perceptions about which electricity generation sources were considered "clean."

Contingent Valuation (CV)

Economists and researchers have employed a robust and diverse set of methodologies to estimate the value of numerous environmental resources through a broadly-defined mechanism called non-market valuation. While there are several approaches to ascertain the value of a particular resource that is neither bought nor sold in a defined market, this report focuses particularly on stated preference contingent valuation.

In order to determine individual preferences and opinions, this study relies on the respondents to state them explicitly, a method called stated preference (SP). The fundamental assumption to SP is that respondents answer accurately and truthfully as it pertains to their overall preferences and opinions. Section three in the survey presents a scenario in which respondents vote for an offshore wind farm given changes in two variables: 1) the offshore wind farm's distance from shore and 2) a theoretical positive or negative impact on the respondents' monthly utility bill. Because of the hypothetical nature of this section, the SP approach is crucial to determining how the respondents would react given the various changes in distance and price resulting from offshore development; this type of research is called contingent valuation (CV).

A single-bounded, dichotomous choice (with an "unsure" option) format was selected for the CV section to follow the National Oceanic and Atmospheric Administration's Contingent Valuation Blue Ribbon recommendation for questionnaire design (Arrow, et al. 1993). The willingness to pay (WTP) questions were followed with a certainty table in which respondents were asked to rate their relative certainty for each response (see Example 1 below). Researcher-selected electricity rate impacts ranged from (-60, -48, -36, -24, -12, 12, 24, 36, 48, 60) USD per month to evoke the most realistic responses for each individual. Each respondent was shown the same theoretical price impact for all three distances. Both positive and negative price bids were shown proportionately. That is, respondents overall were shown equally both positive (+) price increases on utility rates and negative (-) price reductions on utility rates.

Example 1

Given this distance from Northwestern University Beach in Evanston, would you support this wind farm if you knew you would have to...

Pay **$12 less per month**[1] on your electricity bill?

__Yes __No __Not sure

How sure are you of your previous answer given the impact on price?
Please select one number from 1 to 10, with 1 indicating "very unsure" and 10 indicating "very sure".

__ 1 __ 2 __ 3 __ 4 __ 5 __ 6 __ 7 __ 8 __ 9 __ 10

Visualizations

An international engineering consulting firm, CH2M Hill, generated state-of-the-art visualizations of Northwestern University Beach by using WindPRO, a premiere software for this industry[2] (see Appendices A.1 – A.3). The base photographs[3] were taken at Northwestern University Beach on a weekday afternoon in July 2012 using a level, compass, tri-pod, and a Canon DSLR camera. Special considerations were given to achieve eye-level height, fore and mid-ground visual references for scale, and bright afternoon lighting in order to meet rigorous visualization standards (Horner + Maclennan; Envision 2006). Also in accordance with these standards, GPS coordinates were obtained independently and cross-checked with GIS data supplied by the city of Evanston (City of Evanston 2012).

For the visualizations, the project nameplate power capacity, number of turbines, capacity of each turbine, and wind farm layout were selected to realistically portray a project's scale if one were to be constructed five to ten years in the future. Table 2 below shows the specifications of the hypothetical wind turbines utilized in the scenarios presented to respondents. Given that offshore wind farms in the United States do not exist, European development trends were used as a guide to establish the project size and scale. For example, most of the current projects in the United Kingdom range from 3.0 to 5.0 MW per turbine power capacity while facilities regularly deploy more than one hundred turbines per site (Sullivan, et al. 2012).

[1] Each respondent saw the same randomized theoretical price impact for all offshore wind farm distances.

[2] We owe many thanks to the two CH2M engineers that generated the visualizations, Mark Bastasch and Tom Priestly, for their gracious flexibility and thorough dedication to this project.

[3] Base photographs are available upon request and were taken by Matthew Rife and Lauren Knapp.

Table 2. Specifications for Hypothetical Wind Farm near Evanston, IL

Hypothetical Evanston Offshore Wind Farm Specifications			
		Hub height	*Rotor Diameter*
Wind turbine model and OEM	REpower 5M[4]	100 meter	61.5 meter
Wind turbine power capacity	5 MW		
Number of turbines	80		
Total facility power capacity	400 MW		

Controls for Potential Biases

Several approaches were taken to control for and limit potential biases to the greatest extent possible (Section V. further discusses the implications of these biases and the survey's limitations).

1) **Self-selection sampling bias:** No mention of offshore wind farm development was made in any of the initial mailing materials to the respondent sample nor was it mentioned during subsequent follow-up reminder calls or postcards. This approach follows similar offshore research from the University of Delaware (Firestone and Kempton 2007, Firestone, Kempton and Krueger 2009). Instead, the invitation content referred to the survey broadly as an 'academic research regarding possible energy futures' (see survey mailing invitations in Appendices B.1 - B.3).
2) **Hypothetical bias**: Survey-elicited opinions and 'votes' in the CV section are not the same as if respondents were acting in real life; respondents can sometimes over or understate opinions due to the hypothetical nature of presented questions. To encourage the highest quality and true-to-life responses as possible, the survey employed two widely accepted controls to limit this hypothetical bias phenomenon.
    a. An approach often employed by social scientists to control for the hypothetical bias phenomenon is called 'cheap talk' (Cummings and Taylor 1999). The purpose of cheap talk is to acknowledge that the survey is hypothetical in nature and to encourage respondents to vote or respond as if they had to make the decision today and with real dollars. Example 2 below shows the cheap talk format utilized in this survey.
    b. Another approach employed to control for hypothetical bias is through providing a certainty table following the vote and CV referendum (Cummings and Taylor 1999). Due to theoretical nature of the CV scenarios and varying degrees of respondent knowledge, the main goal of the certainty table is to obtain additional data on the level of certainty of each respondent's vote. This additional data allows researchers to weight responses according to the respondents' relative certainty. Example 1, shown previously, displays the certainty table (also see Appendix B.0.)

[4] REpower has been deploying this model since 2008 in European installations across Germany and Belgium.

Example 2

This scenario, along with the following price points, is purely hypothetical and was generated by researchers to elicit opinions. Given the hypothetical nature of this research, people sometimes unintentionally overestimate or underestimate their responses. Though this is a hypothetical scenario, please respond as if you were actually faced with this vote while keeping in mind your monthly budget.

IV. Survey Implementation

This survey was completed by respondents in Evanston, Rogers Park, and Wilmette, Illinois, throughout the month of October 2012 and again during January and February 2013. The following section provides a detailed description of the data collection methods.

Address Data

Address data for Evanston, Rogers Park and Wilmette were purchased from Melissa Data, an online data clearinghouse. Addresses were selected based on the following demographics: single family residential dwellings, homes and apartments, property owners and rental classes.

Sampling Method

Sample population contact data was collected using a systematic approach to ensure a proportionate, geographic distribution across the communities (i.e. inland residents were sampled at the same frequency as residents near the shoreline) and to ensure cost effectiveness.

Contact Protocol

Given time and resource constraints, a five-contact protocol[5] was utilized as described below and summarized in Table 3:

1. Initial priming letters (Appendix B.1) were mailed on September 26, and respondents received the letters within 3-10 business days.
2. Follow-up postcards (Appendix B.2) were mailed on October 1, 2012 to thank those that had already taken the survey and to gently remind those that had not yet taken the survey to do so by October 19, 2012. Postcards arrived within 3-5 business days.
3. Randomized calls (Appendix B.3) to the survey population took place throughout most of October and November. A total of 2,150 follow-up calls were completed.
4. Follow-up postcards (Appendix B.4) were mailed on January 18, 2013.
5. Final follow-up postcards (Appendix B.5) were mailed on February 8, 2013.

[5] All mailings were carried out by the Foresight Group, Inc., Ann Arbor, Michigan.

Table 3. Survey Contact Protocol and Response Rate

Contact Protocol	*First*	*Second*	*Third*	*Fourth*	*Fifth*	*Total number of Respondents*	*Response Rate*
Survey community (Illinois)	**Survey invitations**	**Follow-up postcards**	**Follow-up phone calls**	**2nd postcards**	**Final postcards**		
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Total	**3,000**	**3,000**	**2,150**	**2,160**	**2,160**	**n = 208**	**~7%**

Incentive

Respondents were offered an incentive for their time to increase response rates. Each individual was presented with an option to record his or her email at the end of the survey for a chance to be entered into a $100 drawing. Each of the contact documents was color-printed with the University of Michigan logo to help it stand out from standard mail. In addition, the priming letter and postcard each contained a signature from the principle investigator, Lauren Knapp, to add a personal feel to the documents. Finally, to the extent that they were available, respondent names were used on the priming letters and postcards for a personalized touch and to encourage responses.

V. Limitations

Although every effort was taken to ensure the most accurate responses, control for biases and achieve the highest number of completed surveys, the following issues represent possible limitations to this study. While some of the following limitations were impossible to avoid given resource and time constraints, others are inherent to this type of SP methodology.

Hypothetical Bias

Given the nature of hypothetical scenarios, respondents can sometimes overestimate or underestimate their responses due to the fact that they are stating their preferences based upon a hypothetical scenario. These responses do not provide a perfectly accurate depiction as to how they might vote; however, these can offer the next best alternative and a means to estimate the overall tendency of the sample population.

Furthermore, there might be some hypothetical bias that could not be controlled for those respondents who did not read the survey directions thoroughly. Explicit language was integrated into the survey to ensure that respondents knew the project was purely hypothetical.

Additionally, the project was selected by the study's research team in an attempt to portray what one might look like in the near future. The middle offshore distance (six miles) was based off findings from the GLOW Council's report and many aforementioned studies. Although the project's characteristics

were selected on a conservative basis and based on previous research, it might not reflect a project that, in reality, is best suited for this area.

Responses

In a perfect survey sample, all the individuals in a sample population will complete the survey. However, a 100%response rate is never obtained for a variety of reasons. What is important is the manner in which the sample is selected so as to limit the amount of inherent biases within the sample and the extent to which the sample is representative of the larger population (UC Davis 2013).

Self-Selection Bias

In some cases, individuals may not respond to a survey because they do not hold passionate opinions in either direction about the issue. Likewise, the opposite effect can also occur. If individuals know the survey content and opt to respond, they tend to be motivated by the issue. In short, there is a possibility that the survey might have a stronger representation of the extreme views in these communities and not provide a representation of the communities' views as a whole on average.[6] To avoid this sampling of extreme views, no mention of offshore wind development was made at any stage in the contact protocol and specific care was given to the wording of all communication to be deliberately general.

Timing

For some individuals, voluntary surveys can be burdensome and they do not wish to dedicate time toward an activity that comes with a high opportunity cost. This tendency may have been exacerbated by the 2012 presidential election campaign and associated polling which was highly active during the survey solicitation; many respondents may have felt overwhelmed by the concurrent volume of campaign-related mail and telephone calls during this time and consequently less inclined to participate in the study.

Technological Barriers

While online surveys carry a variety of benefits over traditional paper surveys, they are not without limitations. First, several respondents stated a lack of access to a personal computer equipped with internet access during follow-up calls. Also, although security features were used to prevent participants from accessing the survey multiple times, there is a possibility that some respondents attempted to take the survey multiple times on different computers or electronic devices.

Accuracy of Address Data

Both the data clearinghouse which provided address data and the mailing house which distributed the surveys verified that the contact information was no more than 90-days old. Nonetheless, due to the nature of these information sources, it is difficult to ascertain the accuracy of the data. A simple error

[6] This phenomenon can result in self-selection bias; if the majority of individuals that choose to respond to the survey tend to be highly motivated or passionate about the issue, that representation of extreme viewpoints can hinder the sample selection's randomization and bias overall response trends.

such as the misspelling of a participant's name on the priming letter could have provided enough reason for some respondents to disregard the survey invitation mailings.

Visualizations

While the visualizations employed in this research are state-of-the-art technological simulations, there are some inherent limitations to using any type of two-dimensional representation of three-dimensional objects that rotate and generate noise. The following issues present typical limitations associated with surveys, generally speaking, as well as with visually representing hypothetical wind farms with two-dimensional images, specifically.

Primacy Effect

It is a well-established phenomenon in academic studies that the order in which questions are asked, or the order in which answer options are presented, can influence the type or magnitude of responses. This phenomenon is called the primacy effect (Day, et al. 2012). There is a possibility that the order in which the hypothetical offshore wind farm distances (three, six and ten miles from shore, consecutively) were presented could have impacted the respondents' WTP estimates.

