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Social acceptance of wind energy development and planning in rural communities of Australia: A consumer analysis

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ABSTRACT

Social acceptance is necessary for widespread adoption of new renewable energy technologies. A lack of social acceptance by local community residents is a barrier to increasing the renewable energy mix and targets in Australia. This study empirically evaluated predictor importance of key constructs of social acceptance, using responses from a sample of 226 survey respondents in Australia. Regression analysis suggest that 'Concerns with wind turbines' was the predictor most strongly correlated with Social Acceptance, followed by 'Annoyance with wind turbines', and then 'Consultation with stakeholders'. Implications of the study and recommendations for consideration by various interest groups (such as policy makers, and potential entrepreneurs) are discussed. This research contributes to theory building rather than theory testing of social acceptance of wind energy development.

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1. Introduction

Renewable energy from wind technology has potential for addressing GHG emissions because Australia has some of the world's best wind resources (Verve Energy, 2013). Estimates for year 2020 suggests that wind energy is likely to provide up to five times as much power than, say, biomass (Hatfield-Dodds et al., 2007). Although wind energy has potential to strengthen the renewable energy mix for Australia, social acceptance of wind power development has become a contentious issue, with heightened concerns from local community residents and environmental activists (Lantz and Flowers, 2010; Bond, 2008; Bosley and Bosley, 1988; Dimitropoulosa and Kontoleonba, 2009). The United Nations report on sustainability which provides guidelines for sustainability does not provide an archetype for specific actions (Willums, 1998). Thus, addressing (environmental) sustainability through renewable energy development has become the subject of enquiry for several stakeholders.

Social acceptance is important for more widespread adoption and planning of new technologies (Sauter and Watson, 2007). Consumer acceptability on the other hand, often acts as an impediment towards renewable energy (Devine-Wright, 2005); this in fact can cause substantial planning impediments. Some analysts view social acceptance as the most significant threat to achieving government renewable energy targets (Strachan and Lal, 2004). Complications with social acceptance of wind power development and planning are particularly important for rural regions where governments are often faced with challenges in targeting community economic development and growth initiatives, which also tend to be prime locations for wind farms (Yiridoe et al., 2009).

The controversy surrounding social issues with regard to wind energy has certainly assumed significance on an international scale initiating several countries to impose mandatory regulations. Much of this controversy appears to emerge from an arbitrary and adhoc manner by which wind farms are established. These issues appear to go well beyond the immediate horizon of planning and provide significant challenges for the viability of wind energy development. As critical as this situation has become, a cursory understanding of what drives social acceptance of wind energy development will shed further light on this important area. Thus, in this exploratory study, we develop a conceptual model of key predictors or constructs of social acceptance of wind power development, and empirically test the model to evaluate predictor importance of the social acceptance elements. The applied research question addressed in this study relates to: what characteristics of wind energy are important predictors of social acceptance for wind energy development? Addressing this question will contribute to a better understanding of important issues associated with improving consumer confidence and acceptance of wind power technologies and wind energy development.

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It informs future research to consider public as well as consumer reactions towards social acceptance of wind energy. In this process this research also attempts to contribute to planning new insights towards the strong political will of integrating renewable energy as an important component to future energy systems (Enzensberger et al., 2002). This is important for wind energy socio-policy makers and entrepreneurs contemplating establishing wind energy. The following section provides an overview and importance of wind energy development in rural regions of Australia.

2. Theoretical background

Planning for wind energy development requires support and acceptance from various stakeholders. The fundamental issue with wind energy planning is social acceptance. Williams and Mills (1986) examined social acceptance in the context of a broad continuum, including the degree or strength of acceptance, and consideration of various social groups. Similarly, Wüstenhagen et al. (2007) identifies three dimensions of social acceptance, including socio-political acceptance, community acceptance, and market acceptance. According to Wüstenhagen et al. (2007), socio-political acceptance refers to broad-based support from policy makers and other key stakeholders. Socio-political acceptance deals with policies and technologies at the societal level that require favourable response. Community acceptance, on the other hand, involves residents and local authorities, and about decisions on renewable energy projects by local stakeholders (Wüstenhagen et al., 2007). In the view of Wüstenhagen et al. (2007), factors that influence community acceptance include community consultation and engagement, as well as equity, justice and fairness in the distribution of benefits and costs associated with renewable energy development. The authors refer to market acceptance as adoption of wind energy technology by consumers, investors, and the power generation industry.

In contrast to the dimensions of social acceptance and associated perspective by Wüstenhagen et al. (2007), which captures various groups of stakeholders and provides useful insights, a viewpoint by Sauter and Watson (2007) involves two concepts with potentially different meanings and approaches. According to Williams and Mills (1986), 'acceptance' relates to passive consent and active agreement or approval. This meaning of 'acceptance' suggests a wide continuum, both in terms of how social groups can be considered, and the extent to which acceptance is articulated.

