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A case-control study of support/opposition to wind turbines: Perceptions of health risk, economic benefits, and community conflict



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HIGHLIGHTS

- We compare turbine support in a community living with turbines against a matched control.
- We include health risk perception, economic benefits, and community conflict as predictors.
- Turbine support is highest in the turbine community and surprisingly low in the control.
- Health risk perception and economic benefits consistently predict turbine support.
- Economic benefits distribution and conflict are important, but not consistent predictors.

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ABSTRACT

Despite considerable quantitative case study research on communities living with turbines, few have studied the roles played by the perceptions of: health risk, economic benefits/fairness, and intra-community conflict. We report the findings from a case-control survey which compares residents living with/without turbines in their community to understand the relative importance of these variables as predictors of turbine support. Ontario is the context for this study as it is a place where the pace of turbine installations is both very high and extremely politicized. As expected 69% of residents in the case community would vote in favour of local turbines yet surprisingly, only 25% would do so in the control community. Though the literature suggests that aesthetic preferences best predict turbine support the key predictors in this study are: health risk perception, community benefits, general community enhancement, and a preference for turbine-generated electricity. Concern about intra-community conflict is high in both the case (83%) and control (85%) communities as is concern about the fairness of local economic benefits (56% and 62%, respectively); yet neither is significant in the models. We discuss the implications of these findings particularly in terms of the consequences of a technocratic decide-announce-defend model of renewable facility siting.

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1. Introduction

Several jurisdictions are setting ambitious renewable energy targets with places like the European Union, many U.S. states, and several Canadian provinces calling for 20+% of electricity generating capacity from renewable sources by 2020 (European Union, 2012; Renewable Energy Policy Network for 21st Century, 2012). Ontario's current wind energy capacity (2000 MW) is the largest in Canada, and the province's plans to move from 2% of actual electricity generation in 2010 to 10% by 2030 (Ontario Ministry of Energy, 2010) could translate into almost a tripling from the current 900 to 2600¹ turbines (Government of Ontario, 2010). Yet

as elsewhere, growing opposition has accompanied this rapid growth (Breukers and Wolsink, 2007). For example, Walker (1995, 55) suggests that though opinion polls may show 70% or greater support for wind turbines in the U.K. there are, "...tails of dissatisfaction which may be of more significance than their size suggests...". Opposition and our understanding of it has evolved, so that just as researchers come to grips with one set of issues (e.g., NIMBY, noise, visual aesthetics) (Wolsink, 2000), other issues emerge. This suggests the need to further understand the contingencies of both support and opposition in particular places (Devine-Wright, 2011b) defined not just as individual communities, but also at the regional scale where key policies are defined.

Two important opposition frames for turbines in the Ontario context are health impacts and economic benefits, both within a meta-frame of unfair siting. For example, in a review of media coverage of wind turbine issues in Ontario, Songsore (2011) found that while economic stories are the most dominant, stories with

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¹ The number is based on current MW capacity under development divided by 2.5 MW per turbine.

health impacts of turbines as the dominant frame have grown the most since the provincial legislation that guides wind turbine facility siting (the Green Energy Act—GEA²) was put in place in 2009. One of the major differences between Ontario and many other jurisdictions is that the GEA has removed the power of local municipalities to say “no” to facilities. Appeals from opposition groups to municipal council can have little impact on siting decisions and cannot theoretically prevent a turbine project as long as certain criteria/milestones are met (e.g., public displays; minimum 550 m setbacks to homes). Thus, turbines are bound up with matters of local autonomy (Heagle et al., 2011; Hill and Knott, 2010), perhaps more so than in jurisdictions within the E.U. that have likewise been accused of being overly technocratic (decisions solely in the hands of powerful technical/government experts) rather than participatory (Haggett, 2011). In Ontario as elsewhere, large benefits, now in the order of \$8000 or more/year for the lifetime of each turbine, accrue to landowners who negotiate lease agreements (Canadian Wind Energy Association, 2008); while their neighbours of these same turbines may receive little more than the energy security benefits that the wider society receives. All of these issues have the potential to generate local conflict between residents. The literature review expands on these ideas to outline how the technocratic policy framework in Ontario may be interpreted as regressive in relation to planning recommendations in the renewable energy literature (Devine-Wright, 2011c). Our cross-sectional case-control study looks at the implications of such a policy approach by giving special attention to perceptions of: health risk, economic benefit/fairness and conflict as predictors of support/opposition.

