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Residents' perceptions of wind turbines: An analysis of two townships in Michigan

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HIGHLIGHTS

- Residents' perceptions of local wind energy development.
- The identification of negative attributes associated with local wind energy development.
- The role of the Social Exchange Theory in the process of forming perceptions.

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ABSTRACT

Wind energy development has become a 'hot topic' across Michigan as this state seeks to achieve 10% of energy delivered to consumers from renewable sources (Huron County Planning Commission, 2005). The focus of this effort to generate renewable energy has centered around wind energy. Wind turbines have been constructed at numerous locations across the state. The lower peninsulas' eastern counties near Lake Huron and Saginaw Bay were designated by the Wind Energy Resource Zone board as one such area of strong sustained wind in the state. Turbines have been constructed in 'pockets' across this 'thumb' region, yet half a decade after the first turbines were constructed, negative perceptions are still attributed to wind turbines. This paper examines residents of wind farm locations as a whole and independently as groups (those in opposition and in support of development) to identify what, if any similarities and differences, exist between the residents' perceptions. Qualitative analysis on stated negative perceptions unveiled common issues with residents: increased price of electricity with wind energy, noise from the turbine rotation and uncertainty surrounding the long term effects of wind turbines. These areas of concern seem to persist years after construction was completed.

1. Introduction

The United States government is advocating for more renewable energy to replace the country's reliance on foreign oil. In an effort to reduce the amount of ozone degrading pollutants expelled into the air, the newly created American Recovery and Reinvestment Act of 2009 set a standard to double the renewable energy production in the United States by 2012. The state of Michigan enforces Public Act 295, better known as The Clean, Renewable and Efficient Energy Act, requiring Michigan electric providers to derive at least 10% of retail supply from renewable energy sources by 2015 (Huron County Planning Commission, 2005). As a result, a part of the energy providers strategies is securing leases from private landowners to erect wind turbines in order to meet their renewable energy goals. The average annual growth in the wind industry over the past five years in the United States is a "robust 33%" (Global Wind Energy Council, 2012). Wind energy developers are increasingly focused on rural areas for future and continued development as land is less expensive compared to more developed regions. Rural communities in Michigan have been struggling economically, and have the opportunity to reposition themselves with this new development that uses minimal land areas and utilizes air-based resources. The erection of a wind turbine on agricultural land allows a farmer to continue farming around the turbine base while the income from housing a turbine exceeds the amount of revenue lost from decreased crop production (Renewable Energy Development, 2007).

To facilitate wind developments, The Clean, Renewable and Efficient Energy Act (PA 295) of 2008 created a Wind Energy Resource Zone board to identify regions in the state with the highest wind potential. Referencing wind energy maps (see Fig. 1), the board identified the 'Thumb' region of Michigan as one of four areas in the state having the highest potential and it was declared

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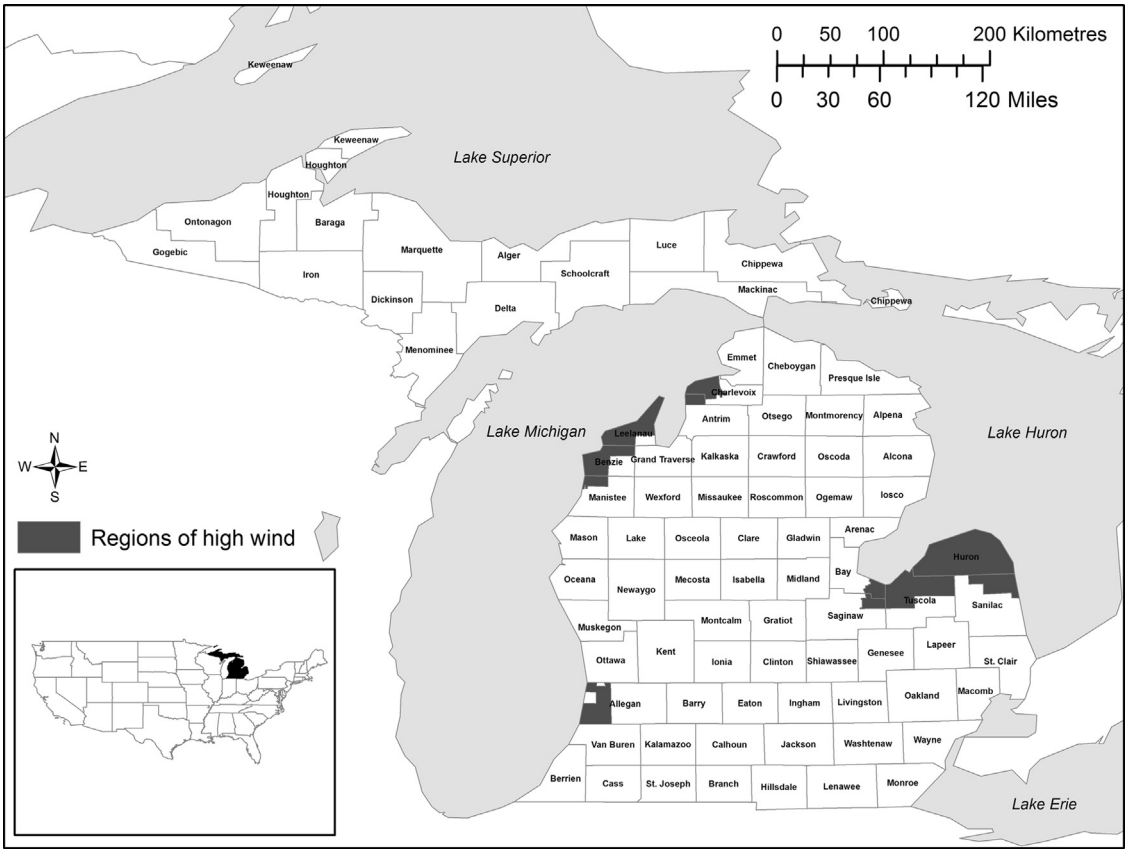

