

"Public perceptions of wind energy developments: Case studies from New Zealand" - Revised personal version of paper to appear in Energy Policy (in press 12 February 2009). NOTE: Final official version can be found using Digital Object Identifier (DOI) listed here: doi:10.1016/j.enpol.2008.12.035

**PUBLIC PERCEPTIONS OF WIND ENERGY DEVELOPMENTS:
CASE STUDIES FROM NEW ZEALAND**

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Abstract

Although the public generally hold positive attitudes towards wind energy, proposals for the construction of new wind farms are often met with strong resistance. In New Zealand, where the government has recently introduced ambitious policy targets for renewable energy generation, negative perceptions of wind farms are increasingly evident and have the potential to prevent the achievement of these targets. This research sets out to examine what influences social resistance to wind farms in New Zealand. Drawing from public submissions on three wind farm proposals, a framework developed by Devine-Wright (2005a) was used as the basis for identification of factors affecting public perceptions of wind farms. The research found firstly that there was no apparent relationship between the proximity of submitters to a proposed wind farm and their likelihood of having a negative perception of the proposal. A wide range of factors written in submissions appeared to have affected the submitter's decision to support or oppose the wind farm proposal. Some of these were consistent with Devine-Wright's findings, but ten further factors were added to the framework to adequately cover the matters raised in submissions. The findings have implications for the achievement of New Zealand's energy policy aspirations.

Keywords

Public perception; wind farm; proximity

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Main text:

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1. Introduction

The New Zealand government has recently adopted a raft of policy initiatives to promote sustainable energy, including targets to significantly increase the proportion of electricity generated from renewable energy sources such as hydro, geothermal and wind.

Despite their 'sustainable' tag, all renewable energy options have their own set of negative impacts that can potentially lead to difficulties in establishing new generation capacity. Wind is no exception. Internationally, social resistance to new wind farms is recognised as a significant barrier to their establishment (Eltham et al., 2008; Moller, 2006; Wolsink, 2005), and research into social perceptions of wind energy developments has become an active, if still evolving, area (Devine-Wright, 2005a; Ellis et al., 2007; van der Horst, 2007; Warren et al., 2005).

Within New Zealand, wind energy generation is rapidly ramping up from a small base, and, perhaps unsurprisingly given international experience, so is controversy. A recent proposal, for example, attracted 519 submissions in objection - 49% of all submissions¹. To date, apart from surveys of levels of general public support or opposition to wind energy and wind farms (e.g. Nielsen Research, 2008) little research has been carried out in New Zealand on the nature of public perceptions of wind farms, and whether these perceptions follow similar patterns to what has been reported internationally. This paper reports on research undertaken on three wind farm proposals in New Zealand, which sought to identify the range of perceptions of submitters, and to compare these to international research findings.

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2. Wind energy and public perceptions

Of the 151.40 PJ of net electricity generated in New Zealand in 2006, 65.8% was generated using renewable energy sources (hydro, geothermal, biogas, wood and wind). The proportion of renewable-sourced electricity has dropped significantly from 79.4% in 1996, and an even more impressive 82.6% in 1986 (calculated using data from Ministry of Economic Development, 2007). To counter this trend, recent government policy announced in the New Zealand Energy Strategy (NZES) aims to increase renewable energy generation, with a national target of 90% of electricity being generated from renewable sources by 2025 (NZ Government 2007a). Related initiatives include the identification of new market arrangements to enable additional wind generation to be integrated into the electricity system, and an expanded renewable energy regional assessment programme. A National Policy Statement on renewable electricity generation is also to be produced later in 2008, which will provide high-level guidance on the consent process for renewable energy projects under the Resource Management Act 1991 (RMA) (NZ Government 2007a, b).

Wind energy, while still representing a minor fraction of New Zealand's electricity generation, is beginning to expand rapidly and has the potential to make a significant contribution towards the government's 90% renewables target. In 2006, net electricity generation by wind in New Zealand was 2.22 PJ, or 1.47% of total net electricity generation, having risen from just 0.03 PJ or 0.02% in 1996 (calculated using data from Ministry of Economic Development, 2007). A study undertaken for the Ministry of Economic Development (MED) and the Energy Efficiency and Conservation Authority (EECA) concluded that based on technical and operational issues only, wind could potentially penetrate about 35% and supply about 20% of New Zealand's electricity (Energy Link and MWH NZ, 2005).

The current total installed capacity of wind turbines (as at February 2008) is 321.8 MW with an additional 164.6 MW under construction. Proposals totalling a further 1914 MW have been consented under the Resource Management Act; or are consented but appealed, on hold, or in the process of gaining resource consent.

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Many other potential wind developments are also being considered throughout the country (New Zealand Wind Energy Association, 2008). It is estimated that by 2015 up to 2450 MW of wind generation could be installed with high confidence and up to 4585 MW with high or medium confidence (Ministry of Economic Development, 2006, p.96).

International research consistently shows that wind energy has high public approval ratings (Ek, 2005; Wolsink, 2000) and New Zealand is no exception. Public opinion research in 2004 showed that wind power had the highest approval rating of any method of electricity generation, with an 82% approval rate overall, and over 40% of respondents preferring that future electricity needs be met by wind power than from other energy sources (EECA, 2005). But despite the strong potential of wind energy to contribute to national policy aspirations, many wind farm developments in New Zealand are generating negative as well as positive responses from individuals and organisations as the proposals go through the resource consent (planning consent) process. Bell et al. (2005) propose that this disjunction between public support for wind energy and successfully building wind energy capacity can be distinguished as a 'social gap' – the gap between high public support and low success rate in planning applications, as well as an 'individual gap' – where a person has a positive attitude to wind power in general but actively opposes a particular development.

Examining the policy implications of these 'gaps', Bell et al. (2005) suggest that these could be bridged using various planks - the 'silent majority' of supporters should be drawn into the planning process through collaboration and participation; improved communication by energy developers and policy makers; better engagement with communities to discuss their concerns and understandings; better accommodation of community concerns from an early stage, particularly in relation to siting decisions; and ensuring that energy policy does not drive energy developments in a direction that is likely to inflame conflict. In a similar vein, Devine-Wright (2005b) suggests government policy targets for renewable energy developments in the UK are more likely to be met via a 'locally embedded' approach whereby communities are more involved in the development process and are able to

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benefit through local supply, partnerships and profit-share. Ellis et al. (2007), however, warn that opposition is more complex than simply a lack of knowledge, or a lack of participation, and call for theoretically based social research that seeks to understand why members of the public accept or resist wind farm proposals.