Static Images

One of the inherent difficulties with representing wind turbines, both onshore and offshore, relates to the aspect of movement. The images employed in this study were stationary and therefore could not capture the viewers' attention in the same way that an oscillating blade might. Furthermore, no static, 2-D image is able to represent all of the various positions of a turbine as it rotates to face prevailing winds.

Simulation Viewing Distance

In order to provide the most accurate representation of a hypothetical wind farm, both the size of the image presented and the viewer's distance from the image should be controlled when presenting hypothetical imagery. While the respondents were advised to only view the survey on a standard computer screen, there was no way to control for a standardized viewing experience.

Differing Conditions

Ideally, visual simulations represent a range of differing conditions in order to compare how the impact may change over time. Such temporal variations include not only daily lighting fluctuations, but also inter-seasonal differences. Furthermore, variations in atmospheric conditions, beach congestion, or seascape congestion (e.g. boat activity) may also affect viewing experience. Budgetary constraints as well as concern for overall survey length restricted the beach condition to that of a summer afternoon and did not allow for a complete enumeration of all possible representations.

VI. Results and Interesting Findings

Responses

Of the 3,000 households selected to participate in this study, 208 individuals completed the survey resulting in a response rate of approximately 7%. The following sections detail results and key findings for each section from the survey.

Information Sources

Where residents' obtain information about offshore wind development can influence opinions and perceptions. The overwhelming majority of survey respondents reported that they have learned or heard about offshore wind farms through the following top three main media sources: local newspapers, word-of-mouth from friends and the internet (Figure 2).

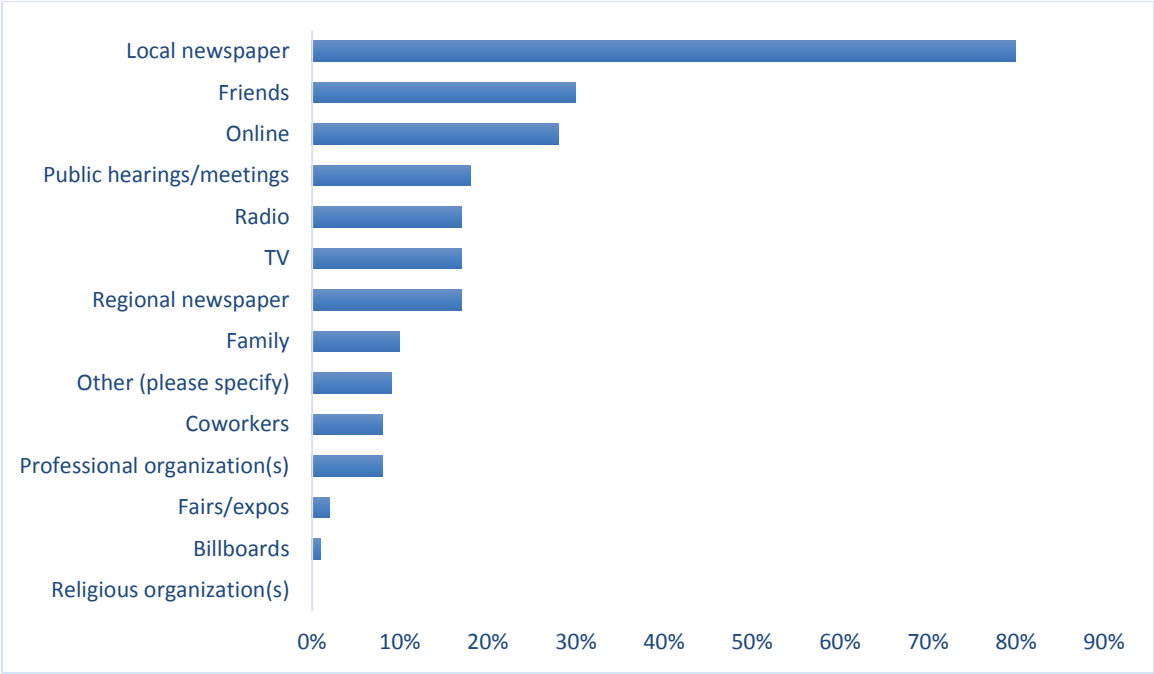


Figure 2. Respondents' Primary Media and Information Sources Regarding Offshore Wind (n = 208)

After selecting the mediums through which they receive information, respondents were then asked to rate the extent to which each source provided them with information. Figure 3 illustrates the relative impact of each source, though it should be reiterated that respondents were only asked to evaluate the specific information sources which they had previously identified as relevant to their situation. The results indicate that public hearings/meetings, professional organizations, online websites, newspapers and radio have had a significant impact on some respondents, while billboards had little, if any, impact. TV and fairs/expos had moderate impact on the recipients who selected them.

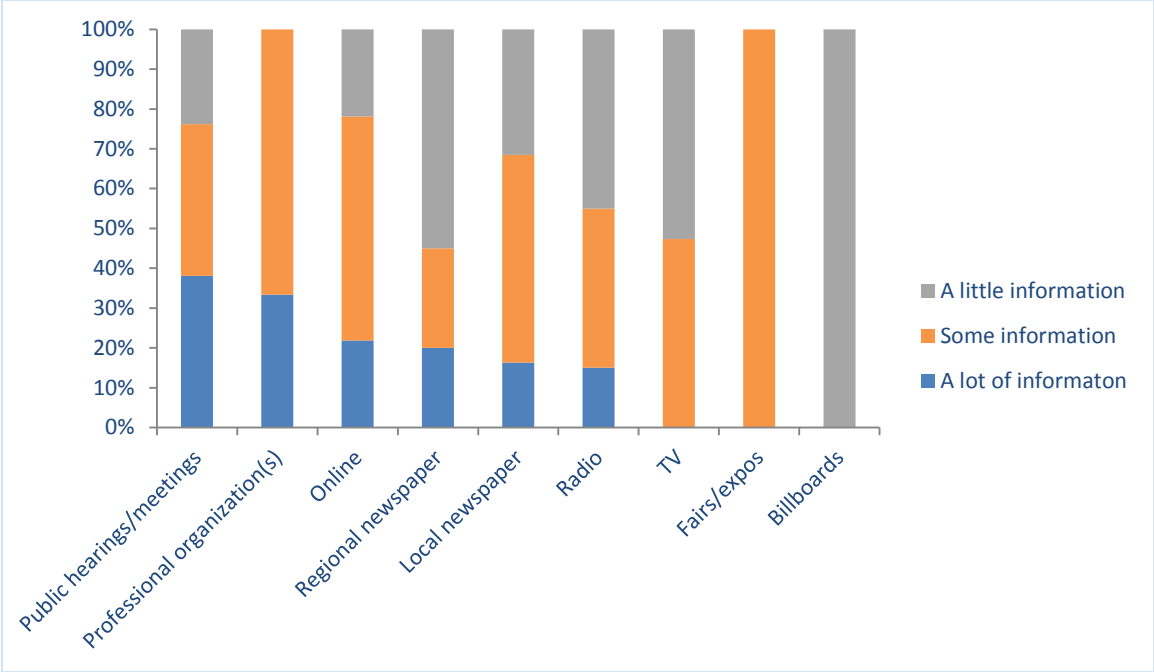


Figure 3. Extent of Information Obtained from Each Information Source (n = 208)

Offshore Wind Impacts in Evanston, Rogers Park, and Wilmette, IL

Respondents were asked to estimate the potential impacts of offshore wind turbines with respect to some of the most relevant issues to the lake and their own lives. As Figure 4 shows, the majority of respondents believed that employment and the local economy would improve and electricity rates would decrease with the deployment of offshore wind project. Similarly, a significant portion of respondents indicated that they expected a decline in the aesthetic value of the lake as well as increased danger to bird life if an offshore wind farm were developed.

One important point to note from this question is the considerable degree of uncertainty among respondents regarding offshore wind development's potential impacts; this ambiguity is not surprising given that the topic has yet to be extensively marketed locally. Prior research suggests that the communication of these potential or perceived impacts can significantly shape overall support or opposition for a project (Firestone and Kempton 2007, Koundouri, Yiannis and Kyriaki 2009). As such, to the extent that they are known, these impacts should be clearly communicated to the community by trusted individuals and organizations with the relevant credibility.

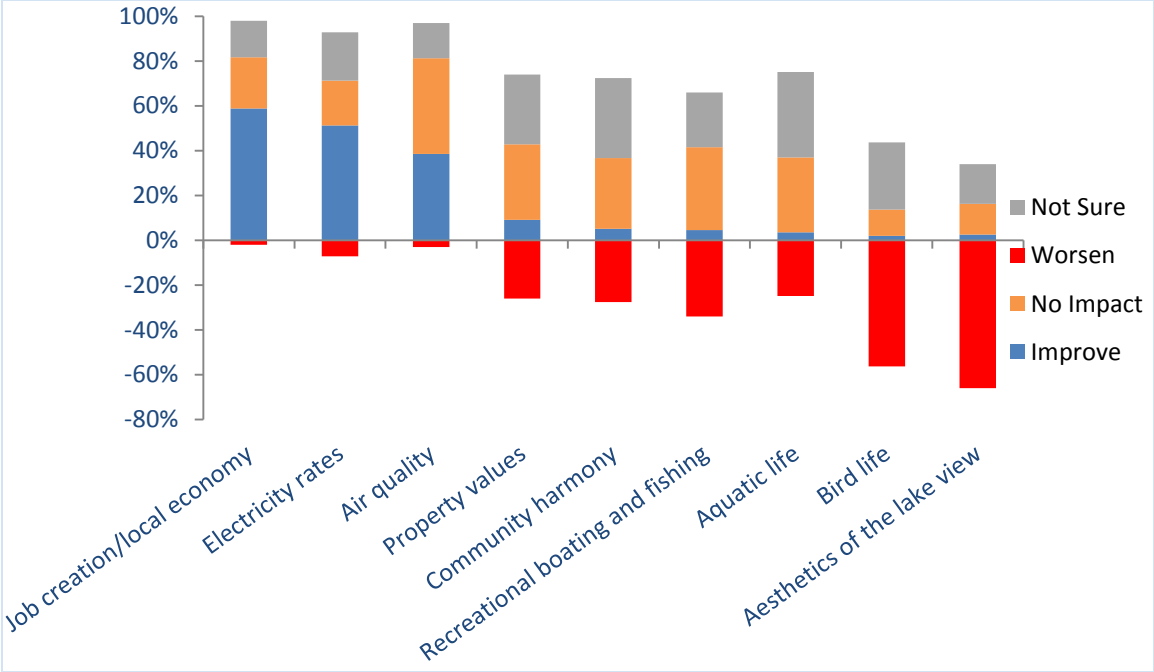


Figure 4. Perceived Impacts from Offshore Wind Development near Evanston (n = 208)

Opinions Regarding Other Electricity Sources

In order to compare perceptions of wind power with other sources for electricity generation, respondents were asked to state the degree to which they support other electricity generation alternatives (Figure 5). It is interesting to note that in general, wind and other renewables, along with conventional natural gas enjoyed relatively high levels of support, while other more traditional generating sources had much stronger levels of opposition.

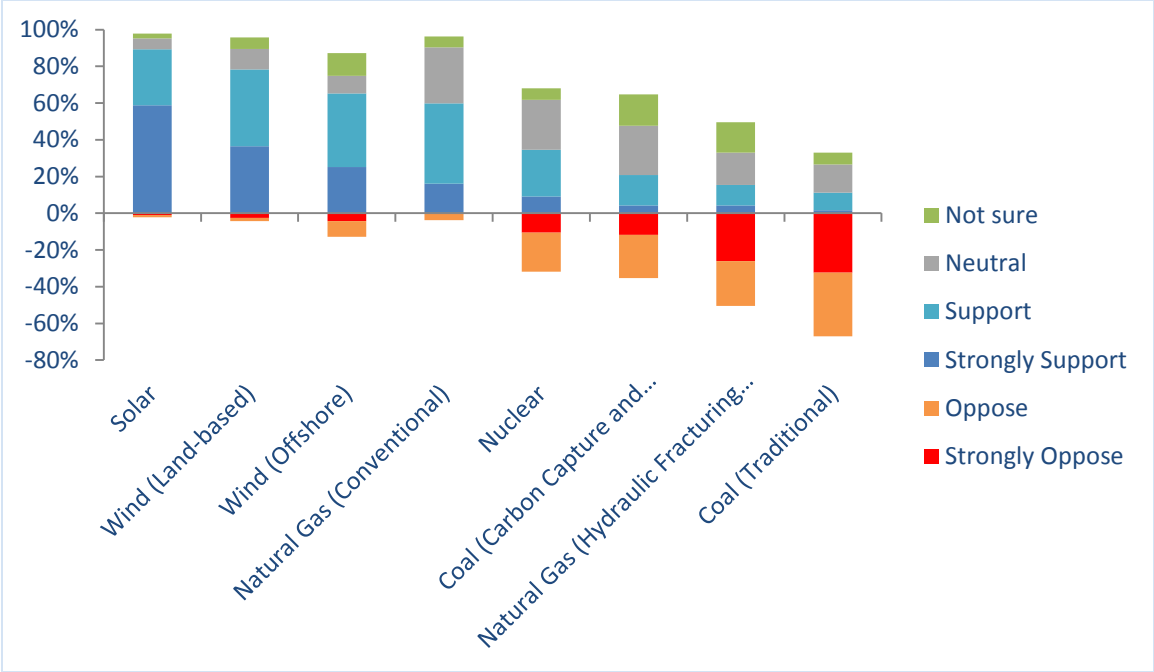


Figure 5. Respondents' Level of Support for Varying Sources of Electricity Generation (n=208)

Respondents were then asked to evaluate whether various sources of electricity generation were "clean". As Figure 6 shows, renewable sources were considered to be "clean", while very few respondents considered the traditional sources of electricity generation to be so.

