



CSIRO Submission 10/399

The Social and Economic Impact of Rural Wind Farms

Senate Community Affairs References Committee

February 2011

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Summary

CSIRO research on the societal acceptance of Australian rural wind farms

CSIRO is conducting a preliminary study into the factors affecting the societal acceptance of wind farms in Australia. To date, this desktop study has involved a short media analysis of the recurrence of the terms 'wind farm' and 'community' in articles published in 19 popular national and state-based newspapers in the final six months of 2010. It found more reasons for rejecting a wind farm (32 reasons) were cited, compared to the reasons supporting a wind farm (19 reasons). Of the reasons for rejecting wind farms, landscape change and visual amenity were most often cited, followed by noise impacts from the turbines and poor consultation. Conversely, the most commonly cited reason for supporting rural wind farms was to reduce greenhouse gas emissions, job creation, and the benefits of community-owned wind farms. The CSIRO study also involves a review of the academic literature related to this topic. Later research will engage community members and wind farm developers in ten operational and proposed wind farms in NSW, SA and Victoria. This submission is drawn from the research report in preparation by CSIRO's Science into Society Group, which will be published later this year. The key findings to date from this study are summarised below, and are outlined in more detail in the following pages.

Health impacts

The National Health and Medical Research Council found no evidence that infrasound, electromagnetic interference, and turbine flicker/glint from wind turbines were harmful to health. Renewable energy generation is associated with few adverse health effects compared with health impacts from fossil-fuel combustion.

Noise impacts

The National Health and Medical Research Council found the noise contribution from a ten-turbine wind farm measured at a distance of 350m placed it between the noise level of a quiet bedroom and a car travelling at 64 km/h.

Property values

The NSW Valuer General found the majority of property sales did not show any reduction in value after wind farm installation.

Employment opportunities

Job creation in wind farm construction is significant, and wind farms also offer tourism potential.

Planning laws

Planning processes that are transparent and participatory from an early stage of planning result in greater acceptance of a wind farm. State-level approvals for wind farms over 30MW may help prevent local councils being influenced by local pressures and ensure greater consideration of renewable energy generation.

Other relevant matters

- *Innovative community compensation* - Alternative models of compensation could share royalties between landholders whose properties host the turbines on a sliding scale with the immediate neighbours who experience visual intrusion.

- *Community ownership* of part or all of a wind farm offers a positive form of financial gain for the local community and greater influence to the community in development and management.

Introduction

The Australian Government's Renewable Energy Target (RET) seeks to provide 20 percent of Australia's electricity generation from renewable energy sources by 2020. The RET is established under the Renewable Energy (Electricity) Act 2000, which has three objectives:

- Encourage the additional generation of electricity from renewable sources;
- Reduce emissions of greenhouse gases in the electricity sector; and
- Ensure that renewable energy sources are ecologically sustainable.

Over the past two decades, wind power has shifted from a 'fringe' energy source in the electricity market to become a core feature of the European and US electricity mix, with a similar trend occurring in Australia (Hepburn Wind, 2011). During this period, wind energy technology has increased in its power rating, efficiency and reliability, while generation costs have fallen (NSW DECCW, 2010). In terms of reducing greenhouse gases, a study by energy market specialists found that every additional unit of wind power entered into the electricity grid replaces a unit of power 'almost exclusively' from a gas or coal-fired power station (MMA, 2009). Given these features, it is anticipated that rural wind farms will contribute 40 percent of renewable energy generated for the RET (Lloyd, 2010).

Currently, 52 wind farms operate across Australia, with a combined capacity of 1879 megawatts (MW). In comparison, the United States, as the highest wind energy producer globally, has 35,159 MW capacity (CEC, 2011). Australian wind farms generate around 5,000 gigawatt hours (GWh) of electricity annually. Although an additional 7,000GWh of wind energy capacity has been proposed, this is still insufficient to meet the RET goal of 18,000 GWh per year in 2020. The slow uptake and installation of wind farms has at least been partly attributed to the low cost and volatility of the Renewable Energy Certificate price (CEC, 2009) and the high level of societal resistance to rural wind farms observed in a range of countries (Breukers & Wolsink, 2007). The societal perception and acceptance of wind farms include physical, contextual, political, socio-economic, social, local and personal aspects that shape public perception (Devine-Wright, 2005, p.125).