But even before policy issues are considered, it is crucial to understand the reasons for negative attitudes towards wind farms. Internationally, much research has been undertaken relating to technical aspects of wind energy, and how to address its physical, measurable effects such as noise generation and the visibility, shape and colour of turbines. Pasqualetti (2001) suggests that the technical problems of wind farms have largely been addressed, but there are still outstanding issues, particularly how to accommodate people's concerns about landscape values. Other influences on perception may include aesthetic integration (Sibille et al., 2009), people's beliefs relating to sustainable energy (Ek, 2005), people's knowledge levels (Ottinger and Williams, 2002), and "NIMBY" ("Not in My Back Yard") (Krohn and Damborg, 1999; noting however, that Wolsink (2000), Devine-Wright (2005a) and others argue that the assumed prevalence of NIMBYism is not borne out by empirical studies).

Until recently, however, these various influences on perceptions have not been brought together into an integrated framework until the work of Patrick Devine-Wright (2005a). Reviewing international research on wind farms, Devine-Wright concluded that perceptions of wind farms can be based on a wide variety of characteristics of the wind farm itself (including its visual impacts, size, noise, and effects on wildlife), as well as influenced by non-site characteristics. Working from different research strands, he grouped the factors affecting public perceptions of wind farms into eight categories: physical, contextual, political and institutional, socio-economic, social and communicative, symbolic and ideological, local, and personal. Most of these categories are further divided into 'aspects'. Devine-Wright's resulting framework is shown in Table 1.

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Table 1: Devine-Wright's (2005a) (p. 135) 'summary of factors identified in past research as affecting public perceptions of wind farms and renewable energy' (2005a:135)

Category	Aspect
Physical	Turbine colour Turbine size Turbine acoustics Farm size and shape
Contextual	Proximity to turbines Landscape context
Political and institutional	Energy policy support Political self-efficacy Institutional capacity Public participation and consultation
Socio-economic	Shareholding
Social and communicative	Social influence processes
Symbolic and ideological	Representations of wind turbines
Local	Place and identity processes Local or community benefit and control NIMBYism
Personal	Previous experience and knowledge

In New Zealand, significant developments such as wind farm proposals are generally notified for public submissions, and these submissions must be considered in the resource consent decision-making process. Strong opposition may implicate the success of new developments if the decision-making authorities (usually local councils) judge the impacts identified in submissions to be significant, and some contentious wind farm proposals have been either refused consent or significantly reduced in size. Many of the factors identified by Devine-Wright have been canvassed in the New Zealand context on a case-by-case basis during the process of various resource consent hearings and appeals. However, there has as yet been little academic study in New Zealand into public perceptions of wind energy developments, and of what little there has been, none has yet been published.

Another issue that has been explored in the international literature is whether those living closer to wind farms perceive them in a more negative light than those living further away. This issue has been explored in a number of international studies, and

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to date, results show variability on this point – for example a Scottish study found that those living closer to wind farms were more likely to speak positively of them than those not living in the vicinity (SECRU 2000), while a US study found that those living closer had more negative perceptions (Thayer and Freeman, 1987). Van der Horst's (2007) review concludes that negative attitudes to *proposed* projects generally has some correlation to proximity, but that this is not necessarily the case with *existing* wind farms. However, as he notes, "the nature, strength and spatial scale of this effect may vary according to local context and 'value' of the land" (p. 2705). This issue has not yet been examined in the New Zealand context.

The research reported in this paper attempts to fill these voids, as a preliminary investigation into factors affecting social perceptions of wind energy developments in New Zealand. The primary purpose of the research was to carry out an initial scoping of the range of aspects that are apparent in influencing attitudes expressed towards proposed wind farms, and to compare this against the range of aspects identified by Devine-Wright. The research draws its data from public submissions on resource consent applications for three proposed wind farms in the South Island of New Zealand. In analysing the submissions, the research sought to address the following research questions:

- (1) Do submitters living closer to a proposed wind farm have a different attitude towards the proposal than submitters generally?
- (2) What is the range of factors referred to in relation to positive and negative local attitudes to wind farms, and to what extent are these factors consistent with Devine-Wright's (2005a) framework for understanding public perceptions of wind energy?
- (3) What are the most commonly expressed factors, and to what extent do these alter with different wind farm proposals?

It should be noted that the term 'attitude' is used in this article to refer to submitters' negative or positive stance towards a wind farm or aspects of a wind farm, while 'perception' is used in a qualitative sense to refer to submitters' views or observations about the wind farm. The term 'factors' is adopted from Devine-Wright

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(2005a) to refer to the key variables that appear to influence public perceptions of wind farms, and thus ultimately their attitudes.

3. New Zealand planning context

The planning consent process for wind farms is carried out under the Resource Management Act 1991, New Zealand's primary planning legislation. The RMA requires that all applications for resource consent are lodged with the relevant local authority, and in most cases wind farm proposals are notified to enable the public to make submissions. Unlike many other planning jurisdictions, submitters under the RMA do not have to show that they are affected or have a particular interest in the proposal – anyone is permitted to make a submission. Submissions must be in writing, and must include the submitter's name and address, whether they support or oppose the proposal, the aspects of the proposal that they support or oppose, and give reasons for the submission. Submissions are thus a fertile source of data for understanding the public's attitudes towards and perceptions of wind farm proposals.

In assessing an application, the local authority is required to consider the submissions, and is also required (amongst other things) to have regard to the environmental effects of a proposal, where 'environment' is defined as:

- (a) ecosystems and their constituent parts, including people and communities;
- (b) all natural and physical resources;
- (c) amenity values; and
- (d) the social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) or are affected by those matters (s2 RMA).

Information on these matters is gleaned from the assessment of effects required to be produced by the applicant, with public submissions being a further source of information for consent authorities, particularly on the social, cultural and aesthetic aspects of environmental effects. Public submissions can be strongly influential on the planning process, not only in being required to be taken into account at planning

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hearings, but in potentially being the basis of legal appeals by submitters of council decisions to the Environment Court. Figures for December 2008 show that of 11 proposed wind farms that have been consented at council level, all but one have been appealed; a process that can lead to significant time delays (NZWEA, 2008).

4. Methodology

The research was undertaken on three wind farm proposals in the lower South Island of New Zealand that were separately publicly notified for submissions during 2006 and 2007. Advantages of using submissions as the data source include that they are publicly available information; they are all in the same format; and they represent public opinion at a comparable point in time for each wind farm. They thus offer an easily accessible window into public perceptions at the time when each wind farm is at the proposal stage. A disadvantage is that what submitters write is expressed for a purpose relating to the RMA process, and while they are asked on the submission form to state their reasons for their support or opposition, they may choose to only state those things which they believe to be useful to support their position. The submissions may thus not cover some of the issues that submitters are concerned about, or may not express them in sufficient detail to be clearly understood. While analysis of submissions was a useful aid in scoping the range of factors of concern to submitters, it would be useful to follow this up with in-depth interviews in subsequent research.

