PO.ID 218

Price Premiums to Finance Offshore Wind Power

Lauren Knapp, Ph.D. student

Jeremy Firestone, Meryl Gardner, and George Parsons

University of Delaware, College of Earth, Ocean, and Environment (CEOE) | Center for Carbon-free Power Integration (CCPI)

Project funded by: Sea Grant Delaware

Abstracts

Offshore wind power is poised to play a significant role in the future of global climate change mitigation and transformative energy policy in the coming decades. Yet, economic barriers related to social and ratepayer impacts continue to slow or impede its implementation altogether across Europe and in the United States. The US Department of the Interior has designated a 321 square km area approximately 18 km off the coast of the Delmarva Peninsula in the Atlantic Ocean, USA, termed the Maryland Wind Energy Area (WEA), recently leased to Italian developer Renexia for offshore wind development.

Various critical project characteristics that can determine ultimate project viability were tested in combination including siting locations, total power capacities (200, 500, 750 and 1000 MW), and electricity rate impacts ($0-100 USD/household/month). During the survey, respondents were presented with a choice experiment that prompted them to vote for various offshore wind project options given proposed electricity rate increases, projects sizes and simulated views of the projects at various locations within the WEA.

Additionally, this poster overviews the analytical approach for estimating individual factors related to offshore wind development's ratepayer effects including related perceptions regarding the 1) project's potential effects (pro and con), generally, and 2) the price premiums, specifically. Some emphasis is placed on coastal residents because they are more likely to be affected by the construction and operation of an offshore wind project given changes to the landscape and the potential for conflict between the new use—offshore wind power development—and existing recreational activities and livelihoods derived from ocean-based activities.

Objectives

1. Understand how specific project characteristics (layout, location, power capacity) affect the level of price premium the public finds acceptable.
2. Define substantive ratepayer perceptions that influence price premium preferences for offshore wind development.
3. Communicate various social cost and economic implications for policy, planning, and decision-making efforts regarding offshore wind development.

Figure 1. Maryland Wind Energy Area (MWEA) – approx. 11 miles from Ocean City, Maryland (Map: Lauren Knapp).

In August 2014, the U.S. Department of the Interior held an offshore lease auction for the development of a 124 mi^2 (312 km^2) area adjacent to Maryland and Delaware. The project's northern edge extends up past Delaware's state border while the project's southern boundary extends adjacent to Assateague Island National Seashore along the Maryland Atlantic coastline. U.S. Wind Inc., the American subsidiary of Italian developer Renexia, placed the winning bids for both lease blocks (the entire area). **[1]**

Methodology and Survey Design

A. Methods

Data is being collected via internet and mail surveys among stratified (by sub-state areas), randomly sampled Delaware and Maryland residents. Employing a multi-mode approach will allow us to reach a more diverse and representative set of age and socioeconomic population as well as glean methodological influences from different survey methods. The survey is being launched in fall 2014.

B. Survey Design: Four key sections

I. Your Opinions on Wind Power

The purpose of the first section is to gauge general opinions about developing an offshore wind project in the Maryland Wind Energy Area (MWEA) as well as perceived effects on various environmental, social, economic and other aspects.