Fig. 1. Regions shaded have the highest wind energy production potential. (Adapted from Michigan State University Land Policy Institute, 2009).

the state's primary wind resource zone (Birkholz et al., 2008). Wind energy developers initially contacted only landowners with large tracts of land to secure leases to build turbines upon. Those who agreed to participate signed a non-disclosure agreement prohibiting landowners from discussing their deal, received a signing bonus and were promised additional income if a turbine was built upon their property in the future. Some residents, with smaller parcels of land, were shocked to learn that wind farms were being introduced into their area as they had no idea anything was being planned; two wind farms were consequently constructed in the 'thumb' of Michigan (see Fig. 2). This build out approach proves to be problematic if all parties affected are not involved and underlying perceptions or costs and rewards regarding wind energy development are not acknowledged.

1.1. Theoretical basis

Social-exchange theory can aid in explaining the relationship between people and the environment. This theory includes a "collection of explanations, propositions and hypotheses, embodying certain assumptions about social behavior" (Chadwick-Jones, 1976). While this theory can be helpful, some may view the inadequacies for understanding the full dynamics of the human dimension as problematic (Emerson, 1987; Johansson and Laike, 2007). Social-exchange theory can explain how residents perceive their personal benefits and how that reflects in a higher level in support of sustainable development; community members feel that they will be getting value from their involvement. The benefits can be of social, economic or ecologic value. In the case of renewable energy projects, NIMBY (Not-In-My-Backyard) has often been used to describe the resistance in local opposition in the face of general approval. The term NIMBY has been challenged as being too simplistic (Jones and Eiser, 2010; Kaldellis, 2005; Swofford and Slattery, 2010; Warren et al., 2005; Wolsink, 2012). Wolsink (2012) believes that NIMBY is 'outdated' and he has turned to examining broader social support (at all levels of decision making) rather than solely public support (focusing on just a subset of the population), which has received much attention over the past 15 years in the literature (Eltham et al., 2008; Johansson and Laike, 2007; Kaldellis, 2005; Krohn and Damborg, 1999; Mulvaney et al., 2013; Waldo, 2012).

The social-exchange theory, conversely, can explain how residents perceive their personal benefits and how that reflects in an increase in support of wind energy. The social-exchange theory is immersed with social psychology and social perspectives that explain social change and stability as a process of negotiated exchanges between parties (Chadwick-Jones, 1976). For example, all human relationships are formed by the use of the subjective cost-benefit analysis and the comparison of alternatives. This theory can help to explain why some people are open to wind energy development and some are not. To some, the economic benefits outweigh any environmental and social costs, however, additional studies (Johansson and Laike, 2007) have listed other factors that may influence behavior.

The most important factor deemed by Johansson and Laike (2007) for reducing public intention to oppose wind turbine development seems to be the esthetic appeal and fit with the surrounding environment. Wolsink (2007a) and Johansson and Laike (2007) found that "the perceived unity of the environment became the only individual significant predictor" in identifying the intention to oppose local wind turbines; unity being defined by Johansson and Laike as how well the various components fit and function together (p. 445). While the results of their study confirmed previous results from other scholars, "rather few of the investigated perceptual and attitudinal factors seem to be critical" (Johansson and Laike, 2007). The authors of this study

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