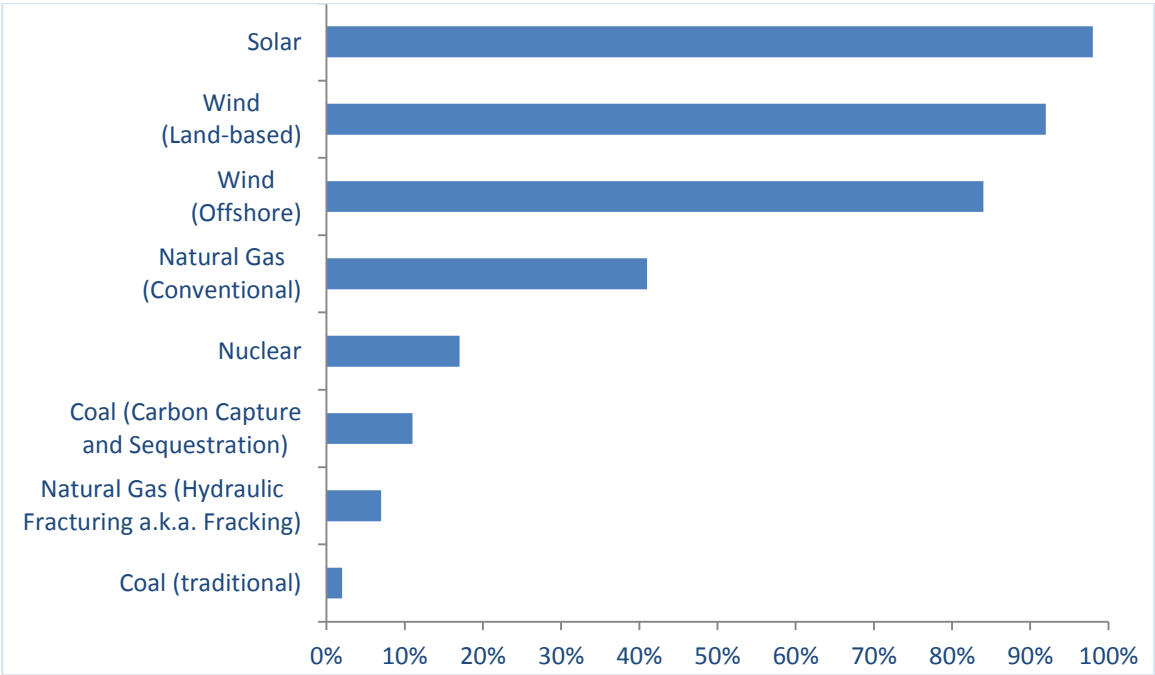


Figure 6. Percentage of Respondents That Consider Each Electricity Generating Source "Clean" (n = 208)

A Hypothetical Scenario

Respondents were presented with a baseline scenario along with three hypothetical wind farm scenarios for Northwestern University Beach. Respondents were then asked whether they would support such a development based on a pre-defined, randomly presented price increase or decrease to their monthly electric bills. Each scenario is discussed below.

Three-Mile Scenario

When presented with an offshore wind farm three miles from Northwestern University Beach (Appendix A.1.), the majority of respondents reported that they would not support the wind farm regardless of price impacts on monthly electricity rates. The small fraction of respondents who stated they would support the wind farm was generally offered hypothetical utility price reductions (Figure 7). The highest percentage of respondents that said they would vote 'yes' for the proposed three-mile distance was ~35% given a $36 dollar *decrease* in monthly electricity bills.

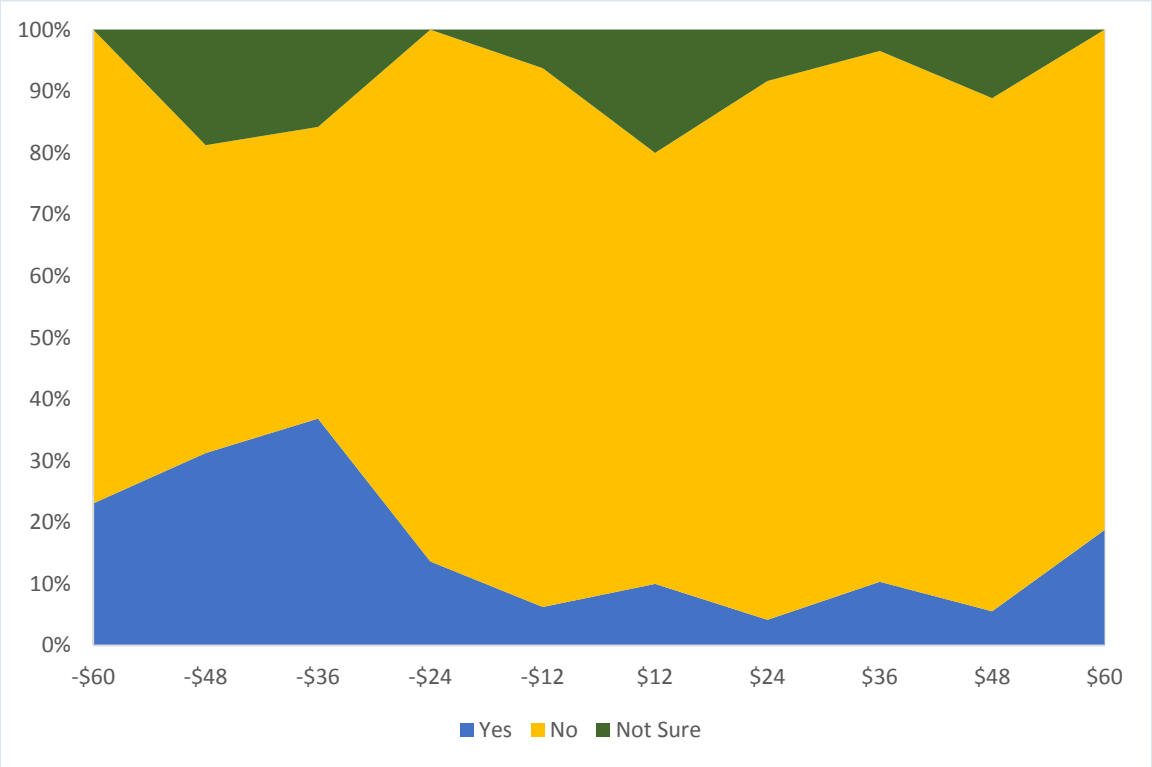


Figure 7. Share of Support for Evanston Offshore Wind Farm Development (3 miles)

Six-Mile Scenario

When presented with an offshore wind farm six miles from Northwestern University Beach (Appendix A.2.), the majority of respondents stated they would still oppose the development. However, the proportion of those who stated they would vote in favor of the project increased relative to the three-mile scenario (Figure 8). The highest percentage of respondents that said they would vote 'yes' for the proposed wind farm at six miles distance from the shoreline was ~70% given a $36 dollar *decrease* in monthly electricity bills. Approximately 30% responded they would vote 'yes' for the project at six miles given a $12 *increase* in monthly electricity rates.

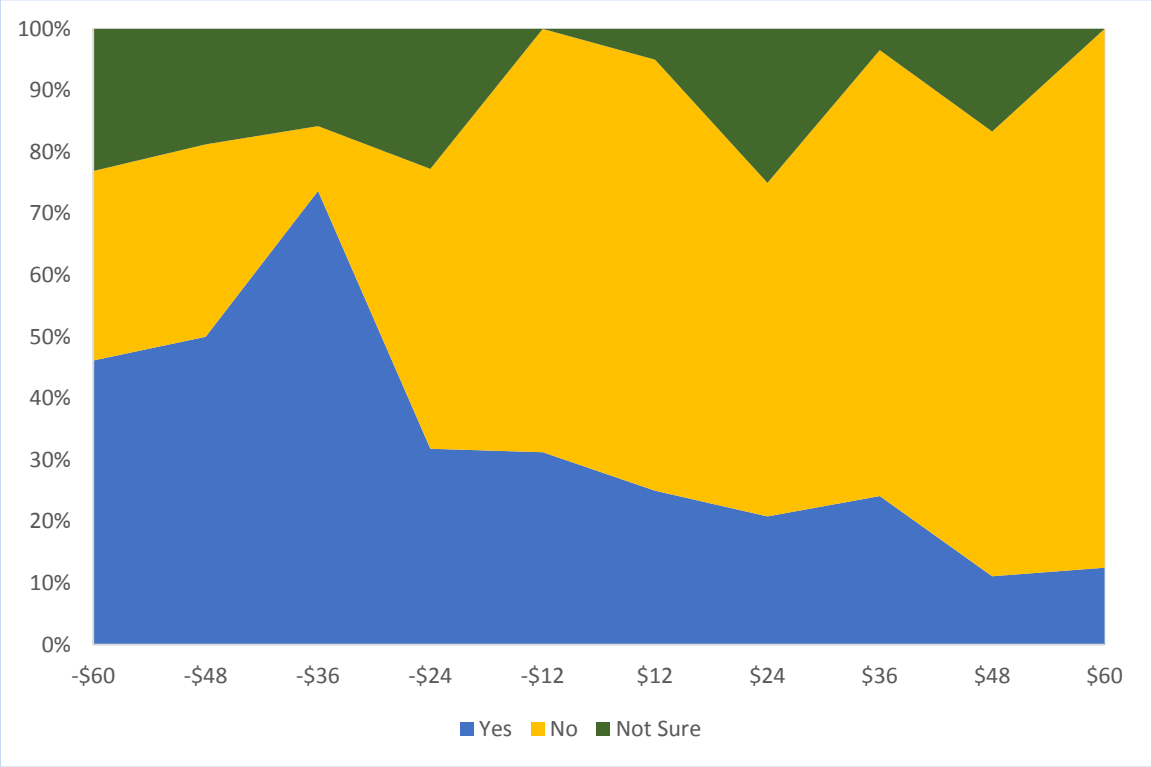


Figure 8. Share of Support for Evanston Offshore Wind Farm Development (6 miles)

Ten-Mile Scenario

When presented with an offshore wind farm ten miles from Evanston's beach (Appendix A.3.), many of the respondents would support the wind farm whether they were shown utility price reductions or increases. The largest share would also support the wind farm if there were monthly rate reductions associated with this distance (Figure 9). Again, the highest percentage of respondents that said they would vote 'yes' for the proposed ten-mile offshore wind farm was ~80% given a $36 dollar *decrease* in monthly electricity bills. Approximately 30% responded they would vote 'yes' for the proposed wind farm at ten miles from the shoreline given anywhere from a $12, $36 or $48 *increase* in monthly electricity rates.