Societal resistance to, and acceptance of, Australian wind farms was highlighted in a short media analysis by CSIRO of articles published in 19 popular national and state-based newspapers in the final six months of 2010. This analysis found more reasons for rejecting a wind farm (32 reasons) were cited compared to the reasons supporting a wind farm (19 reasons). Of the reasons for rejecting wind farms, landscape change and visual amenity were most often cited, followed by noise impacts from the turbines, and poor consultation. Conversely, the most commonly cited reason for supporting rural wind farms was to reduce greenhouse gas emissions, job creation, and the benefits of community-owned wind farms.

Despite the prevalence of articles in the popular media regarding societal acceptance of rural wind farms, there is minimal academic examination of this situation (Devine-Wright, 2005, p.125). This CSIRO submission is drawn from a report in preparation by the CSIRO's Science into Society Group that seeks to address this gap by methodically examining the societal acceptance of rural wind farms in Victoria, NSW and South

Australia. CSIRO is mapping Australia's existing and potential wind energy sources, overlaid with additional criteria, such as social and economic aspects that affect community acceptance of rural wind farms. The resulting maps will help identify the socially and environmentally feasible wind farm sites for both present and future options as regional populations increase. The CSIRO report will be published later in 2011. In this submission, initial findings from the CSIRO literature review with relevance to the Senate committee's inquiry are presented.

The remainder of this submission specifically addresses the terms of reference of the inquiry.

Terms of Reference

a) Health effects for people living in close proximity to wind farms

In the CSIRO media analysis, health issues ranked as the fourth highest reason for opposing a wind farm. The health impacts perceived to be associated with wind farm turbines included irritation from low frequency sounds and reflective 'flicker' from the turbines, sleep disturbance from noise, and also stress from opposing farm pre-installation.

A small, non peer-reviewed study from New Zealand coined the term 'wind turbine syndrome' to describe the perceived health impacts of wind turbines located within 1.5km of the homes of ten families. The symptoms included visual blurring, tinnitus, and loss of balance (in Bond, 2009).

However, a review by the National Health and Medical Research Council (NHMRC, 2010) found no evidence that infrasound, electromagnetic interference, and turbine flicker/glint were harmful to health, citing the World Health Organisation, an expert panel review in North America and a study of three wind farms in Britain. It noted that health problems may be a result of stress, and suggested that potential impacts could be minimised by adhering to planning guidelines. The review also noted that renewable energy generation is associated with fewer adverse health effects compared with the documented health impacts from fossil-fuel sources of electricity (NHMRC, 2010, p.8).

b) Concerns over the excessive noise and vibrations emitted by wind farms, which are in close proximity to people's homes

The noise level of wind turbines is created from a combination of the sounds from the blades rotating, the gears inside the transmission, and the drone from the generator. The CSIRO media analysis found that perceived and actual noise impacts were the second most frequently cited reason for opposing a wind farm (after visual impacts).

However, a comparison by the NHMRC (2010b) found the noise contribution from a ten-turbine wind farm measured at a distance of 350m (35-45 dbA) placed it between the noise level of a quiet bedroom (35 dbA) and a car travelling at 64 km/h (55 dbA). And as noted above, there is currently no evidence positively linking noise impacts with adverse health effects (NHMRC, 2010b).

Despite this, changes in noise inputs in a residential landscape are important even if it they are not linked with identifiable health impacts. The perceived tranquillity of the local landscape for the local population is often highly valued. The introduction of a new sound, from which the surrounding residents receive no direct benefit, heavily impacts on their acceptance and support of the technology (Gipe, 1991, p.763).

c) The impact of rural wind farms on property values, employment opportunities and farm income

Property values

In the CSIRO media analysis, perceived losses to property value were only cited twice in the 49 articles. This perception was not supported by an assessment of the impact of wind farms on surrounding land values in Australia prepared for the NSW Valuer General (NSW Dept Lands, 2009). This assessment analysed property sales transaction data for 45 properties near six wind farms in Australia. Of these, forty sales did not show any reductions in value. Of the five properties that received lower than expected sale prices, further work was recommended to confirm the extent to which these were due to the wind farm. Additionally, no reductions in sale price were evident for properties located in townships with views of the wind farm (NSW Dept Lands, 2009, p.2). An earlier assessment of 78 property sales around the Crookwell wind farm in NSW over the period 1990-2006 found no reductions in property values (Henderson & Horning, 2006). The NSW study also presented findings from similar assessments in Denmark, United Kingdom and the United States. The most comprehensive of these assessments found no statistical evidence of reductions in value associated with the development of a wind farm (NSW Dept Lands, 2009, p.3).