Research in England and Wales by Toke (2005) suggests that high levels of apprehension by people living in the immediate vicinity of proposed sites is the most important influence on decisions by local planning authorities to refuse wind power schemes in England and Wales. While this research does not set out to prove or disprove this hypothesis, the views of local people as to the possible effects of a proposal are certainly an important contributor to the decision-making process, and anecdotally tend to be given greater weight than submissions by non-locals. For this reason, it was decided to focus this research on submissions by people living in the vicinity of each site. The cut-off was determined on the basis of those submitters

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living within a 15 km radius of each proposed wind farm; a rationale developed from work by Parliamentary Commissioner for the Environment (PCE) (2006) and Moran (2007) that suggests that the visibility of a wind farm drops significantly by this distance. Clearly, this definition could be challenged on the basis of other impacts, and other concepts of 'localness', and the authors do not imply by this that they consider others outside this radius to be unaffected. However given the need to limit the number of submissions analysed (there was a total of 1324 submissions for all 3 wind farms) and a wish to deal with comparable data sets, it was decided to apply the 15 km criteria for the purposes of this 'scoping' study.

Given the focus on people living in the vicinity of the site, only submissions made by individuals were included in the study, and any made by groups or organisations with an address within the 15km boundary were omitted. A small number of submissions were from the same address (presumably family members) and four groups of two/three submissions were found to be either identical or containing identical fragments of other submissions within that group. These were included.

Having identified the 'local' residential submissions (on the basis of the address of the submitter), these were first broken down into 'support' or 'oppose' as stated on the relevant part of the submission form (or in some cases neutral). Each submission was analysed to identify the negative and positive factors raised relating to the wind farm. These were then coded using established procedures for dealing with qualitative data (Davidson & Tolich, 2003). Factors were in the first instance grouped according to Devine-Wright's 'categories and aspects' (Table 1) but where clusters of factors did not fit, new groupings were created, as explained in Section 6. As an example, part of one submission stated: "*While wind farms may contribute to domestic security, they detract from the hinterland experience of freedom and distance that has cradled Otago in its growth to an idiosyncratic province. An excess of development will make Otago a less attractive place to live*" (F, Project Hayes submission). This was coded to 'place and identity processes' which was interpreted to refer to human bonds to a specific environment and how these are embedded in the psychology or identity of people of the area (Vorkinn & Riese, 2001). Other

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submissions coded to 'place and identity' included those referring to a significant family history in the area through farming or otherwise.

The research was focused on attitudes and perceptions; thus all submitters' contentions were included regardless of whether these could be considered to be objective or not. In the submission analysis, a single submission could potentially produce no factors (e.g. if no reasons were given for supporting or opposing) or could produce many factors (e.g. if many different reasons were given). The key focus was to identify the *range* of factors raised by submitters in relation to their support or opposition. The resulting data was entered into a spreadsheet with submitters listed vertically and factors horizontally. The spreadsheet was populated using the codes attributed to each submission, as well as whether the submission was in 'support' or 'opposition' and whether the submitter wished to speak at the hearing.

The outcome of this analysis is reported below: firstly introducing the case studies and then comparing the submissions received, secondly discussing the fit between Devine-Wright's categories and the results, and thirdly reporting in more detail on the positive and negative aspects raised in relation to each wind farm proposal.

5. The case studies

The three case studies are all located in the southern part of the South Island of New Zealand: Project Whitehill in Southland (Meridian Energy); Project Hayes in Otago (Meridian Energy); and Project Mahinerangi (TrustPower) also in Otago². Project Whitehill was granted resource consent and is now in operation. Project Hayes and Project Mahinerangi have each been granted resource consent, but these decisions have been appealed by submitters.

A summary of key details of each wind farm and the submissions received is laid out in Table 2.

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Table 2: Wind farm proposals and total submissions compared

	Whitehill	Hayes	Mahinerangi
Site size	2400 ha	9200 ha	1723 ha
Site ownership	Mainly a forestry company, plus Meridian Energy	Five private properties	Four private properties, plus Trustpower
Maximum number of turbines	29	176	100
Maximum turbine height	107m	160m	145m
Maximum generating capacity	58MW	630MW	200MW
Total submissions	99	1058	167
% supporting*	84%	50%	15%
% opposing*	8%	49%	70%

**Total will not be 100%, as some submitters were neutral*

The Project Whitehill site is a prominent ridge lying within a fertile farming region. The ridge is currently largely in pasture, but much of it has been planted in Douglas fir seedlings for forestry. The 'local area' (i.e. the 15km radius) is predominantly farmed, but includes two settlements of approximately 200 and 400 people, respectively. Fifty-two of the 99 submitters were from the local area; this consisted of 46 (88.5%) in support, 5 (9.6%) in opposition and 1 (1.9%) commenting. The proportion of local support for the wind farm was slightly greater than non-local support, as can be seen in Figure 1.

The site for Project Hayes lies on the western edge of the Lammermoor Range, and is mostly over 900 m in elevation. The site and much of the vicinity are rolling downs covered in tussock and other grasses, and is mostly farmed at a low stocking rate. A large water storage lake, Loganburn Reservoir, lies adjacent to the wind farm site. The 15 km 'local area' includes the more intensively farmed valleys below the range, and a small settlement of around 165 people in one of these valleys. Of the 1058 Project Hayes submissions, 20 were from the local area. Of these, 13 (65%) were in support, 6 (30%) were opposed and one stated conditional support. A standardised supporting submission (with pre-paid postage) that had been circulated in the area by the developer via a mail-drop, featured strongly in the local

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submissions. Twelve of the 13 submissions in support used this standard form, just adding their name and address, while one of the six in opposition used this form but altered it to an opposing submission. As can be seen from Figure 1, local submitters showed a higher percentage of support (65%) than non-local submitters, with a converse result for those in opposition.

Project Mahinerangi is approximately 15 km from the Project Hayes site, and is similarly situated across rolling hill country. The majority of the local area is in tussock or pasture, with some forestry. Around the shores of nearby Lake Mahinerangi, some houses are clustered, but there are no settlements within the 15 km radius. A total of 24 local submissions were received, none of which (0%) supported the proposal. Twenty-one local submissions (87.5%) opposed the proposal, and 3 (12.5%) were neutral. Compared to non-local submissions, more local submitters were opposed to the proposal, and the complete absence of local supporting submissions can be compared to 17.5% support amongst non-local submitters.