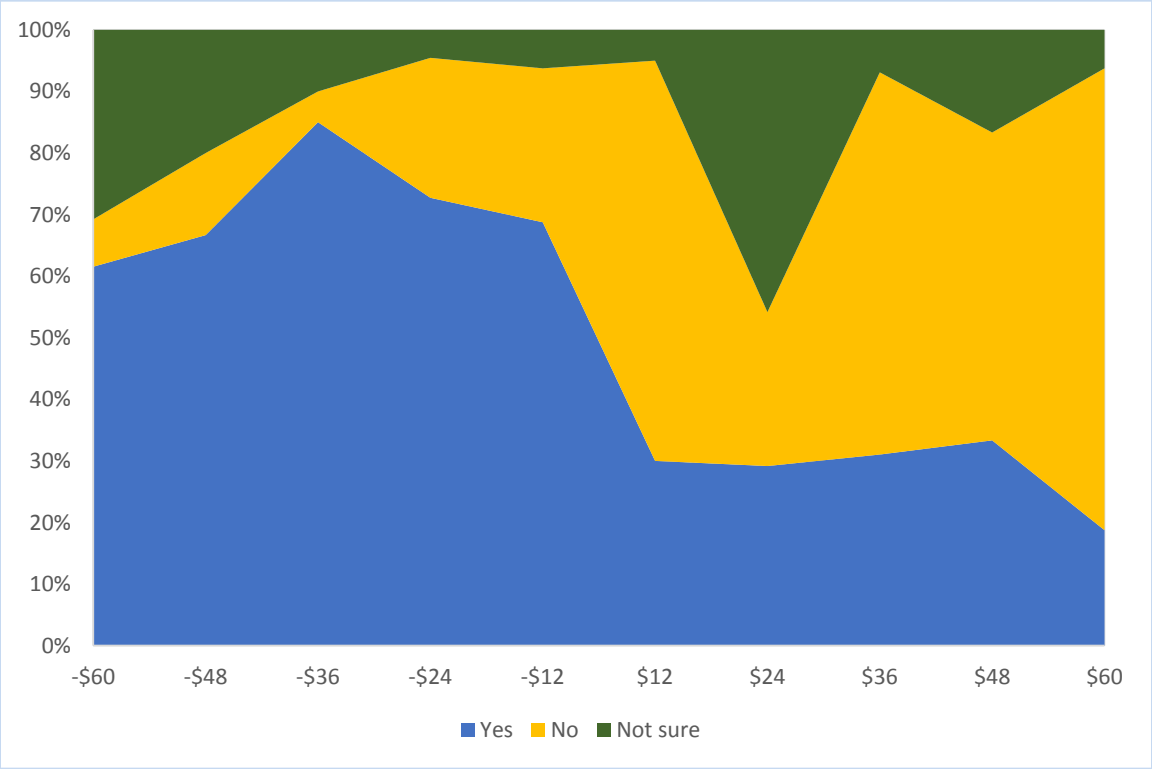


Figure 9. Share of Support for Evanston Offshore Wind Farm Development (10 miles)

'Yes' votes across distances

The majority of 'yes' votes were selected for price decreases at ten miles offshore (Figure 10). However, a notable share of respondents would also vote yes at various distances even with hypothetical rate increases. For example, approximately 35% of respondents stated they would vote 'yes' even with a perceived $12 increase in monthly electricity rates.

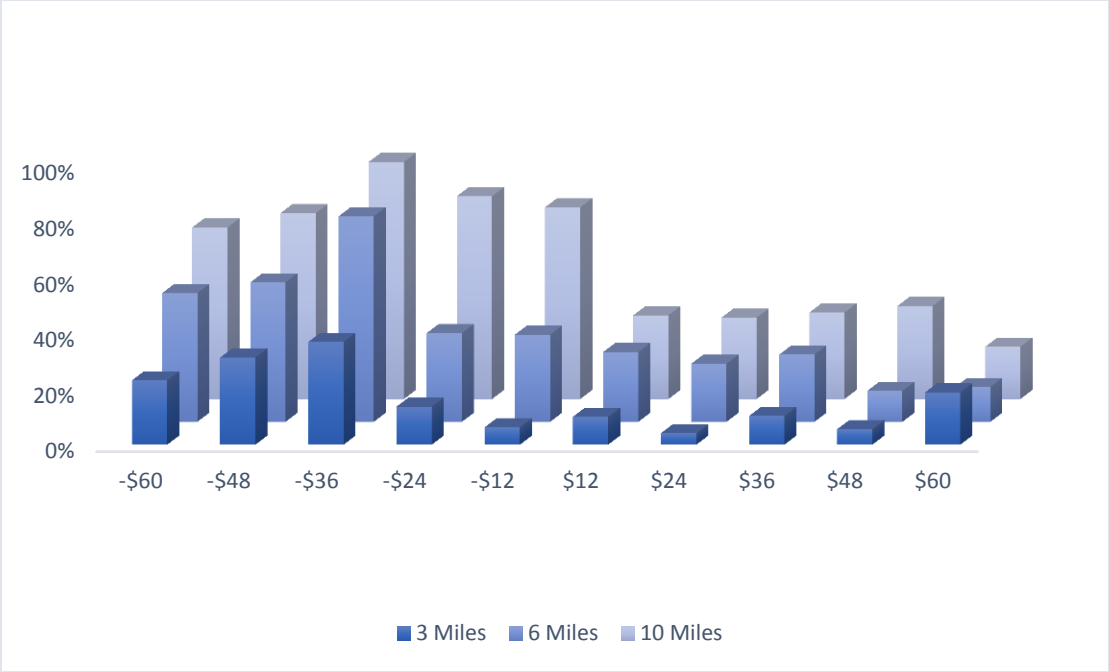


Figure 10. Share of 'Yes' Votes across Various Offshore Distances (n = 208)

Demographics

Respondents were prompted for general demographic information regarding household income, gender, age, race, and education level, among other variables. This sample is similar to the results for Evanston from the 2010 Census, although older participants are overrepresented and minorities are underrepresented. See Appendix C.1. for comparisons between this sample and U.S. Census Bureau results (United States Census Bureau 2012). Figure 11 shows the breakdown of respondents' political affiliation; 71% of the sample population define themselves as either liberal or moderately liberal. This result is consistent with results from the 2010 general elections in which a Democratic senator, congresswoman and governor were all elected with between 75-80% of the electorate (Cook County Clerk 2010). The survey respondents' political ideology is conducive to the support for renewable energy because it aligns with one of the key 2012 campaign issues of the Democratic Party.

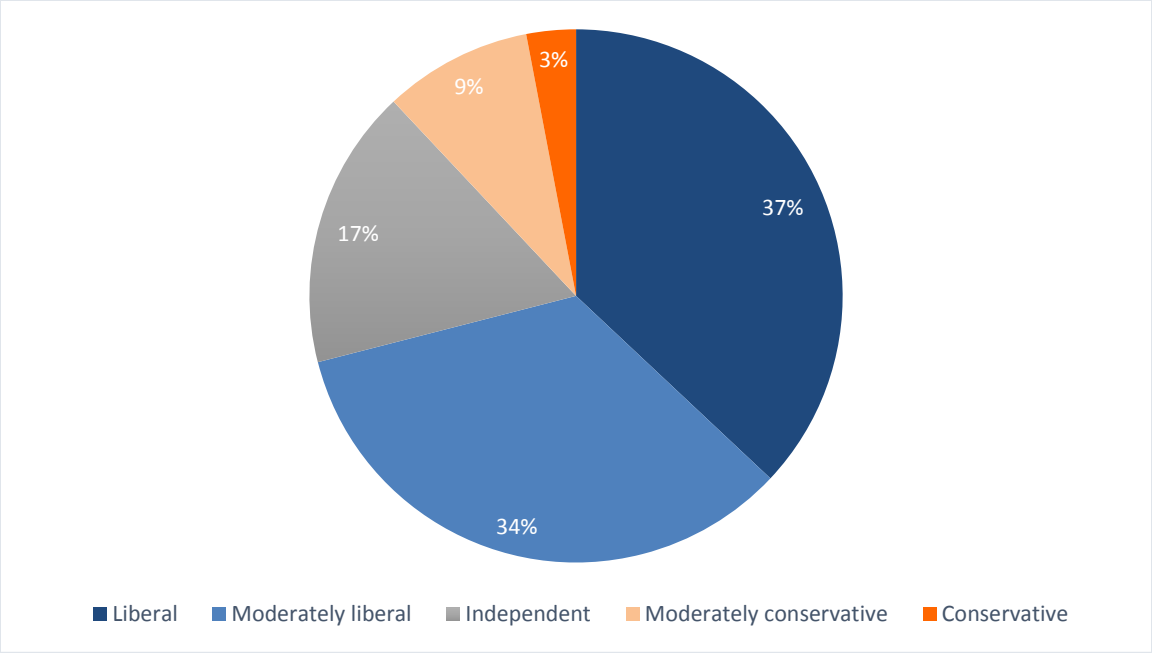


Figure 11. Political Affiliation for All Respondents in Evanston, Rogers Park and Wilmette (n = 208)

When respondents were asked if they thought they would be able to see an offshore wind farm from their house, the large majority selected 'No' (Figure 12). This response satisfies an intuitive understanding because only a small percentage of homes in Evanston, Rogers Park and Wilmette are physically situated on the shoreline.

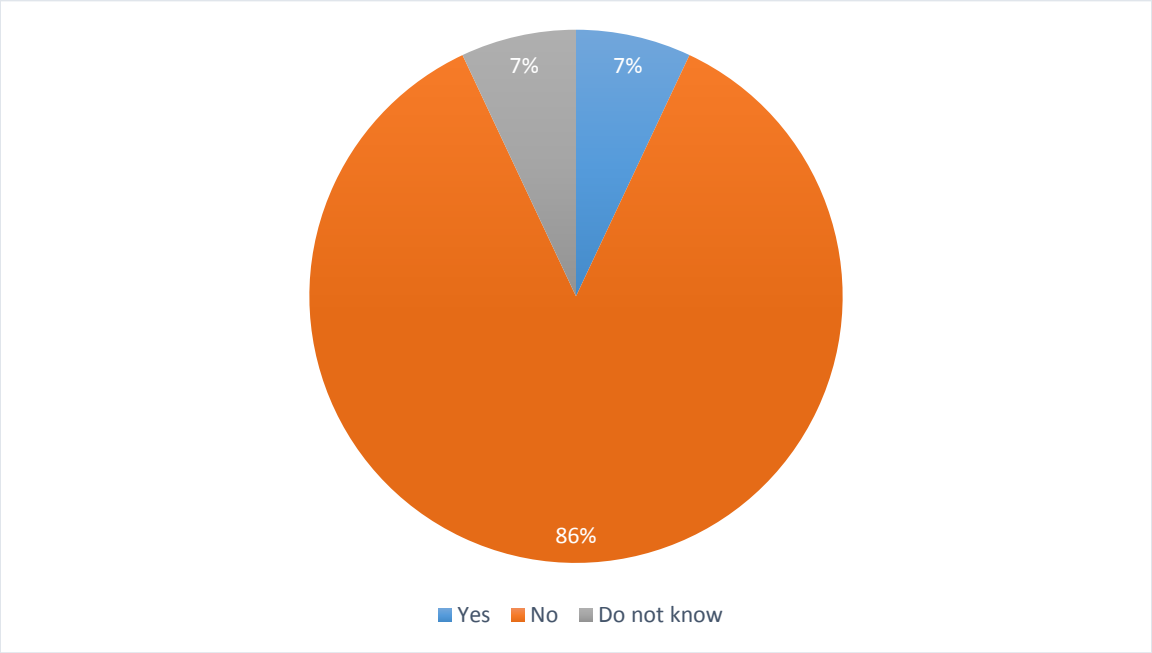


Figure 12. Respondents That Think They Would Be Able to See an Offshore Wind Farm from Their Homes (n = 208)

On the other hand, roughly one-third (35%) of the respondents thought they would be able to see an offshore wind farm in their daily routine (Figure 13). Many of these individuals work in Chicago, so it is reasonable to assume that they think an offshore wind project would be visible on their daily commute to Chicago or the nearby northwest suburbs.