To be socially acceptable requires positive attitudes and feelings towards an object or issue under consideration. Attitudes may be defined as 'a relatively enduring organisation of beliefs, feelings, and behavioural tendencies towards socially significant objects, groups, events or symbols' (Hogg and Vaughan, 2005, p. 150). Analysts such as Sauter and Watson (2007) notes that (social) acceptance can be expressed in various forms, including attitudes; behaviour; investment decisions and choices. There are several factors that impact public attitudes towards wind power development (Ellis et al., 2007). Factors that shape consumer and public attitudes include institutional factors such as equal participation in the planning process, along with other factors such as economic provisions, social impacts and political environment (Birnie et al., 1999; Khan, 2003; Devine-Wright, 2005; Wolsink, 2007). Feelings can be expressed in terms of sensitivity towards an object or entity. There are reports about negative concerns and emotional feelings about wind farms in Australia (Bond, 2008). Acceptance of technologies for generating green electricity, (e.g., wind, biogas, and solar) are often measured in terms of public attitudes towards such technologies (Sauter and Watson, 2007). In this study, 'acceptance' of wind turbines and wind farms is investigated using reported attitudes and feelings as proxies for (i.e., constructs of) social acceptance, consistent with the scholarly literature.

Several analysts report that social acceptance tends to be affected by several constraints and challenges (Bosley and Bosley, 1988; Thayer, 1988; Wolsink, 1987). For example, community engagement and local ownership, as well as concerns with and annoyance caused by wind turbines all influence social acceptance. These are discussed in more detail in the following sections.

2.1. Concerns and annoyance with wind energy

Several studies report a strong consumer preference for electricity produced using wind (and other renewable energy) systems (Carlman, 1982; Bond, 2008; Bosley and Bosley, 1988; Dimitropoulosa and Kontoleonba, 2009). In addition, some studies suggest that wind farms have little or no negative impacts on residential property values (Sterzinger et al., 2003), others have reported negative impacts on property values (Hoen, 2010). On the other hand, in terms of willingness to pay for residential property, the research findings are mixed especially in cases where wind farms are located in close proximity to such dwellings (Lloyd, 2011). Wind farms may also be perceived as aesthetically and visually not appealing, and evoke negative emotions among community residents (Gipe, 1995). Furthermore, other studies have reported quality of life concerns by individuals (Hoen, 2010). Several studies report annoyance with noise from wind turbines (Pedersen and Persson, 2004, 2007), sleep disturbance (Rideout et al., 2010), and visual interruption (Pedersen and Larsman, 2008). Similarly other empirical studies have reported annoyance caused by wind turbines, sleep disruption and psychological distress (Bakker et al., 2012). In response to the growing concerns and reported human health issues linked to wind turbines, some regulatory authorities are re-evaluating existing regulations and guidelines on setback distance specifically to address noise concerns (Pedersen and Halmstad, 2003).

A survey commissioned by the Australian Wind Energy (AWE) involving 1027 consumers find that 95% of respondents support wind farms, and 91% agreed it was important to establish wind farms in rural Australia to generate electricity (AWE, 2003). Although the general public tends to support electricity from wind technology, Bond (2008) found that about 2% of Australian respondents opposed wind energy development after the wind project construction (Bond, 2008), this raises fundamental consumer or public awareness and understanding of wind farms. Poor attitudes towards wind farm development have been reported in other studies (Firestone and Kempton, 2007; Eltham et al., 2008; Portman, 2009). In a recent study for Australia the majority of respondents report that wind farms not in close proximity to residential dwellings did not pose serious concerns (Bond, 2008). The proportion of respondents that 'do not worry' about various wind turbine externalities included 89% for visual intrusion, 81% for noise intrusion, 86% for effect on property values, 85% for radio interference, and 90% for sun/light flicker. However, 32% of the study participants report that the potential harmful impact of wind turbines on wildlife worried respondents 'somewhat' or 'a lot' (Bond, 2008).

Other studies for Australia also report that wind farms have negative effects on landscapes with high scenic quality, and a positive effect on landscapes with low scenic quality (Lothian, 2008). In addition, there are several reported individual cases of negative experiences and/or problems regarding gag orders, split communities, health related issues and turbine shadows (Lloyd, 2011). There are controversies about wind technology in the literature, with about 40% in favour of development of wind energy, while the Not-in-my-backyard (NIMBY) syndrome are not common views among Australians (Dalton et al., 2008), there

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