2. Literature

This section starts by making a case for quantitative case-control analysis in Candida; followed by a review of the empirical evidence on turbine support/opposition; with the remainder of the section outlining several key predictors of support/opposition. It is tempting to assume that opposition to turbines manifests in every place for the same reasons, but Walker (1995, 49) warns that, “...generalizing between places and across time can be hazardous and misleading...”. Researchers like Braunholtz (2003), Krohn and Damborg (1999), and Warren and McFadyen (2010) provide evidence of place-based differences in support/opposition between countries with different policies and between locales within countries living with the same policy—suggesting it is prudent to continue to explore further case studies in different policy regimes. The empirical literature on wind turbines in the social sciences is dominated by European studies (Braunholtz, 2003; Devine-Wright, 2005a, 2005b; Ek, 2005; Eltham et al., 2008; Toke, 2005; vand der Horst, 2007; Wolsink, 2000, 2007a) with a growing number of case studies from the United States (Bolinger, 2005; Brannstrom et al., 2011; Pasqualetti, 2000 2002). Yet, there has been very little empirical *case study* research in the Canadian context (Heagle et al., 2011; Hill and Knott, 2010).

Some studies have suggested that support is actually quite high in communities living with turbines. Further, support is said to vary with the stage of a turbine project—being lowest during siting and construction and higher both before siting and after a turbine development has been operational for years (Walker, 1995). Wolsink (2007a) describes this phenomenon as a u-shaped support curve (see also: Devine-Wright, 2005a; Gipe, 1995). For example, Eltham et al., (2008) found that visual perceptions of a Cornwall U.K. wind farm had improved from

74% support (14% opposed) as recalled back to 1991 to 82% support (6% opposed) in 2006 once communities had lived with them for several years. Renewable U.K. (2010) found similar levels of support with up to 80% of those living near turbines being supportive while Krohn and Damborg (1999) report majority but lower levels of support in three Welsh communities: 74% (11% opposed), 74% (23% opposed), 55% (35% opposed). Braunholtz's (2003) findings in Scotland are perhaps more cautionary indicating that only 20% perceived that the local turbines have had a positive impact on the community. Ontario polls have found 89% (Ipsos Reid, 2010) and 87% (Green Energy Act Alliance, 2009) of residents support the production of wind energy in “their area of the province”. Yet, there are no Ontario data specifically parsed out for communities actually living with turbines.

A common thread in the literature on turbine support is a scalar mismatch in support for renewable energy technologies. There may be very broad support for the technology, but vehement opposition to proposed installation in some communities (Walker, 1995). In Ontario there seems to be evidence to the contrary whereby support for wind turbines in the province dropped from 89% to only 87% when respondents were asked if they would *hypothetically* support turbines in their own community (Green Energy Act Alliance, 2009). Yet, the province has a very active network of opposition to almost every new turbine development—a network that has grown considerably since that poll (Hill and Knott, 2010; Ontario Wind Resistance, 2012). In terms of predictors of support and opposition, the scalar mismatch in attitudes and opposition in general, often gets conceptualized uncharitably in public policy circles as the not-in-my-back-yard (NIMBY) phenomenon. NIMBY suggests that local opposition residents be conceptualized as opposing the local installation of turbines they otherwise support in principle and further; that this apparent perceptual mismatch suggests opposition residents are short sighted and selfish (Kaldellis, 2005; Krohn and Damborg, 1999). Thus, much research has been devoted to better understanding the locals' points of view. Those studies suggest that NIMBY is a poor explanation and indeed scalar mismatch of opinions about renewable technologies is relatively rare. Those who do not support wind turbines locally, tend not to support them in general. Further, reasons for lack of local support are conceptualized as rational since they may be tied more to siting and other processes that are perceived to be unjust (Wolsink, 2000, 2006).

Two explanations of support/opposition that are central themes in the European literature are noise and visual aesthetic annoyance. In fact, Wolsink (2000) suggests that visual aesthetic concerns are likely the most important predictor of local opposition to turbines (see also: Devine-Wright, 2005a; Eltham et al., 2008; Walker, 1995). As far as noise is concerned Pedersen et al. (2009) found that for some, turbine noise is more annoying than other industrial noises at the same level. Yet, they also found that the visibility of turbines from the home and whether or not residents benefitted economically were both significantly linked to noise annoyance; with similar findings in Sweden (Pedersen and Persson Waye, 2004; Pedersen and Larsman, 2008). The Ontario Ipsos Reid (2010) poll found the top two “main drawbacks of turbines” were that residents perceived them to be noisy (23%) and an eye sore (16%). However, such studies and polls tend not to define these issues as health impacts the way they seem to be framed by opposition groups (Hill and Knott, 2010).

Though turbine noise has more recently been linked to negative health issues (McMurtry, 2011; Nissenbaum et al., 2012; Pedersen and Persson Waye, 2004, 2007; Pierpont, 2009) existing studies of opposition to turbines make scant mention of the links between health risk *perception* and opposition (Devine-Wright, 2005a; Knopper and Ollson, 2011; Wolsink, 2006). Health impacts

² The official name is the *Green Energy and Green Economy Act*—Bill 150, 2009.

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