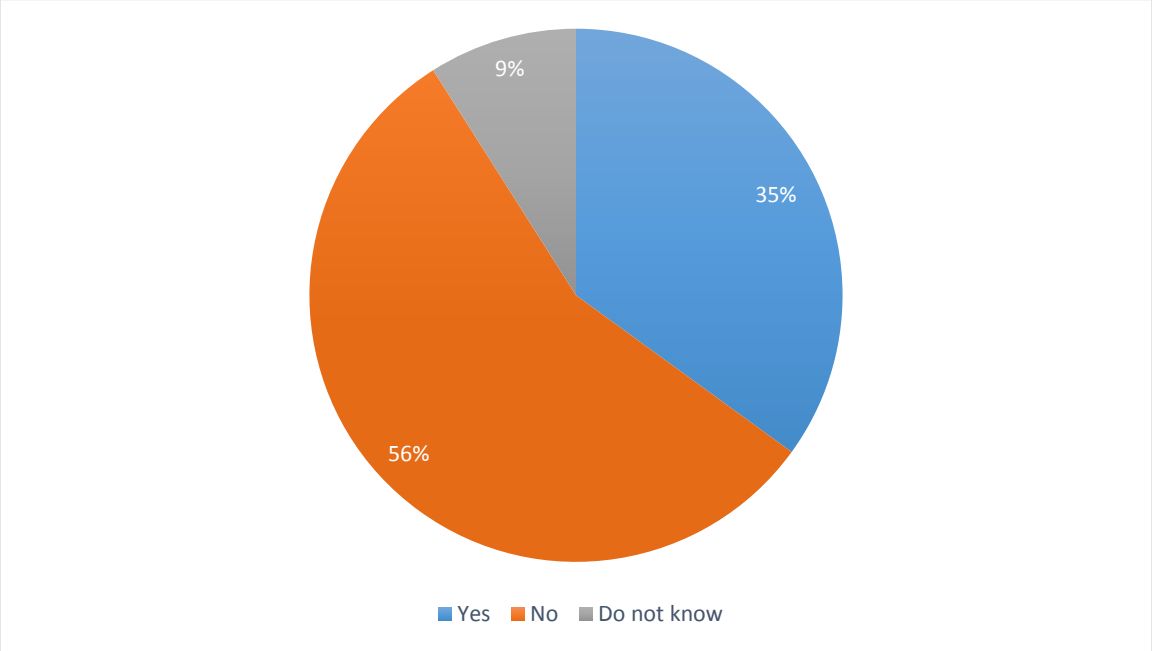


Figure 13. Respondents That Think They Would Be Able to See an Offshore Wind Farm During Their Daily Routine (n = 208)

Analysis: Binary Logistic Regression

Model 1: Determinants of the likelihood of supporting a hypothetical offshore wind scenario

In order to explore the underlying factors that influence the likelihood of support for an offshore wind development scenario, a binary logistic regression was employed. This binary logit model was used to analyze a binary dependent outcome of the likelihood of that a respondent would vote 'yes' for the hypothetical wind farm scenario as a function of the wind farm distance, the proposed theoretical impact on electricity rates, and respondent demographic characteristics. This model employs a binary (or dichotomous) outcome as a function of a vector of explanatory, independent variables, otherwise called a binary logit:

$$\text{Prob}(Y = 1 = \text{'Yes'}) = \frac{e^{d\theta X}}{1+e^{d\theta X}}$$

In the equation above, θ is a vector of explanatory variable coefficients that were estimated using the statistical software Stata. The dependent variable is set equal to one (Y = 1) if a respondent selected 'yes' voice to voice his/her support the hypothetical offshore wind scenario with a confidence greater

than or equal to 7 on their vote response certainty Likert scale. A review of the literature suggests that education, income, and age (among other variables) are significantly related to the stated or revealed preference for renewable electricity (Ek 2004). The independent variables tested in the model along with variable coefficient interpretation are detailed below.

Model 1: Results

Only statistically significant variables have a relationship that contributes to explaining respondent's likelihood in voting for or against for the offshore wind farm scenario. In the constrained model (Table 4) that accounts for socioeconomic and demographic characteristics, all bolded variables are statistically significant at varying levels of confidence (see Appendix C.2. for variable descriptions and coding parameters). For those variables that are statistically significant, the *sign* on each variable's estimated coefficient can be directly interpreted to determine the direction of the relationship; that is, a (+) sign on a coefficient (Table 4, Column 2) implies that the variable of interest *encourages* the likelihood of support for the offshore wind project while a (-) sign on a coefficient implies that the variable of interest *discourages* the likelihood of support for the offshore wind project. While each variable's sign on the coefficient shows the direction of the variables' relationship on the likelihood of supporting an offshore wind farm, the extent, or magnitude, of the relationship appears through the actual coefficient. However, the convention for interpreting the extent, or magnitude, of each variable's relationship is to examine the coefficient converted into odds ratios (Table 4, Column 3).

For example, the odds that an individual will support the offshore wind farm scenario increase by approximately 3.4 times (341%) if the wind farm is located 6 miles offshore compared to a 3 mile offshore distance, holding all other variables constant ($p<0.001$). Similarly, the odds that an individual will support the offshore wind farm scenario increase by approximately 10 times (1021%) if the wind farm is located 10 miles offshore compared to a 3 mile offshore distance, holding all other variables constant ($p<0.001$).

Additionally, the odds that an individual will support the offshore wind farm scenario increase by approximately 6.3 times (635%) for respondents that have either a high school degree, some college or an associate's degree compared to those respondents with a graduate degree, holding all other variables constant ($p<0.05$). Households with an 'high' annual household income ($160,000—$200,000) were 5 times (500%) more likely to support an offshore wind farm scenario than those respondents with an household income > $200,000 per year ($p<0.10$). Moreover, respondents that self-reported they were a member of an environmental organization were 2.2 times (215%) more likely to support the offshore wind farm scenario than those respondents that were not environmental organization members, holding all other variables constant ($p<0.10$).

Table 4. Constrained model 1: Logistic Regression of Factors Influencing Support for CV Scenario (Negative Coefficients Indicate Factors Increasing Opposition) (n = 332 with Repeated Measures)

Variable	Coefficient	Odds ratio	Standard error (robust)	p-value
Bid price	**-0.0223*** **	**0.978**	**(0.00624)**	**0.00**
Distance (6 miles)	**1.229*** **	**3.419**	**(0.323)**	**0.00**
Distance (10 miles)	**2.324*** **	**10.219**	**(0.392)**	**0.00**
Age	0.0160	1.016	(0.0172)	0.35
Highschool_associate	**1.849** **	**6.352**	**(0.853)**	**0.03**
Bachelors	0.304	1.356	(0.403)	0.45
Lowest income	-0.258	0.773	(0.743)	0.73
Low income	0.213	1.238	(0.692)	0.75
Mid income	0.114	1.120	(0.639)	0.86
High mid income	0.488	1.629	(0.843)	0.56
High income	**1.610** **	**5.002**	**(0.805)**	**0.05**
Conservative	-0.906	0.404	(0.919)	0.32
Liberal	0.809	2.245	(0.586)	0.17
Enviro	**0.769* **	**2.157**	**(0.421)**	**0.07**
Male	-0.599	0.550	(0.421)	0.15
See from home	**1.268* **	**3.554**	**(0.672)**	**0.05**
See on routine	-0.219	0.803	(0.385)	0.57
Attached to Great Lakes	-1.478	0.228	(1.079)	0.17
Caucasian	-0.908	0.403	(0.789)	0.25
Constant	-1.790	0.167	(1.517)	0.24

Statistically significant *** p<0.01, ** p<0.05, * p<0.1

Log pseudolikelihood = -148.43; Wald x^2(19) = 72.93; Probability > x^2 = 0.0000; Pseudo R^2= 0.2693.

VII. Recommendations and Conclusion

Recommendations

- **Perceived impacts:** The survey's respondents stated that the top three *positive* impacts they would expect from offshore wind development would be on 1) job creation/local economy, 2) electricity rates, and 3) air quality. Conversely, the top three perceived *negative* impacts the respondents expect from an offshore wind project would be 1) aesthetics of the lake view, 2) bird life, and 3) recreational boating and fishing. These perception inclinations should be taken into account when distributing information to educate the public on the potential impacts from an offshore wind farm near Evanston. For example, if developers incorporated plans to site an offshore wind farm to ease impact on recreational boating areas, educational materials should reflect this consideration to address pre-conceived concerns.

- **Educational avenues and informational sources:** The survey's respondents stated that they have learned about offshore wind though the top three following sources: local newspaper, friends, and the internet. Additionally, respondents stated they have received the largest extent

of information regarding offshore wind development through public hearings and meetings, professional organizations and online (for those that heard about offshore wind initially through these media). Educational materials regarding offshore wind farm development should be distributed through these selected channels to both achieve cost effectiveness and target a wide audience.

- **Variables that increase likelihood of support for proposed offshore wind farm scenarios:** Initial analysis suggests that environmental members are more likely to support the survey's presented offshore wind farm scenario (holding other variables constant) among other variables. Additionally, an offshore wind farm distance at six miles and ten miles from the shore line increase the likelihood of support by 3 and 10 times when compared to an offshore distance of three miles, respectively, holding all other variables constant. Educational media should be targeted through environmental organizations to reach members in the community that already have an inclination to support offshore wind farm development. Also, generating comparative simulations of an offshore wind farm at various distances compared to closer distances and the shoreline's baseline view could help the public visualize the visual impacts that could result from this type of development.

Conclusion

Consistent with other academic research, initial analysis results suggest that the likelihood of a respondent supporting a proposed offshore wind farm scenario is dependent on not only the distance of the wind project from the shoreline but also other various demographic variables such as environmental membership and annual household income. For example, respondents that were self-reported environmental organization members were more likely to vote 'yes' for the CVM offshore wind farm scenario than non-environmental organization members. Households with an annual household income between $160,000—$200,000 were also more likely to vote 'yes' for the scenario than the most affluent respondents with an annual household income greater than $200,000, holding all other variables constant.

While this study found tentative initial support for the idea of offshore wind development near Evanston, approximately half (53%) of respondents classified themselves as 'undecided' on the issue. This uncertainty is likely related to a substantial lack of information and sheer unfamiliarity regarding potential community-wide impacts that could result from this type of development. When asked which direction they were leaning, approximately half (45%) of the undecided respondents indicated that they were leaning towards supporting the idea. Given the considerable amount of uncertainty not only surrounding offshore development in general but also potential subsequent impacts, there remains a significant opportunity to involve and educate local community stakeholders prior to the start of the development process.

Appendix A.1. WindPro Visualization, Three Miles Offshore (Northwestern University Beach)

Appendix A.2. WindPro Visualization, Six Miles Offshore (Northwestern University Beach)

Appendix A.3. WindPro Visualization, Ten Miles Offshore (Northwestern University Beach)

Appendix B.0. Survey Questionnaire

[Exported from Qualtrics: March 7, 2013]

FINAL CVM Mail-Out Survey (Evanston, IL)

Age Are you at least 18 years of age?

- ❍ Yes (1)
- ❍ No (2)

If No Is Selected, Then Skip To End of Survey

Local Do you live in Evanston or an adjacent community either seasonally or full-time?

- ❍ Yes (1)
- ❍ No (2)

If No Is Selected, Then Skip To End of Survey

Intro Introduction: Thank you for your interest in this survey! Your thoughts, opinions, and perceptions are valuable to us and will contribute to a broader, regional body of research regarding possible energy futures for some of Lake Michigan's coastal communities. Upon full survey completion, you will be offered the option to record your email to be entered into a $100 drawing as a thank-you for your participation. In addition, you will also be offered the voluntary option to record your email if you wish to receive follow-up questions regarding this study. As we stated in our introductory letter, your participation is voluntary and you may opt out at any time. If you agree to participate, please click the >> button below to start the survey.

Background: There have been informal discussions about offshore wind farm development in this area to generate electricity from wind. To an extent, the impact on local communities from installing an offshore wind farm here is uncertain. Your answers will contribute to a broader research study that will estimate possible economic and social impacts, if any, in this area. Your opinions are important to us!

Part A: Information Sources

A1 Have you heard anything about offshore wind development in Evanston?

- ❍ Yes (1)
- ❍ No (2)

Answer If Have you heard anything about an offshore wind farm being... Yes Is Selected

A2 Where have you heard about offshore wind farms? Please select all that apply.

- ❑ Local newspaper (1)
- ❑ Regional newspaper (2)
- ❑ TV (3)
- ❑ Radio (4)
- ❑ Online (5)
- ❑ Billboards (6)
- ❑ Public hearings/meetings (8)
- ❑ Fairs/expos (9)
- ❑ Professional organization(s) (10)
- ❑ Religious organization(s) (11)
- ❑ Coworkers (12)
- ❑ Friends (13)
- ❑ Family (14)
- ❑ Other (please specify) (7) _____

Answer If Have you heard anything about offshore wind development i... Yes Is Selected

A3 Please indicate the extent of the information you obtained from each source.

	A little information (1)	Some information (2)	A lot of information (3)
Local newspaper (1)	❍	❍	❍
Regional newspaper (2)	❍	❍	❍
TV (3)	❍	❍	❍
Radio (4)	❍	❍	❍
Online (5)	❍	❍	❍
Billboards (6)	❍	❍	❍
Public hearings/meetings (7)	❍	❍	❍
Fairs/expos (8)	❍	❍	❍
Professional organization(s) (13)	❍	❍	❍
Religious organization(s) (14)	❍	❍	❍
Friends (10)	❍	❍	❍
Family (11)	❍	❍	❍
Other (please specify) (9)	❍	❍	❍

Part B: Offshore Wind Opinions in Evanston

B1 Have you formed an opinion about offshore wind farm development in Evanston?