These results are compared in graphic form in Figure 1, and will be considered further in the Discussion.

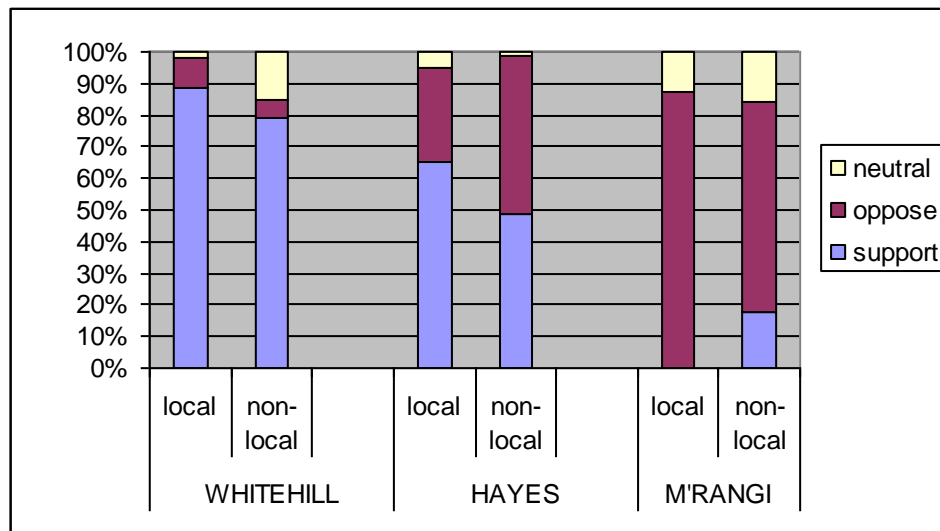


Figure 1: Comparison of submission type between local and non-local submissions for the three wind farm proposals.

6. Range of factors raised in submissions

The analysis of the local submissions from all three wind farms (96 submissions in total) revealed a wide range of factors relating to the perceptions expressed. While many of these factors were consistent with those identified in Devine-Wright's framework (e.g. concerns about turbine height, landscape context, consultation, etc.), ten groupings of factors were not captured by the framework. These were as follows:

1. *Cumulative effects in relation to neighbouring projects*: this was a concern to both Hayes and Mahinerangi submitters, due to the proximity of the wind farm projects to one another. For example: "*There has been no thorough cumulative assessment of the combined potential effects (particularly traffic) arising from the Trust Power (sic) project and the nearby Meridian Project Hayes being under construction concurrently*" (M, Project Mahinerangi submission). Devine-Wright identifies 'Farm size and shape' as a factor, but this relates to area contained by the proposed wind farm itself. Our findings suggest that cumulative effects may be an additional significant factor.

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2. *Proximity to important features*: one of Devine-Wright's categories is 'landscape context' and this was certainly an important issue for many submitters. However, some submitters were solely or additionally concerned at the impact on specific features, rather than on the landscape generally. For example, one submitter commented "*Trustpowers (sic) plans are on the boundary of Te Papanui and the Blackrock Scientific Reserve and the DCC water catchment area. I object to the proximity to these Reserves as these are unique areas of Otago, put aside, many years ago, for the public use and pleasure, not for industrialisation*" (X, Project Mahinerangi submission). Other submitters commented on the proximity of proposals to areas used for tramping, skiing, walking, Dunstan road (a historic relic), and other reserves. Features are as much part of the 'context' as the landscape generally, and we consider that this could usefully be added to the table.
3. *Energy policy opinion*: under Devine-Wright's 'political and institutional' category, the first factor listed is 'energy policy support'. Our findings suggest that submitters' perceptions of wind farms may be influenced by both their support *or* their disagreement with energy policy. We therefore propose that 'Energy policy support' should apply more broadly and should instead read 'Energy policy opinion'.
4. *Attitude towards wind power in general*: the submissions made it clear that people's attitude to wind power generally was an important driver of support or opposition, and that this could be differentiated from opinions about the government's current energy policy.
5. *National good / security of supply*: a number of submissions in support raised the 'public good' aspect of the proposed wind farm, which did not fit under any of Devine-Wright's 'aspects'.
6. *Perception of the developer*: some submitters referred to good or bad experiences with public participation and consultation (one of Devine-Wright's 'aspects'), but perceptions of the developer from other experiences could also colour the submitters' responses. A common theme was whether the company was seen to be a 'good citizen' or not, as demonstrated in the following fragment: "*I have already experienced Trustpowers (sic)*

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destruction of DCC vegetation, when they drilled test pits on DCC catchment area and then denied this in the ODT [Otago Daily Times] (Friday 12th May 2006) and for sometime, before admitting it was true. [Name deleted], community relations manager, went as far as saying we "imagined" these test pits" (X, Project Mahinerangi submission). Similarly: "Meridian's confidence does not seem to be demonstrated, however, by the provocative and selective mail-drop to Maniototo residents promoting support for their point of view and endeavouring to completely mislead potential submitters into utilising their positively orientated version of the official CODC [Central Otago District Council] submissions form." (I, Project Hayes submission).

7. *Economic effect – property values:* Devine-Wright's only 'aspect' under socio-economic was 'shareholding'. The analysis of submissions revealed a number of submitters concerned at another economic aspect - the effects of the wind farm on property values.
8. *Social impact:* submitters also raised concerns about the social impact of the wind farm. This included such things as employment opportunities, effects on tourism, and the effect of splitting a small mutually reliant community: "*It appears that there are those who will benefit in some way from the project on one side of the fence and those who will not, on the other. The community is a small and isolated one and is very reliant on one another's assistance and good will, in particular in the snowy winter months*" (K, Project Mahinerangi submission).
9. *Local impacts of construction:* aspects of local concern also included the local impacts of construction, such as the large number of truck movements on narrow local roads causing increased driver hazard, local road damage, driver delays and congestion, and negative impact on daily farming business activities.
10. *Environmental:* many submitters expressed concerns about the impact of the wind farm on the local environment. These differed from concerns about the visual impacts of the wind farm on landscape values, and were specifically to do with impacts on wildlife, plants, ecosystems, water quality, etc.

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These ten new groupings, which were found to be necessary to categorise the factors raised in submissions, have been added to Devine-Wright's (2005a) framework in Table 3. Most of these fit within one of Devine-Wright's existing categories as new 'aspects', but one new category is proposed. The new category and aspects added are in bold print.

Table 3: Factors affecting public perceptions of wind farms - a revised framework, based on Devine-Wright (2005a).