Employment opportunities

Job creation in wind farm construction and, to a lesser extent, in operation of the wind farm, was the second-highest aspect cited in support of wind farm development in the CSIRO media analysis. Financial benefits through indirect opportunities were also cited, including tourism potential. Indeed, the Victorian Civil and Administrative Tribunal ruled in the approval of the Cape Bridgewater wind farm that it would add a 'positive element to the landscape interest, and could become a significant tourist attraction in the South Gippsland area' (Jones, p.267).

d) The interface between Commonwealth, state and local planning laws as they pertain to wind farms

In the CSIRO media analysis, the theme of planning processes, including poor consultation and jurisdictional conflict over planning control, was the second most frequently cited theme for opposing a wind farm. Conversely, the fourth most-cited reason in favour of a wind farm was good planning processes, including adequate consultation and a comprehensive wildlife conservation plan. Eltham et al. (2008, p.32) outlined that many community objections are actually underpinned by 'institutional factors, such as a disbelief in the planning system, distrust of the developer or the persuasive opinion of a local opposition group'. The role of planning policy and legislation, as well as the agencies managing these processes, is significant in influencing this societal acceptance.

To manage potential underlying distrust and to reduce the negative influence of local and other opposition groups, Eltham et al. (2008, p.32) recommend planning processes that are transparent and that seek to engage the widest spectrum of community members in consultation. They encourage early engagement during the planning phase with local communities 'so that concerns and objections can be addressed through effective dialogue between stakeholders', and site visits to operating wind farms and their respective communities by 'trusted' community leaders. This is supported by Wolsink (2007, p.1205), who criticises processes where the location is decided prior to consultation through 'top-down' planning that triggers 'public hostility' reactions. Wolsink's research found that 'consultation after a plan has been announced is more of

a trigger for opposition than an incentive for the proper design of acceptable projects'. Instead, he recommends a collaborative approach that considers and accommodates community input (Wolsink, 2007, p.1204).

To prevent local councils being swayed in their decision by local influences, Victoria has shifted planning approval responsibilities from local council to the State Minister for Planning for projects over 30MW. Additionally, these larger development applications require the Minister to give serious consideration to both renewable energy generation as well as community impacts (Prest, 2007, p.234).

e) Other relevant matters

Societal acceptance of rural wind farms can be enhanced through improved models of compensation and through increased community ownership and management.

Innovative community compensation

A commonly documented reason for community division over wind farms is between individuals who financially benefit from the turbines and those who do not; at its most basic, a 'jealous neighbour' situation is created. Alternative models of compensation could involve agreements to formally share royalties between landholders whose properties host the turbines on a sliding scale with the immediate neighbours who experience visual intrusion (as assessed by the wind farm design). In addition, often the 'community fund' established by the wind farm developer is directed into the local council's consolidated revenue. An alternative approach to address inequitable financial gains would be to direct this to those community members most negatively impacted.

Community ownership

Community ownership of part or all of a wind farm offers a positive form of financial gain for the local community, as well as providing greater influence to the community in development and management, and thus engenders greater acceptance of a wind farm. The first Australian community-owned wind farm is Hepburn wind farm in Victoria, and is expected to be operational in late 2011. Hepburn was initiated to reduce local greenhouse gas emissions and to ensure returns are paid to local shareholders. Most significantly, the wind farm will contribute \$15,000 per turbine per year directly to a Community Sustainability Fund, in contrast to the more common rate of \$500 per turbine annually. The intention is to contribute over \$1,000,000 in local grants for long term sustainability projects in the local community (Hepburn Wind, 2011).

Conclusions

Wind energy will contribute significantly to achieving the RET, but the current rate of installation needs to increase to meet this target. The documented high levels of societal resistance to wind farm development are based on negative perceptions of health, financial and legislative aspects. At least some of these negative perceptions are contradicted and/or disproved in current research from notable agencies, including the National Health and Medical Research Council, World Health Organisation and NSW Valuer General. There is currently no evidence positively linking noise impacts with adverse health effects, the majority of property sales do not show any reductions in value after wind farm installation, and planning processes that are transparent and participatory from an early stage of planning result in greater acceptance of wind farms. Other factors likely to increase the acceptance and installation of rural wind farms in Australia are improved models of compensation, increased community ownership and management, and thorough planning and consultation processes that provide information regarding concerns of community members.

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