- ❍ I support the idea (1)
- ❍ I oppose the idea (2)
- ❍ I have not yet made up my mind (3)

Answer If Have you formed an opinion about developing an offshore w... I have not yet made up my mind Is Selected

B2 Even though you have not yet made up your mind, which way are you leaning?

- ❍ To support the idea (1)
- ❍ To oppose the idea (2)
- ❍ Need more information (3)

B3 Given what you know currently, do you think that offshore wind farm development in Evanston would have a positive impact (improve), no impact, or a negative impact (worsen) on the following:

	Improve (1)	No Impact (2)	Worsen (3)	Not Sure (4)
Electricity rates (1)	❍	❍	❍	❍
Job creation/local economy (2)	❍	❍	❍	❍
Air quality (3)	❍	❍	❍	❍
Property values (5)	❍	❍	❍	❍
Aesthetics of the lake view (6)	❍	❍	❍	❍
Aquatic life (7)	❍	❍	❍	❍
Bird life (8)	❍	❍	❍	❍
Recreational boating and fishing (9)	❍	❍	❍	❍
Community harmony (10)	❍	❍	❍	❍
Other (please specify) (11)	❍	❍	❍	❍

B4 Imagine that a wind farm were developed off the coast of Evanston in the next few years. Generally speaking, if this project were to be successful and led to more projects in Lake Michigan and/or in the Great Lakes in the future, what kind of impacts do you think all of these projects taken together would have on the following?

	Improve (1)	No Impact (2)	Worsen (3)	Not Sure (4)
U.S. independence from foreign energy sources (1)	❍	❍	❍	❍
Effects of global climate change (2)	❍	❍	❍	❍

B5 In deciding whether you support or oppose offshore wind development in Evanston, please write in the three aspects you consider to be the most important, ranked in order of importance #1, #2, and #3, with aspect #1 having the highest importance. Examples could include, but aren't limited to the following: energy independence, ecological impact, pollution reduction, noise, aesthetic value, etc.

Aspect #1 (1)
Aspect #2 (2)
Aspect #3 (3)

B6 Given your current knowledge, how would your opinion change if you knew that offshore wind development in Evanston would...

	Much less favorable (1)	Less favorable (2)	Unchanged (3)	More favorable (4)	Much more favorable (5)
Generate electricity for Evanston? (1)	❍	❍	❍	❍	❍
Improve local air quality? (2)	❍	❍	❍	❍	❍
Have no serious harm to bird life? (3)	❍	❍	❍	❍	❍
Have no serious harm to aquatic life? (4)	❍	❍	❍	❍	❍
Decrease electricity rates? (5)	❍	❍	❍	❍	❍
Help job creation/local economy? (6)	❍	❍	❍	❍	❍
Increase coastal property values? (7)	❍	❍	❍	❍	❍

B7

	Much less favorable (1)	Less favorable (2)	Unchanged (3)	More favorable (4)	Much more favorable (5)
Not generate electricity for Evanston? (1)	❍	❍	❍	❍	❍
Hurt job creation/local economy? (2)	❍	❍	❍	❍	❍
Not improve local air quality? (3)	❍	❍	❍	❍	❍
Seriously harm bird life? (4)	❍	❍	❍	❍	❍
Seriously harm aquatic life? (5)	❍	❍	❍	❍	❍
Increase electricity rates? (6)	❍	❍	❍	❍	❍
Decrease coastal property values? (7)	❍	❍	❍	❍	❍

E2 On average, how much does your household spend on electricity each month?

$/month in the Summer (1)
$/month in the Winter (2)

C Part C: A Hypothetical Scenario

Please first note the current coastal view at Evanston's University Beach:

Possible Distances Now, please consider three visual simulations of a hypothetical, offshore wind farm at three distances in Evanston's coastal waters. Please note: No decisions have been made yet about placing wind farms anywhere in Evanston or Lake Michigan!

Images for: Three miles from shoreline, Six miles from shoreline, Ten miles from shoreline

Q85 Please consider this purely hypothetical scenario: Suppose Evanston and the surrounding areas are facing a vote to approve or deny a permit to build an offshore wind farm off of Evanston's University Beach. It is time to make your "vote" with the information and opinions you currently hold. This hypothetical wind farm would contain approximately 80 wind turbines and contain a total capacity of approximately 400 megawatts (MW) of power. In other words, a project of this size could power

between 96,000 to 120,000 households per year. The closer the wind farm is to the coast, the following trends are likely to occur: lower construction costs because of shorter transmission lines, more tax revenue gains to local area, and reduced impact on electricity rates. The opposite effect for each category would occur as the wind farm is sited further away from the coast.

Q107 This scenario, along with the following price points, is purely hypothetical and was generated by researchers to elicit opinions. Given the hypothetical nature of this research, people sometimes unintentionally overestimate or underestimate their responses. Though this is a hypothetical scenario, please respond as if you were actually faced with this vote while keeping in mind your monthly budget.
Image: Three miles from shoreline

C1a Given this distance from University Beach in Evanston, would you support this wind farm if you knew you would have to....

	Yes (1)	No (2)	Not Sure (3)
pay $60 less per month on your electricity bill? (1)	❍	❍	❍
pay $48 less per month on your electricity bill? (2)	❍	❍	❍
pay $36 less per month on your electricity bill? (3)	❍	❍	❍
pay $24 less per month on your electricity bill? (4)	❍	❍	❍
pay $12 less per month on your electricity bill? (5)	❍	❍	❍
pay $12 more per month on your electricity bill? (6)	❍	❍	❍
pay $24 more per month on your electricity bill? (7)	❍	❍	❍
pay $36 more per month on your electricity bill? (8)	❍	❍	❍
pay $48 more per month on your electricity bill? (9)	❍	❍	❍
pay $60 more per month on your electricity bill? (10)	❍	❍	❍

C1b How sure are you of your previous answer given the impact on price? Please select a number from 1 to 10, with 1 indicating “very unsure” and 10 indicating “very sure”.

- ❍ Very Unsure (1) (1)
- ❍ 2 (2)
- ❍ 3 (3)
- ❍ 4 (4)
- ❍ 5 (5)
- ❍ 6 (6)
- ❍ 7 (7)
- ❍ 8 (8)
- ❍ 9 (9)
- ❍ Very sure (10) (10)

Image: Six miles from shoreline

Q114 Given this distance from University Beach in Evanston, would you support this wind farm if you knew you would have to....

	Yes (1)	No (2)	Not Sure (3)
pay $60 less per month on your electricity bill? (1)	❍	❍	❍
pay $48 less per month on your electricity bill? (2)	❍	❍	❍
pay $36 less per month on your electricity bill? (3)	❍	❍	❍
pay $24 less per month on your electricity bill? (4)	❍	❍	❍
pay $12 less per month on your electricity bill? (5)	❍	❍	❍
pay $12 more per month on your electricity bill? (6)	❍	❍	❍
pay $24 more per month on your electricity bill? (7)	❍	❍	❍
pay $36 more per month on your electricity bill? (8)	❍	❍	❍
pay $48 more per month on your electricity bill? (9)	❍	❍	❍
pay $60 more per month on your electricity bill? (10)	❍	❍	❍

C2b How sure are you of your previous answer given the impact on price? Please select a number from 1 to 10, with 1 indicating “very unsure” and 10 indicating “very sure”.

- ❍ Very Unsure (1) (1)
- ❍ 2 (2)
- ❍ 3 (3)
- ❍ 4 (4)
- ❍ 5 (5)
- ❍ 6 (6)
- ❍ 7 (7)
- ❍ 8 (8)
- ❍ 9 (9)
- ❍ Very sure (10) (10)

Image: Ten miles from shoreline

Q113 Given this distance from University Beach in Evanston, would you support this wind farm if you knew you would have to....

	Yes (1)	No (2)	Not Sure (3)
pay $60 less per month on your electricity bill? (1)	❍	❍	❍
pay $48 less per month on your electricity bill? (2)	❍	❍	❍
pay $36 less per month on your electricity bill? (3)	❍	❍	❍
pay $24 less per month on your electricity bill? (4)	❍	❍	❍
pay $12 less per month on your electricity bill? (5)	❍	❍	❍
pay $12 more per month on your electricity bill? (6)	❍	❍	❍
pay $24 more per month on your electricity bill? (7)	❍	❍	❍
pay $36 more per month on your electricity bill? (8)	❍	❍	❍
pay $48 more per month on your electricity bill? (9)	❍	❍	❍
pay $60 more per month on your electricity bill? (10)	❍	❍	❍

C3b How sure are you of your previous answer given the impact on price? Please select a number from 1 to 10, with 1 indicating “very unsure” and 10 indicating “very sure”.

- ❍ Very Unsure (1) (1)
- ❍ 2 (2)
- ❍ 3 (3)
- ❍ 4 (4)
- ❍ 5 (5)
- ❍ 6 (6)
- ❍ 7 (7)
- ❍ 8 (8)
- ❍ 9 (9)
- ❍ Very sure (10) (10)

Part D: About You – Demographics: Now please answer some questions to help us interpret the data.

D1 How old are you?

- ❍ Age (1) _____
- ❍ Prefer not to say (2)

D3 What is your gender?

- ❍ Male (1)
- ❍ Female (2)
- ❍ Prefer not to say (3)

D4 What is your relationship status?

- ❍ Single (1)
- ❍ Married (2)
- ❍ Divorced (3)
- ❍ Prefer not to say (4)

D5 What is your race?

- ❍ Caucasian (1)
- ❍ African American (2)
- ❍ Hispanic (3)
- ❍ Asian (4)
- ❍ American Indian (5)
- ❍ Pacific Islander (6)
- ❍ Other (7) _____
- ❍ Prefer not to say (8)

D6 Please select your household income after taxes last year:

- ❍ $0-$19,999 (1)
- ❍ $20,000 - 39,999 (2)
- ❍ $40,000 - 59,999 (3)
- ❍ $60,000 - 79,999 (4)
- ❍ $80,000 - 99,999 (5)
- ❍ $100,000 - 119,999 (6)
- ❍ $120,000 - 139,999 (7)
- ❍ $140,000 - 159,999 (8)
- ❍ $160,000 - 179,999 (9)
- ❍ $180,000 - $200,000 (10)
- ❍ > $200,000 (11)
- ❍ Prefer not to say (12)

D7 What is your highest level of education completed?

- ❍ Some High School (7)
- ❍ High school (1)
- ❍ Some college (2)
- ❍ Associate's degree (2 year) (3)
- ❍ Bachelor's degree (4 year) (4)
- ❍ Graduate degree (5)
- ❍ Prefer not to say (6)

D8 Generally speaking, where would you place yourself in the political spectrum?

- ❍ Liberal (3)
- ❍ Moderately liberal (4)
- ❍ Independent (5)
- ❍ Moderately conservative (6)
- ❍ Conservative (7)

D10 Are you employed?

- ❍ Yes (1)
- ❍ No (2)
- ❍ Retired (4)
- ❍ Prefer not to say (3)

Answer If Are you employed? Yes Is Selected Or Are you employed? Retired Is Selected

D11 Which industry best describes your field of work? Please check one:

- ❍ Automotive/transportation (1)
- ❍ Construction/building (6)
- ❍ Consulting (18)
- ❍ Education (8)
- ❍ Energy (4)
- ❍ Financial (16)
- ❍ Food services (3)
- ❍ Health care (10)
- ❍ Insurance (17)
- ❍ Non-profit (14)
- ❍ Public service (7)
- ❍ Real estate (9)
- ❍ Retail/service (11)
- ❍ Student (12)
- ❍ Tourism (2)
- ❍ Other (15) _____

Answer If Are you employed? Yes Is Selected

D12 Do you work in Evanston?

- ❍ Yes (1)
- ❍ No (2)

Answer If Do you work in Evanston? No Is Selected And Are you employed? Yes Is Selected

D13 Where do you work?

- ❍ City: (1) _____

D14 Do you own a residence in Evanston?

- ❍ Yes (1)
- ❍ No, but I rent in Evanston (2)
- ❍ No, I live in an adjacent community (3)

Answer If Do you own a residence in Evanston? No, I don't live there Is Selected

D15 Where is your primary residence?