Category	Aspect
Physical	Turbine colour Turbine size Turbine acoustics Farm size and shape New aspect: cumulative effects of neighbouring projects
Contextual	Proximity to turbines New aspect: proximity to important features Landscape context
Political and institutional	Energy policy opinion Political self-efficacy Institutional capacity New aspect: attitude towards wind power in general New aspect: national good / security of supply Public participation and consultation New aspect: perception of developer
Socio-economic	Shareholding New aspect: economic effect: property values New aspect: social impact
Social and communicative	Social influence processes (media, social networks, trust)
Symbolic and ideological	Representations of wind turbines
Local	Place and identity processes Local or community benefit and control New aspect: local impacts of construction NIMBYism
Personal	Previous experience and knowledge
New category: environmental	New aspect: local environment

Three factors in Devine-Wright's table were not identified in submissions. These were political self-efficacy, institutional capacity and NIMBYism. In the context of this research, the term 'political self-efficacy' was taken to mean the degree by which the person can affect the consent decision of a particular wind farm proposal. This is difficult to measure from the submissions; however, the act of placing a submission to some extent gives evidence of a degree of belief in political self-efficacy by the submitters. The term institutional capacity has been defined by Willems and Baumert (2004, p. 11) as "a broader enabling environment which forms the basis upon which individuals and organisations interact". This cannot be measured by analysing submissions in this research, and no issues raised by submitters fit

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within this category. To show NIMBYism, submitters would have to express a negative opinion of the local wind farm along with a positive opinion towards wind power in general. Although some submitters did appear to hold this combination of opinions, there was insufficient information to safely conclude whether this was NIMBYism. The lack of identification of these three factors in the submissions does not deny their potential relevance, but that the methodology used does not reveal them.

7. Comparative analysis of submissions

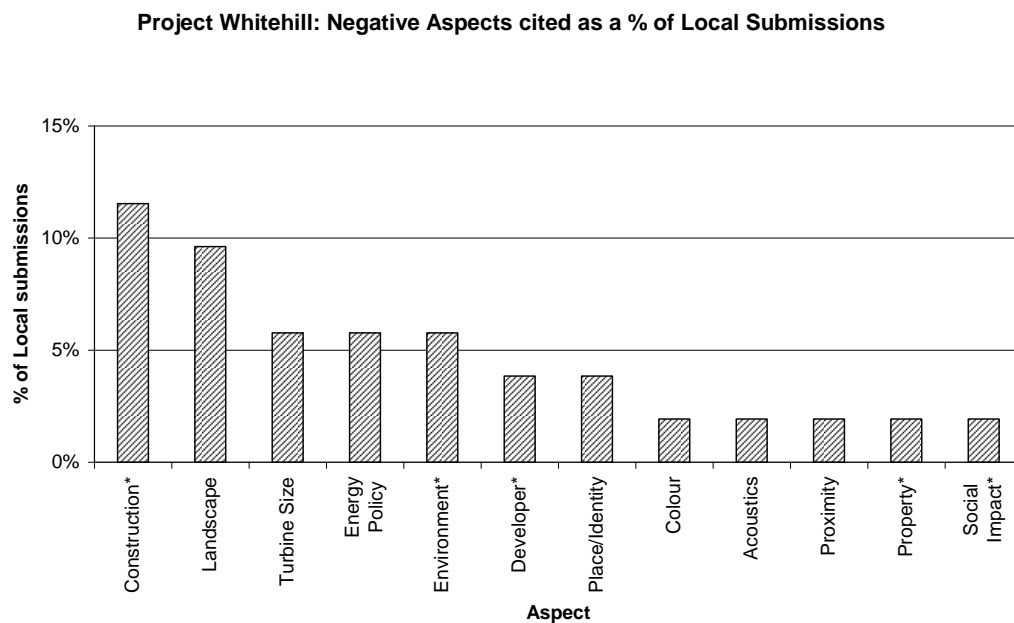
To identify the factors and compare these across the three case studies, the analysis broke each submission down into the 'aspects' relating to their support or opposition to the wind farm. By counting the number of submissions that referred to each aspect, and expressing this as a percentage of total local submissions (i.e. all those in support, opposition and neutral), an indication of the relative dominance of each aspect was obtained, and could be expressed in a way that was comparable across the three case studies.

These findings are discussed below in relation to each wind farm, firstly examining the aspects of the three wind farms that were seen in a negative light, followed by those aspects of the wind farms that were seen as positive. Note that some of the 'aspects' listed in Table 3 could potentially be referred to in either a positive or a negative way by submitters. For example, the consultation process by the energy company was referred to both positively (e.g. commenting on a well-presented application) or negatively (e.g. that concerns raised by the community were not genuinely addressed by the developer).

7.1 Negative Aspects

For Project Whitehill, opposing submissions (plus neutral) made up 11.5% of local submissions. Twelve aspects were cited as being of concern (see Figure 2). Those cited by over 5% of total local submissions were local impacts of construction, landscape context, turbine size, energy policy opinion and local environment.

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*Denotes 'aspects' added to Devine-Wright's framework.

Figure 2: Project Whitehill: negative aspects as a percentage of total local submissions (n=52). See Table 3 for a full description of each aspect.

Thirty-five percent of local submissions for Project Hayes opposed aspects of the proposed wind farm. Fifteen aspects were cited in 5% or more of total local submissions. The predominant aspects of concern (cited in over 20% of the total local submissions) were farm size and shape, landscape context, energy policy opinions, perceptions of the developer, local impacts of construction, cumulative effects of neighbouring projects, proximity to important features, and place and identity (Fig. 3).

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Project Hayes: Negative Aspects cited as a % of Local Submissions

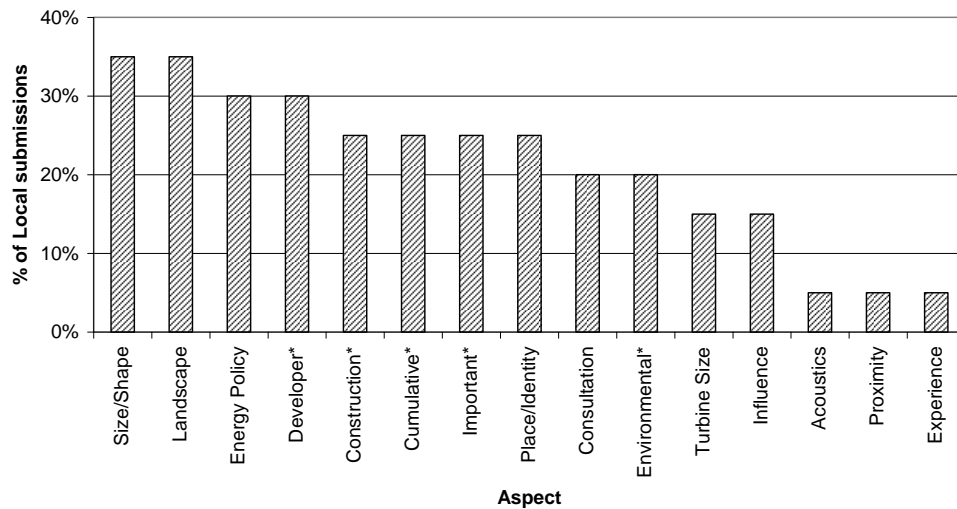


Figure 3: Project Hayes: negative aspects as a percentage of total local submissions (n=20). See Table 3 for a full description of each aspect.

