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Wind energy in the city: An interurban comparison of social acceptance of wind energy projects



Iman Khorsand^{a,*}, Christine Kormos^b, Erin G. MacDonald^c, Curran Crawford^a

^a Institute for Integrated Energy Systems, Department of Mechanical Engineering, University of Victoria, PO Box 1700 STN CSC, Victoria, BC V8W 2Y2, Canada

^b Department of Psychology, University of Victoria, PO Box 1700 STN CSC, Victoria, BC V8W 2Y2, Canada

^c Department of Public Administration, University of Victoria, PO Box 1700 STN CSC, Victoria, BC V8W 2Y2, Canada

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ABSTRACT

A transition towards low-carbon energy sources, such as wind, requires higher levels of public interaction; as such, the ultimate contribution of wind energy relies as much on technological advancements and policies as on societal sentiments. This study evaluates the influence of region, community involvement, and several IEA-recommended practices on social acceptance of wind energy projects among residents ($n = 350$) surveyed from cities in four OECD and three non-OECD countries. The results indicate interurban variations among the generally high levels of acceptance reported, especially among residents of cities in developing countries with lower domestic CO₂ emissions. The level of community involvement in a hypothetical wind energy project had a positive effect on acceptance, and respondents from cities in countries with the highest installed wind capacity reported the greatest sensitivity towards involvement. Moreover, the results revealed that although the IEA-recommended practices collectively predicted acceptance across all cities, fair distribution of earnings and costs was the only significant individual predictor. These economic considerations, combined with increased community involvement, appear to be paramount to facilitating future development of wind energy. Through its broad geographical coverage, this research provides valuable groundwork for future cross-cultural studies on social acceptance of wind energy.

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1. Introduction

1.1. Trends in wind power development

To address global energy challenges related to climate change and energy security, many countries worldwide have adopted policies and targets towards a sustainable energy mix. As part of the emerging global shift in energy systems, wind power has played – and will likely continue to play – an integral role. Indeed, according to Global Wind Energy Council (GWEC), the deployment of wind power has more than tripled since 2007, surpassing 318 gigawatts (GW) of cumulative installed capacity, and to date, the greatest shares of cumulative installed capacity are within China (91 GW), the United States (61 GW), and Germany (34 GW; [1]). As a result of rapid progress in wind power deployment, the International Energy Agency (IEA) technology roadmap for wind power targets a 15–18% share of global electricity production by 2050. The roadmap

targets 2300–2800 GW of installed wind power capacity which will prevent up to 4.8 gigatonnes (Gt) of future carbon dioxide (CO₂) emissions per year [2]. Yet, these environmental benefits cannot be realized without governmental and institutional commitment, as well as social acceptance and cooperation. Thus, social acceptance is a key determinant in shaping the role that wind energy will play in helping to solve the global energy challenges that lay ahead.

Throughout the literature, the assessment of various aspects of social acceptance of wind energy projects is mainly focused on the rural communities hosting the projects rather than the broader surrounding urban environments (e.g., [3–7]). However, studying social attitudes among urban dwellers, who do not typically bear the burden of wind turbines directly, allows for potential comparisons with findings from rural populations and thus can contribute to a more nuanced and complete understanding of the mechanisms necessary to facilitate further penetration of renewables. Furthermore, residents from some regions, such as the Middle East and North Africa, are also currently underrepresented in the literature. Given these existing gaps in the literature, this study evaluates the perceptions of members of the urban population

* Corresponding author. Tel.: +1 250 8533200; fax: +1 250 7216323.
E-mail address: Khorsand@uvic.ca (I. Khorsand).

about wind energy projects in seven cities across five continents, including cities in the Middle East and North Africa. Specifically, this study evaluates the influence of city, community involvement, and several IEA-recommended practices on social acceptance of wind energy projects among participants from cities within four countries that are part of the Organization for Economic Cooperation and Development (OECD; Australia, Canada, Germany, and the United States) and three non-OECD countries (China, Iran, and Morocco). Our research goals were both exploratory and confirmatory, as described below.

1.2. Fostering social acceptance

Social acceptance, as used in this manuscript, is defined as “societal consensus on the planning, construction, and operation of wind energy projects” ([8], p. 5). The three dimensions of social acceptance, identified by Wüstenhagen et al. [9], are as follows: *market acceptance* (mostly related to investors); *socio-political acceptance* (covering acceptance of technologies and policies by the public, stakeholders, and policymakers); and *community acceptance* (associated with procedural justice, distributional justice, and trust). These latter two dimensions of acceptance are both fundamental to understanding discrepancies between theoretical acceptance of renewable energy technologies and tangible support for specific projects [9,10]. This distinction illustrates the difference between acceptance (i.e., to refrain from active resistance) and support (i.e., to want, embrace, and actively encourage), with the latter being more difficult to foster at the community level [11,12]. Given the above, public support for proposed projects may be lower than self-reported acceptance [13].