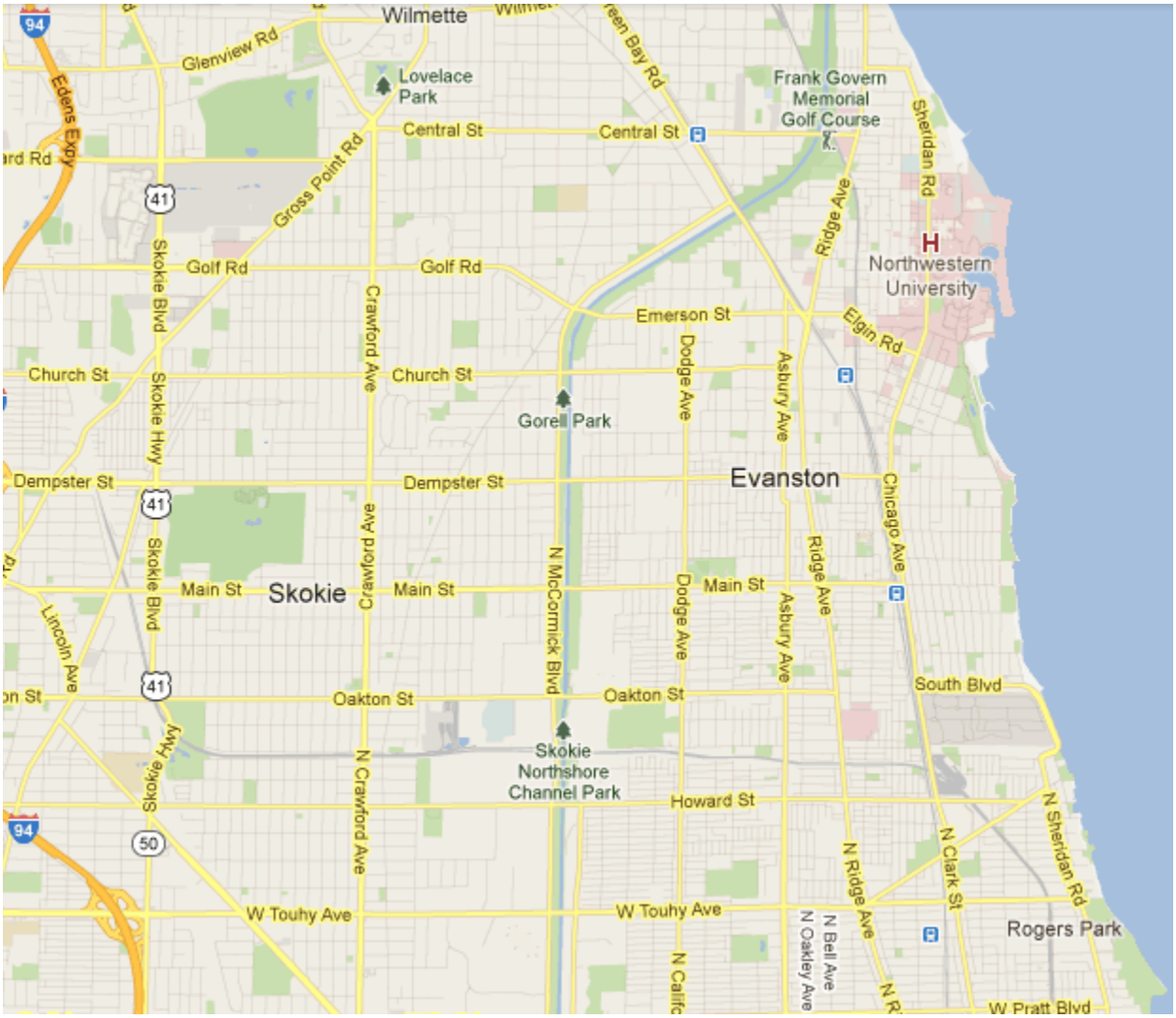
- ❍ Rogers Park (2)
- ❍ Wilmette (4)

Q109 How long have you lived there?

- ❍ < 1 year (1)
- ❍ 1-5 years (2)
- ❍ 5-10 years (3)
- ❍ 10-20 years (4)
- ❍ More than 20 years (5)

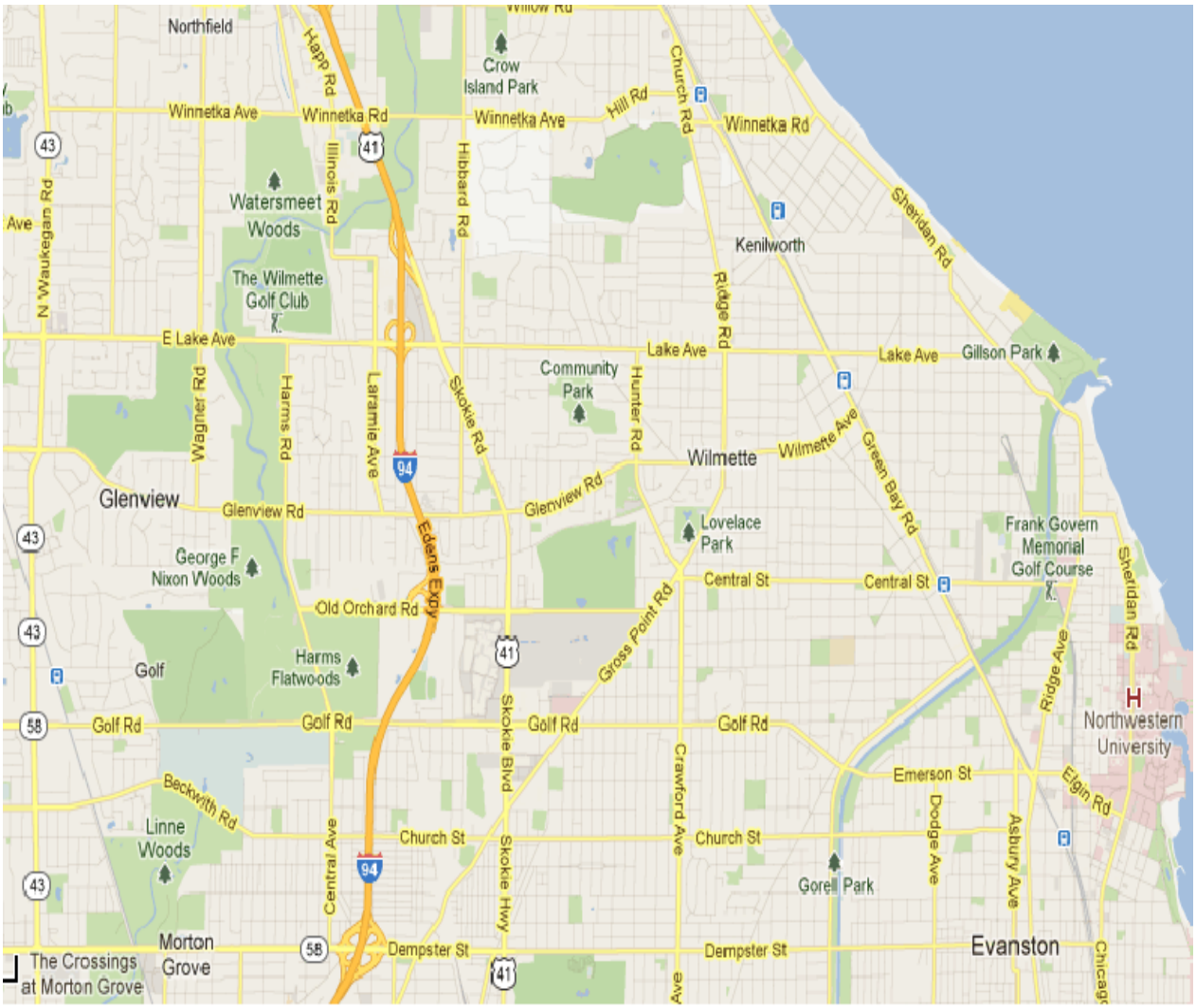
Answer If Do you own a residence in Evanston? Yes Is Selected

D16 Please click the mouse on the general area of your primary residence in Evanston. This information will be kept completely confidential.



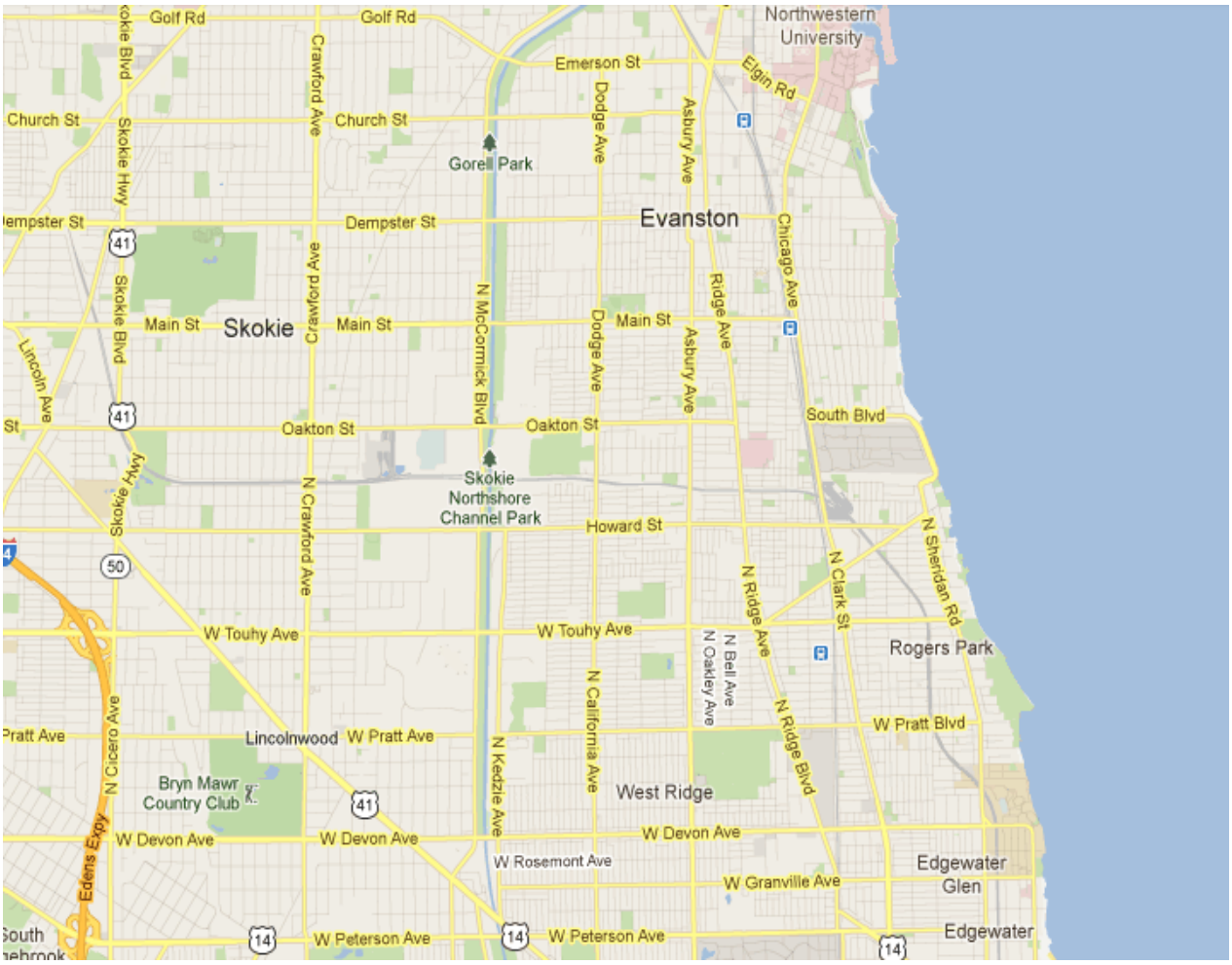
Answer If Where is your primary residence? Wilmette Is Selected

D18 Please click the mouse on the general area of your primary residence in Wilmette. This information will be kept completely confidential.



Answer If Where is your primary residence? Rogers Park Is Selected

D19 Please click the mouse on the general area of your primary residence in Rogers Park. This information will be kept completely confidential.



D20 Are you a member of an environmental organization?

- ❍ Yes (4)
- ❍ No (3)

D22 Do you think you would be able to see an Evanston offshore wind farm from your primary residence?

- ❍ Yes (1)
- ❍ No (2)
- ❍ Do not know (3)

D24 Do you think you would be able to see an Evanston offshore wind farm during your day-to-day routine?

- ❍ Yes (1)
- ❍ No (2)
- ❍ Do not know (3)

Part E: Final Section We would like to understand your general opinions regarding electricity.

E1 Have you ever seen an operational wind turbine (or wind farm) in person before?

- ❍ Yes (1)
- ❍ No (2)

E3 How do you think your household's average electricity usage compares with the average household usage in Evanston? I think my electricity usage is...