Project Mahinerangi was the least supported project by local submitters, with 87.5% opposing outright and 12.5% neutral. Nineteen aspects of Project Mahinerangi were of concern to 5% or more of local submitters. Aspects of concern to more than 20% of local submitters were landscape context, local impacts of construction, perception of developer, local environment, turbine acoustics, proximity to important features, wind farm size and shape, energy policy, place and identity, proximity to turbines, cumulative effects with neighbouring projects, and impacts on property values (Fig. 4).

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Project Mahinerangi: Negative Aspects cited as a % of Local submissions

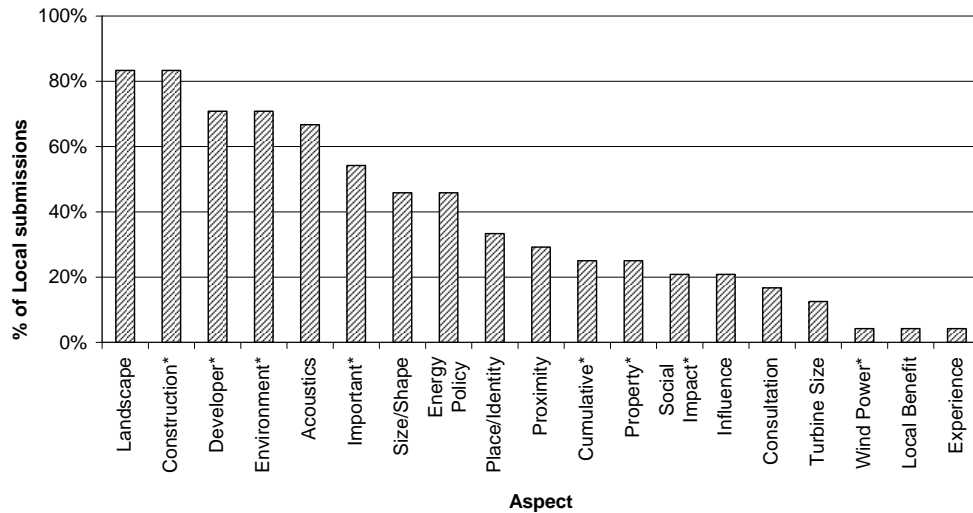


Figure 4: Project Mahinerangi: negative aspects as a percentage of total local submissions (n=24). See Table 3 for a full description of each aspect.

7.2 Positive Aspects

Supporting submissions for Project Whitehill made up 88.5% of local submissions. A relatively small range of aspects were referred to in relation to their support, the main ones being a positive attitude to wind power in general; local or community benefits, and the national good (Fig. 5).

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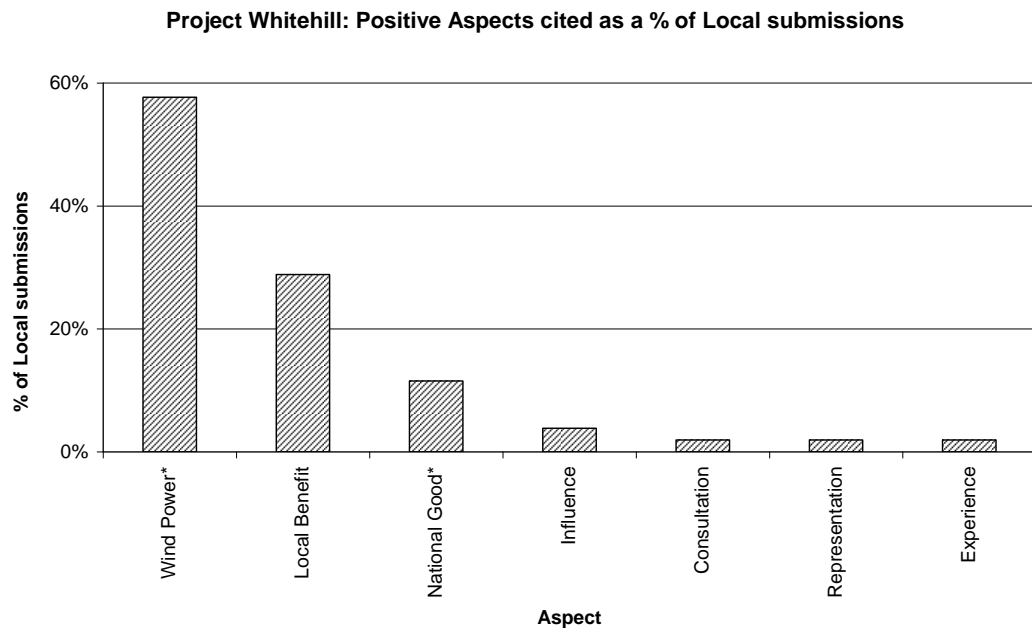


Figure 5: Project Whitehill: positive aspects as a percentage of total local submissions (n=52). See Table 3 for a full description of each aspect.

Sixty-five percent of local submissions on Project Hayes were in support. Aspects referred to in relation to this support were positive attitudes towards wind power in general, national good/security of supply, local or community benefit, and positive impacts on the landscape (Fig. 6).