According to public opinion polls and research findings, citizens are largely accepting of wind energy and report favourable attitudes towards future development (e.g., [14–20]). Underlying this generally high acceptance is the perception that wind provides a low-risk, ethical, and renewable source of power (e.g., [21,22,84]). In particular, wind energy is typically perceived as safer than other energy sources, most notably nuclear [14,23,24].

Problematically, these generally positive attitudes have led policymakers and wind energy developers to underestimate the extent to which social acceptance can serve as a practical barrier to the implementation of wind power deployments (see [9]). That is, although levels of support for wind farms are generally high at the national level, local support can be much lower when projects are actually proposed or initiated (e.g., [25]). In practice, project developments can encounter substantial resistance from citizens, occasionally generating conflicts that delay or impede development [9,20,26–30]. For instance, several initiatives in Ontario, Canada, as well as the Cape Wind Project in Massachusetts, United States, have been met with resistance [6,31,32]. Given the potential for resistance at the local level, there has recently been increased research attention focused on public attitudes towards such renewable energy projects (e.g., see [33] and [26,27] for overviews).

Multiple factors appear to contribute to resistance, such as concerns about health, noise, shadow flicker, aesthetics, and loss of place identity, as well as a potential loss in property value [8,6]. Most notably, close proximity to the proposed development can strongly influence local acceptance, occasionally leading to overt opposition [13,34,35]. This effect, termed “NIMBY” (i.e., not-in-my-backyard), has been employed to explain a potential source of resistance to proposed projects; that is, individuals are presumed to reject a development that is proximal to them, but not one which is proximal to someone else. Critics of this concept argue that the term is not only an over-simplification but, furthermore, that its use has done much to undermine advances in renewable energy (e.g., [36,37]). In some cases, however, local resistance has led to the formation of organized groups that have strongly opposed the

construction of wind power projects through lobbying and lawsuits [38–40]. Despite these varied obstacles, the literature as well as the successful realization of wind power development projects reveal promising avenues for fostering social acceptance.

Throughout the literature, several primary themes emerge as being influential in shaping social acceptance. The IEA Wind report [8], for example, has categorized recommended practices into the following five themes: policy and strategy; well-being and quality of life; costs and benefits (distributional design); consultation and involvement (procedural justice); and implementation strategy. Three elements stemming from the above themes appear most essential for inclusion in this present consideration of social acceptance of wind power at the community level, of which the first two pertain to the concept of justice. Increasingly, this notion of justice, or fairness, is a concept thought to be integral to discussions about public acceptance of wind energy projects (e.g., [4,41,42]).

First, the way in which decisions are perceived to be arrived at during the planning and implementation process is crucial in fostering social acceptance [4]. “Procedural justice” can be created and maintained via a procedural design that involves all relevant individuals in the decision-making process, provides opportunities for input, and ensures that all involved are treated with respect [8]. According to core principles outlined by the IEA [8], acceptance is likely to be maximized if citizens perceive the planning and construction process as inclusive, comprehensive, respectful, transparent, consistent and sensitive towards the local context. The process should also involve ongoing, balanced, evidence-driven discussion which empowers participants. As such, justice in procedural design is an important contributor to social acceptance [4,14,43,44].

Second, distributional justice, as embodied by benefits to the local economy, also plays an important role in social acceptance ([45,46,80]). Indeed, various strategies have been put forth to increase local support for wind energy projects, such as providing community benefits to those in the local area affected by the development (e.g., [47]). Aside from economic benefits to local communities via increased employment opportunities, community benefits refer more so to separate funds offered to affected communities [3]. Effective project management, local economic conditions and institutional factors are other elements that foster acceptance [34]. Resistance may be reduced by providing economic incentives to the host community, enabling community involvement in the planning stage of local development and upholding the value of both procedural and distributional justice [20,45]. Otherwise, in the absence of distributional justice, community members may perceive that they are being exploited by external corporate interests [8].

Research has begun to empirically evaluate the assumption that providing benefits to the community will result in higher levels of social acceptance of wind farms; for instance, some qualitative studies have examined the attitudes of community members in response to such benefits (e.g., [3,48]). In addition, a recent quantitative study in the UK, which employed an experimental message-framing approach, found that local support for a hypothetical, future offshore wind farm was greatest under the frame that emphasized benefits, or payments, likely to be experienced by the affected community as a result of the wind farm [19]. Interestingly, in another recent study among citizens in five rural municipalities in Switzerland, Walter [7] found that local residents' acceptance of specific wind projects was dependent on local benefits for those with a moderate or positive attitude towards wind energy but not for those with a negative attitude towards it. Understandably, however, such benefits are thought to have the largest influence on public opinion about wind energy projects when perceptions of community control are high (e.g., see [3,48]).

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