- ❍ Lower (1)
- ❍ About the same (3)
- ❍ Higher (4)

E4 Where do you buy your electricity? (ARES stands for an Alternative Retail Electric Supplier, i.e. any entity that supplies your electricity that is not a utility).

- ❍ ComEd (1)
- ❍ Community Choice Aggregation (CCA) (2)
- ❍ ARES - standard mix of conventional/renewable energy sources (3)
- ❍ ARES - 100% renewable energy generation (4)
- ❍ Other (5) _____
- ❍ Not sure (6)

E5 What is your overall stance on each of the following sources of electricity generation?

	Strongly Oppose (1)	Oppose (2)	Neutral (3)	Support (4)	Strongly Support (5)	Not sure (6)
Coal (Traditional) (7)	❍	❍	❍	❍	❍	❍
Coal (Carbon Capture and Sequestration) (8)	❍	❍	❍	❍	❍	❍
Natural Gas (Conventional) (2)	❍	❍	❍	❍	❍	❍
Natural Gas (Hydraulic Fracturing a.k.a. Fracking) (3)	❍	❍	❍	❍	❍	❍
Nuclear (1)	❍	❍	❍	❍	❍	❍
Solar (6)	❍	❍	❍	❍	❍	❍
Wind (Land-based) (4)	❍	❍	❍	❍	❍	❍
Wind (Offshore) (5)	❍	❍	❍	❍	❍	❍

E6 In your opinion, which of the following would you classify as a "clean electricity" generation source? Please select all that apply.

- ❑ Coal (traditional) (7)
- ❑ Coal (Carbon Capture and Sequestration) (8)
- ❑ Natural Gas (Conventional) (2)
- ❑ Natural Gas (Hydraulic Fracturing a.k.a. Fracking) (3)
- ❑ Nuclear (1)
- ❑ Solar (6)
- ❑ Wind (Land-based) (4)
- ❑ Wind (Offshore) (5)

E8 If an offshore wind farm were built in Evanston, would you take a boat tour of the facility?

- ❍ Yes (1)
- ❍ No (2)
- ❍ Maybe (3)

E7 I feel a personal attachment to the Great Lakes.

- ❍ Strongly Agree (1)
- ❍ Agree (2)
- ❍ Neither Agree nor Disagree (3)
- ❍ Disagree (4)
- ❍ Strongly Disagree (5)

Is there anything you would like to express that you feel has not been covered by this survey? Also, we will be conducting follow-up interviews with interested stakeholders to further explore the subject, if you would like to participate please record your email address below.

Email Optional: Please record your email address if you would like to be entered into a $100 gift card drawing as a thank-you for your time. Like your survey answers, your email address will remain confidential.

Appendix B.1. Priming Letter

September 21, 2012

Dear Joe Smith:

My name is Lauren Knapp, and I am part of a graduate research team from the University of Michigan. On behalf of my colleagues, I would like to invite you to participate in a brief, voluntary online survey. Your thoughts, opinions, and perceptions are valuable to us and will contribute to a broader, regional body of research regarding possible energy futures for Lake Michigan's coastal communities. You can access the survey at the following link and password:

Survey link:	**http://tinyurl.com/UM-study**
Password:	**energystudy2012**

Your responses will be kept completely confidential. Each survey is assigned a unique identifier, and only that will be recorded. This identifier will only be used to examine different demographic factors in relation to your responses. Moreover, the survey is voluntary; at any time you have the option to discontinue it. Finally, you will not result in loss of benefits or penalty if you choose not to complete the survey. Once the survey is completed**, you will be offered the option to record your email address to be entered into a $100 drawing**. We request that you complete the survey by **Monday, October 1, 2012.** The survey contains visualizations, so please take it on a **standard computer screen** if possible.

If you have any questions regarding this study, please do not hesitate to contact me at:

The University of Michigan, School of Natural Resources and Environment,
440 Church St., Ann Arbor, MI 48109-1041, (847) 440-4250, umenergystudy@gmail.com

The University of Michigan Institutional Review Board Health Sciences and Behavioral, Sciences has determined that this study is exempt from IRB oversight.

Thank you in advance for your time and willingness to offer valuable feedback to this research study!

Warm Regards,

Lauren A. Knapp, B.S.
Master's Graduate Student
School of Natural Resources and Environment
University of Michigan

Appendix B.2. Follow-up Postcard (1 of 3)

Hello!

You were recently sent an invitation to take a voluntary, online questionnaire regarding possible energy futures for your coastal Lake Michigan community. If you have already completed the questionnaire, **thank you**!

If you have not had a chance yet to complete the online questionnaire, there is still time. Please respond by 10/19/2012. Your opinions are extremely valuable to us and will contribute to a regional research study.

Survey link: http://tinyurl.com/UM-study
Password: energystudy2012

Sincerely,

Lauren Knapp
Master's Graduate Student
umenergystudy@gmail.com

NATURAL RESOURCES AND ENVIRONMENT
UNIVERSITY OF MICHIGAN

University of Michigan
School of Natural Resources and Environment
440 Church St.,
Ann Arbor, MI 48109-1041

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PERMIT No. 45

**********AUTO**5-DIGIT 60091
Dennie Freeman
1630 Sheridan Rd Unit 2H
Wilmette, IL 60091-1836

Appendix B.3. Follow-up Phone Call Script

Researcher: Good morning/afternoon/evening. My name is Matt Rife/Lauren Knapp/Beren Li/Russell Ma, I am a master's student at the University of Michigan. Is (participant's name) available to speak?

>>If no,

1. **Subject:** I'm sorry they aren't in now.
2. **Researcher:** Is there a better time when we could reach him/her?
3. **Subject:** No, call back later.../no...
4. **Researcher:** Wonderful, thank you very much for your time. Good bye.
5.

>>If yes, **Subject:** Yes, this is she/he.

Researcher: Terrific. I am calling on behalf of my research team to follow-up on a letter we sent you last week regarding as study we're conducting. We would like to remind him/her/you that we would greatly appreciate his/her/your voluntary participation in our study regarding possible energy futures for Lake Michigan communities. Do you still have the letter? Can I mail you a follow-up letter?

You have been randomly selected to participate in a survey. The purpose of the survey is to gain a better understanding of public perceptions relating to energy futures in the Great Lakes region. We just wanted to remind you that your opinion is very valuable to us, and we would really appreciate it if you could take 10 minutes to complete it online. As a thank-you for your participation, you will be offered an option to record your email at the end of the survey to be entered into a drawing for $100.

If you have any difficulties accessing the survey, would like another introduction letter, would prefer to not receive further contact, or have any further questions, please feel free to contact me at (231) 742 8384 [or by email at umenergystudy@gmail.com].

Voicemail Follow-up Call Script

Hello [JOE SMITH], my name is Lauren Knapp/Matthew Rife/Yufeng Ma/Beren Li, and I am a graduate student at the University of Michigan. I'm following up on a letter I recently mailed you requesting your participation in a voluntary survey regarding possible energy futures for your community.

I wanted to remind you that your opinion is very valuable, and I would really appreciate it if you could take 10 minutes of your spare time to complete the online survey. And as a thank-you for your participation, you will be offered an option to record your email for a $100 drawing. You can access the survey at **Tinyurl.com/um-study (password: energystudy2012).**

If you have any questions, please feel free to contact me at (231) 742 8384 or by email at umenergystudy@gmail.com.

Thank you very much for your time! Have a great day! Bye bye.

Appendix B.4. Follow-up Postcard (2 of 3)

Hello!

You were mailed an invitation in November to take a voluntary, online survey regarding possible energy futures for your coastal Lake Michigan community. If you have already completed the questionnaire, **thank you**!

If you have not had a chance to complete the questionnaire, there is still time given. **The extended, final deadline is February 11, 2013 if you wish to be entered into the $100 drawing.** This postcard is your last mailing contact regarding this study.

Thank you in advance for your time and attention to this survey!

Sincerely,

Lauren Knapp
Master's Graduate Student
umenergystudy@gmail.com

NATURAL RESOURCES AND ENVIRONMENT
UNIVERSITY OF MICHIGAN

University of Michigan
School of Natural Resources and Environment
440 Church St.,
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*******AUTO**5-DIGIT 60091
Mr Allen Abrams
2216 Schiller Ave
Wilmette, IL 60091-2328

Appendix B.5. Follow-up Postcard (3 of 3)

Hello!

Our academic study regarding possible energy futures for your community is nearly complete. However, in response to numerous requests, we would like to provide the survey link and password one last time for your convenience.

Survey link: www.tinyurl.com/um-study
Password: energystudy2012

In order to accommodate all potential participants, we will also extend the suggested deadline. **If you have not done so already, please complete the survey by February 25, 2013 to be eligible for the $100 drawing.**

Anyone interested in the final results of the study may send a request to umenergystudy@gmail.com.

Thank you for your dedicated time and attention to this study!

Sincerely,

Lauren Knapp
Master's Graduate Student

NATURAL RESOURCES AND ENVIRONMENT
UNIVERSITY OF MICHIGAN

University of Michigan
School of Natural Resources and Environment
440 Church St.,
Ann Arbor, MI 48109-1041

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**********AUTO**5-DIGIT 60091
Mr Allen Abrams 1 1
2216 Schiller Ave
Wilmette, IL 60091-2328

Appendix C.1. U.S. Census Bureau and Sample's Descriptive Statistics

Demographics	2010 U.S. Census for Evanston	Sample Population
Age		
65 or older	12.2%	21.58%
Gender Male	47.6%	46.9%
Race		
White	65.6%	86%
Black	18.1%	2%
Asian	8.6%	1%
Hispanic	9.0%	2%
Other	0.2%	2%
Prefer not to say	-	7%
Median Household Income	$68,107	$40,000 - 59,999[9]
Education		
Bachelor's Degree or higher	65.6%	93.55%

[9] 28% of respondents chose the "Prefer not to say" option for this question.

Appendix C.2. Binary Logistic Regressions: Variable Descriptions

Model 1: Description of variables in binary logistic regression for likelihood of CVM scenario support

Variable name	Units	Coefficient description
Bid price	(+/-)$	Theoretical price impact on monthly electricity rates
Distance (3 miles)	*Miles*	*Categorical variable for offshore wind farm distance from shoreline (omitted, reference category)*
Distance (6 miles)	Miles	Categorical variable for offshore wind farm distance from shoreline
Distance (10 miles)	Miles	Categorical variable for offshore wind farm distance from shoreline
Age	Years	Continuous variable for respondent's age
Highschool_associate	0-1	Dummy variable assigned a "1" if high school graduate, some college, or associate's degree; "0" if otherwise
Bachelors	0-1	Dummy variable assigned a "1" if college graduate; "0" if otherwise
Graduate	*0-1*	*Dummy variable assigned a "1" if graduate or professional degree (omitted, reference category)*
Lowest_inc	0-1	Dummy variable assigned a "1" if annual household income is $0-39,999
low_inc	0-1	Dummy variable assigned a "1" if annual household income is $40,000-$79,999
mid_inc	0-1	Dummy variable assigned a "1" if annual household income is $80,000-$119,999
highmid_inc	0-1	Dummy variable assigned a "1" if annual household income is $120,000-$159,999
high_inc	0-1	Dummy variable assigned a "1" if annual household income is $160,000-$200,000
Highest_inc	*0-1*	*Dummy variable assigned a "1" if annual household income > $200,000 (omitted, reference category)*
Conservative	0-1	Dummy variable assigned a "1" respondent is slightly conservative or conservative; "0" otherwise
Liberal	0-1	Dummy variable assigned a "1" if respondent is slightly liberal or liberal; "0" otherwise
Independent	*0-1*	*Dummy variable assigned a "1" if respondent is independent; "0" otherwise (omitted category)*
Enviro. org. member	0-1	Dummy variable assigned a "1" if member of environmental organization
Male	0-1	Dummy variable assigned a "1" if male; "0" if female
See from home	0-1	Dummy variable assigned a "1" if respondent thinks he/she could see Evanston offshore wind farm from home; "0" if not
See from routine	0-1	Dummy variable assigned a "1" if respondent thinks he/she could see Evanston offshore wind farm on daily routine; "0" if not
Attached to Great Lakes	0-1	Dummy variable assigned a "1" if respondent stated he/she is strongly attached or attached to the Great Lakes ; "0" if he/she is not attached
Caucasian	0-1	Dummy variable assigned a "1" if Caucasian; "0" otherwise

*Unless otherwise stated, "prefer not to respond," "not sure," and missing answers were coded as '.'.

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