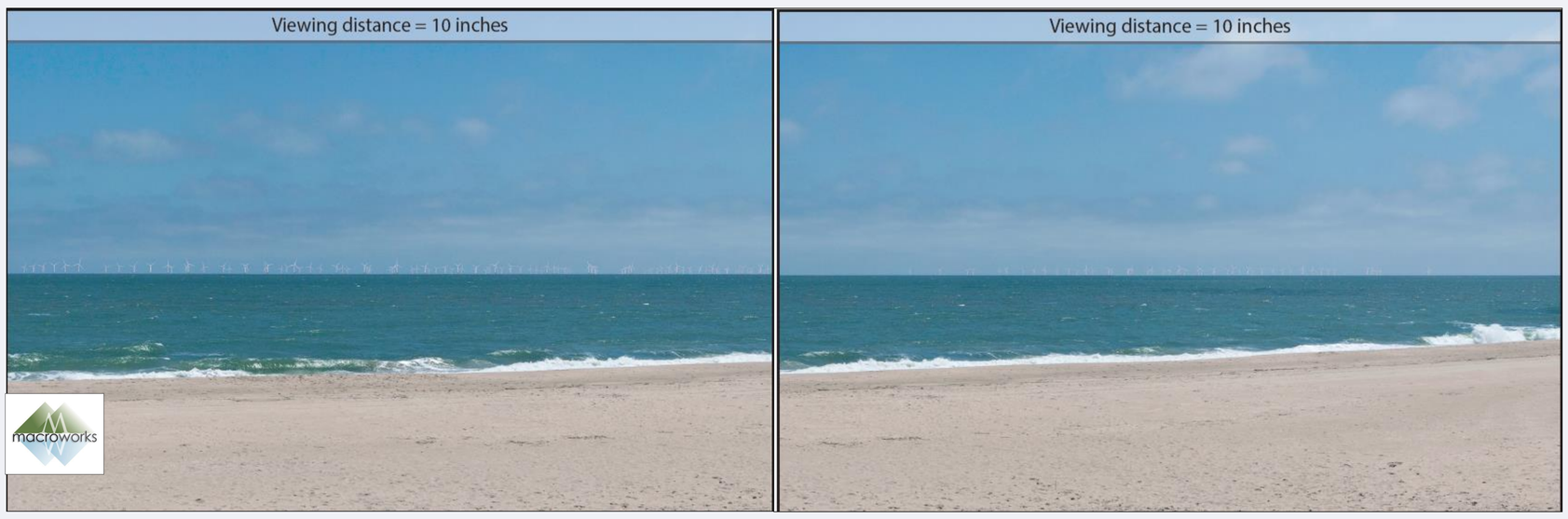
II. New Energy Development

The second section presents respondents with the **choice experiment** exercise for building a new energy project. Respondents will be faced with several choice sets in which they have to vote for the energy development option scenario that they most prefer for their region. Each choice set includes two offshore wind projects that have varying characteristics (location, size price) that would be located within the Maryland WEA, each located approximately 11 miles from shore at its closest point, and an alternative that assumes a natural gas project will be built in the state instead of an offshore wind project. On each occasion, respondents are asked to choose their preferred alternative. Simulated project views from the respondents' respective state are provided and helps inform the choice. This section:

a) **Estimates the amount of the price premium that Maryland and Delaware residents would be willing to pay for the offshore wind power electricity** from a mid-Atlantic offshore wind power project, and

b) **Examines the attributes (or characteristics) about the offshore wind project that influence this price appetite**. Price attributes were chosen based on a pilot test and do not necessarily reflect actual price premiums required.

During the choice experiment, respondents are prompted to view what the wind project will look like offshore from either Ocean City, Maryland (for Maryland respondents) or Fenwick Island, Delaware (for Delaware respondents).



Figures 3, 4. Draft photo simulations for choice experiment. 1000 MW project (left) across the entire MWEA and 300 MW project (right) located just in the South. Both viewing locations are from Fenwick Island, Delaware.

Figures 3 and 4, above, show examples of draft photo simulations for two of the project options, with a Fenwick Island viewing location. All simulated offshore projects depict 6 MW Alstom offshore wind turbines with 150 m rotor diameters. [2]

III. General Questions

This section focuses on general and specific aspects about respondents to get a better understanding of their preferences, habits and characteristics. Questions are centered around environmental attitudes and behavior, world views (i.e. climate change beliefs) as well as beach and ocean going activities.

IV. Household Questions

Standard socio-economic and demographic questions are presented in the final section including but not limited to questions about: age, income, education and employment. This section also includes a detailed question on respondents' second homes in coastal/beach areas in communities adjacent to the Maryland WEA.

> ➢ *Keeping in mind your **monthly budget**, please respond as if you were actually faced with this vote and as if the options presented in each choice are the only available options.*

Choice 1: Please consider this set of options for Your State's energy future.

*Refer to the **Wind Energy Area Map** and to the insert for the **simulated views of the wind projects**.* Each simulation indicates the viewing location of a given wind power project option.

11a. If the vote were held today, which option would you vote for?

	Wind Power		Natural Gas
	Option A	**Option B**	**Option C**
Location	South	South	N/A
Size of energy project	33 wind turbines (~200 MW)	125 wind turbines (750 MW)	Expansion of electricity generation from natural gas.
Increase to your electricity bill	$1.50/month	$5/month	$0/month
I would vote for… *(Check one)*	☐	☐	☐

Figure 2. Sample choice experiment referenda question.

Offshore wind project attributes/characteristics/attributes (Figure 2)

Project location	Power capacity/Size (MW)	Energy surcharge ($USD/ month)
• North • South • Entire energy area (North + South)	• 200 • 300 • 500 • 750 • 1000	• $1.50 • $5 • $25 • $75 • $100

Conclusions

We have estimated public preferences to pay price premiums for offshore wind power development specifically among affected ratepayers and present coinciding welfare impacts. These findings have the potential to substantively affect related coastal energy development and decision-making if incorporated into project cost-benefit analyses.

References

1. Press release: Interior Auctions 80,000 Acres Offshore Maryland for Wind Energy Development, Advances President's Climate Action Plan. http://www.doi.gov/news/pressreleases/interior-auctions-80000-acres-offshore-maryland-for-wind-energy-development-advances-presidents-climate-action-plan.cfm

2. Alstom Haliade 150-6MW. http://www.alstom.com/Global/Power/Resources/Documents/Brochures/offshore-wind-turbine-6mw-robust-simple-efficient.pdf

Contacts: Lauren Knapp, knlauren@udel.edu | Jeremy Firestone, jf@udel.edu

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EWEA Offshore 2015 – Copenhagen – 10-12 March 2015