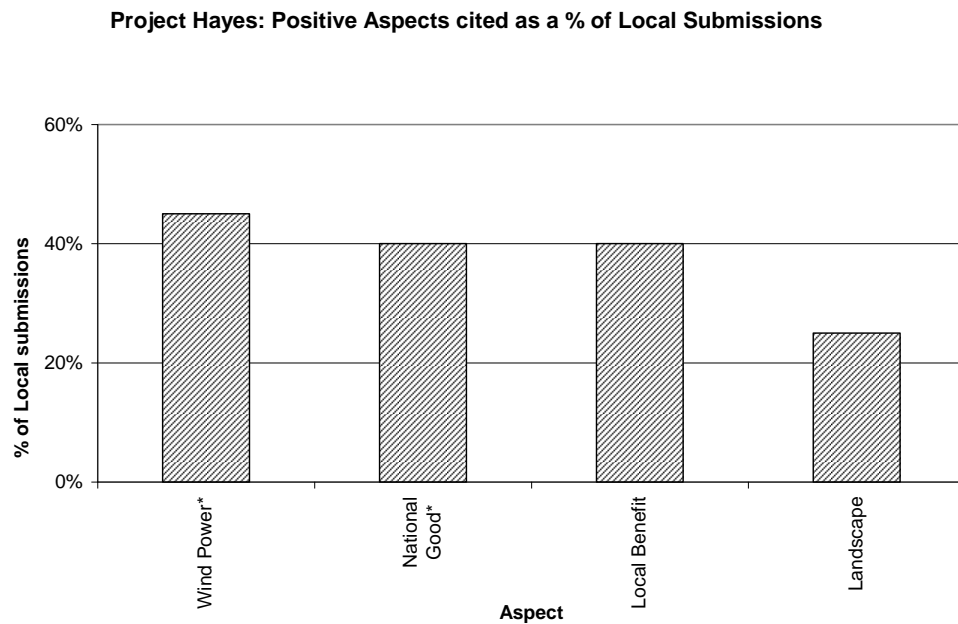


Figure 6: Project Hayes: positive aspects as a percentage of total local submissions (n=20). See Table 3 for a full description of each aspect.

There were no supporting submissions relating to Project Mahinerangi.

8. Discussion

The first research question sought to determine whether submitters living closer to the proposed wind farms have a more negative attitude than submitters generally. Our findings suggest that there is no reliable relationship between proximity and attitude. For Project Whitehill, neutral views were more common among non-local than local submitters, and locals showed higher proportions of both support and opposition (see Fig. 1). For Project Hayes, the percentage of local support was again higher than non-local, while objections from locals were significantly lower at 30% than for non-locals at 50%. In contrast, Project Mahinerangi had no local support while 17.5% of non-locals were in support. Local objections (87.5%) far outweighed non-local objections (66.5%).

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These findings are consistent with the variable findings internationally on the relationship between proximity and attitude for wind farms, and support van der Horst's (2007) conclusion referred to earlier, in that the overall context of each wind farm appears to have a much greater impact on submitter attitudes than proximity alone.

The analysis of 96 submissions across the three case studies revealed a wide range of local attitudes and perceptions towards wind farms. Many of these could be grouped into the 'factors' identified in Devine-Wright's (2005a) framework, but further clusters of data did not fit, giving rise to ten new proposed factors. New factors that generally supported a negative view were 'cumulative effects of neighbouring projects', 'proximity to important features', 'perception of developer', 'economic effects (property values)', 'social impact', 'local impacts of construction' and 'local environment'. The two factors of 'attitude towards wind power in general' and 'national good/security of supply' generally were associated with a positive view toward the wind farm.

These additional factors are inserted into Devine-Wright's (2005a) framework to create a revised version (see Table 3). Based on the case study research, this fuller framework is necessary to capture the complex influences that may contribute to shaping an individual's opinion on a proposed wind farm development in New Zealand. The differences between Devine-Wright's (2005a) framework and the revised framework are unlikely to be because these matters are only of interest to people in New Zealand. It may be a consequence of the difference between the methodology used by Devine-Wright – being a review of research into public perceptions of wind farms – and the more grounded methodology described in this paper.

The third research question sought to determine the most commonly expressed perceptions towards wind farm proposals, and to what extent these alter with different wind farm proposals.

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There was a high degree of consistency between the three case studies in relation to the most commonly expressed concerns in opposing submissions. Taken across all of the local submitters, the four aspects most frequently cited were 'local impacts of construction', 'landscape context', 'perception of the developer' and the 'local environment' (in that order). For those submitting to Project Whitehill and Project Mahinerangi, the two most common factors were 'local impacts of construction' and 'landscape context', while the two main concerns for those submitting to Project Hayes were 'farm size and shape' and 'landscape context'. 'Landscape context' and 'local impacts of construction' were cited in the top three negative aspects for all three projects.

The significance of the landscape context is consistent with Wolsink (2007) and Ellis et al. (2007) who separately conclude that the impact of wind farms on landscape values is the main determining factor in explaining opposition or support. This confirms the importance of site selection – not just its wind characteristics, but also how the community perceives the landscape values of the site. However, depending on the particular site, other factors can be equally or more dominant, such as local impacts of construction for the Whitehill site, or the scale of the wind farm for the Hayes site. Clearly, some of these aspects will be inter-related – for example concern about the size and shape of Project Hayes is likely to be related to the high value placed on the landscape, and the impact of a very large wind farm on those values. Understanding the linkages between aspects, and how these inter-relate to generate positive or negative attitudes, would be a useful further research area.

The next most frequent aspects impacting on perceptions of wind farms were 'farm size and shape', 'proximity to important features', 'place and identity processes' and 'cumulative effects of neighbouring projects'. However, as with landscape, concerns over these aspects depend on the characteristics of the specific wind farm and its location. While these four aspects were frequently cited by those submitting to Projects Mahinerangi and Hayes, the same aspects were of little to no concern to those submitting to Project Whitehill. This can perhaps be related to the very different size and location details between the projects – Whitehill being smaller and

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located within a farmed/forested landscape, while the other two are larger and located in landscapes with valued natural and heritage features.

Two aspects that appear to impact on a person's perception towards a wind farm proposal, but which are perhaps underestimated when presented in this way are 'perception of the developer' and 'public participation and consultation'. This is because comments regarding these aspects are split between negative and positive. The tone of submissions suggests that these aspects are quite influential in determining a submitter's stance, and should not be overlooked.

Further research is needed to establish whether these findings are characteristic of wind farm proposals more generally and whether there is a causal link between these and public perceptions. However, it is tentatively inferred from the findings that wind farm proposals would be less likely to generate local opposition if they have the following characteristics:

- the public have been collaboratively involved in the process from an early stage;
- the site is not within in or close to a valued landscape or valued features;
- local impacts of construction are minimised;
- the developer is perceived to be a good citizen;
- impacts on the natural environment are minimised;
- the wind farm is not too large and is not close to other wind farms; and
- the wind farm is not seriously at odds with conceptions of place and identity.

The use of collaborative and participatory planning approaches, as proposed by Bell et al. (2005), and strategic planning of wind farm locations, as suggested by Warren et al. (2005), could assist in addressing these issues.

The three most commonly cited *positive* aspects in submissions were 'attitude towards wind power in general', 'local or community benefit or control' and 'national good/security of supply' (in that order). If more wind farms are to be established to meet government policy targets, there is clearly value in understanding

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the public's views towards wind power. These findings reinforce Devine-Wright's (2005b) contention of the importance of ensuring that some of the benefits of the wind farm flow into the local community; this could be not only through the rental of land for turbines, but through other means such as local employment or even improved access to the landscape. In parts of Europe, community benefit is achieved via local shareholdings in wind energy developments, a trend that has not yet been apparent in New Zealand.

9. Conclusion

The New Zealand government's new policy targets for renewable energy may be technically achievable, but negative social attitudes to new energy developments could derail these aspirations. Understanding the multiple factors that underlie resistance or support for wind energy developments is a crucial step in informing renewable energy policy. This research has revealed that a broad raft of factors – relating to the site, the physical aspects of the wind farm, the political and institutional context, socio-economic aspects, social processes, local and personal issues, and environmental impacts – can all contribute to a person's ultimate views as to whether they support or oppose a wind farm proposal. The energy company promoting the development influences some of these factors; some are determined at a government level; some are more particularly relevant to the choice of site; and some may be generated through social interactions and personal experience. Ultimately, most of these factors are drawn into the decision-making processes Resource Management Act in determining whether to grant or refuse consent to a wind farm proposal, or at a higher policy level, whether to set out criteria to direct the selection and design of wind farm sites. The government's National Policy Statement on renewable electricity generation (currently under development) could usefully give guidance as to how to achieve a consistent and collaborative approach to addressing these matters, so as to minimise local adverse impacts of wind energy developments, and to ensure their more sensitive location and design.

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As a preliminary scoping exercise, this research produced unexpectedly rich findings. As noted earlier, the findings are limited by the nature and expectations of the submission process, and it would be useful to follow this up with in-depth interviews or surveys grounded in established social science methodologies. This would provide an opportunity to explore beyond the illusory simplicity of a descriptive list of 'factors' to the more complex interactions between these factors, and ideally to start to develop a theoretical framework that had explanatory power. However, there is still a wealth of information to be gleaned from submissions, and further analysis, including of non-local submissions and submissions from other wind farm proposals, has the potential to reveal even more about public perceptions of wind energy developments in New Zealand.

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Footnotes

¹. Project Hayes, one of the case studies

². The electricity industry in New Zealand is structured so as to split the generation of electricity from its transmission. Most of the country's generating capacity lies in the hands of three state-owned enterprises - Meridian Energy, Genesis Power, and Mighty River Power - and two private companies Contact Energy and Trustpower.

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References

Bell, D., Gray, T., Haggett, C., 2005. The 'Social Gap' in wind farm siting Decisions: explanations and policy responses. *Environmental Politics* 14(4), 460-477

Davidson, Carl, and Martin Tolich, eds. 2003. *Social Science Research in New Zealand: Many paths to understanding*. Longman: Auckland.

Devine-Wright, P., 2005a. Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy. *Wind Energy* 8, 125-139.

Devine-Wright, P., 2005b. Local aspects of UK renewable energy development: exploring public beliefs and policy implications. *Local Environment* 10(1), 57-69

Ek, K., 2005. Public and private attitudes towards "green" electricity: the case of Swedish wind power. *Energy Policy* 33, 1677-1689.

Ellis, G., Barry, J., Robinson, C., 2007. Many ways to say 'No', different ways to say 'Yes': applying Q-methodology to understand public acceptance of wind farm proposals. *Journal of Environmental Planning and Management* 50(4), 517-551.

Eltham, D., Harrison G., Allen, S., 2008. Change in public attitudes towards a Cornish wind farm: implications for planning. *Energy Policy* 36, 23-33.

Energy Efficiency and Conservation Authority, 2005. *Renewable Energy: Fact Sheet 1: Wind Energy [Brochure]*. Energy Efficiency and Conservation Authority, Wellington, New Zealand.

Energy Link and MWH NZ, 2005. *Wind Energy Integration in New Zealand*.

"Public perceptions of wind energy developments: Case studies from New Zealand" - Revised personal version of paper to appear in Energy Policy (in press 12 February 2009). NOTE: Final official version can be found using Digital Object Identifier (DOI) listed here: doi:10.1016/j.enpol.2008.12.035

Retrieved March 13, 2008, from
www.eeca.govt.nz/eeca-library/renewable-energy/wind/summary/wind-integration-in-nz-report-summary-05.pdf

Krohn, S., Damborg, S., 1999. On public attitudes towards wind power. *Renewable Energy* 16, 954-960.

Ministry of Economic Development, 2006. New Zealand's Energy outlook to 2030. Retrieved July 12, 2007, from
http://www.med.govt.nz/templates/MultipageDocumentTOC____21862.aspx

Ministry of Economic Development, 2007. Energy Data File June 2007. Retrieved September 25, 2007, from
http://www.med.govt.nz/templates/MultipageDocumentTOC____28065.aspx

Moller, B., 2006. Changing wind-power landscapes: regional assessment of visual impact on land use and population in Northern Jutland, Denmark. *Applied Energy* 83, 477-494.

Moran, D. 2007. An economic assessment of wind farm power generation in Scotland including externalities. *Energy Policy* 35, 2811-2825.

New Zealand Government, 2007a. New Zealand Energy Strategy to 2050 – Powering Our Future. Ministry of Economic Development, Wellington.

New Zealand Government, 2007b. New Zealand Energy Efficiency and Conservation Strategy – Making it Happen. Energy Efficiency and Conservation Authority, Wellington.

New Zealand Wind Energy Association, 2008 online: Proposed Wind Farms
<http://windenergy.org.nz/nz-wind-farms/proposed-wind-farms> (downloaded 14 December 2008).

"Public perceptions of wind energy developments: Case studies from New Zealand" - Revised personal version of paper to appear in Energy Policy (in press 12 February 2009). NOTE: Final official version can be found using Digital Object Identifier (DOI) listed here: doi:10.1016/j.enpol.2008.12.035

Nielsen Research, 2008 online. Public Perceptions of Renewable Energy – a survey for the Energy Efficiency and Conservation Authority
<http://www.eeca.govt.nz/renewable-energy/documents/renewable-energy-nielsen-research-report-may-08.pdf> (downloaded 14 December 2008).

Ottinger, R.L., Williams, R., 2002. Renewable energy sources for development. Environmental Law 32, 331-368.

Parliamentary Commissioner for the Environment, 2006. Wind power, people, and place. Parliamentary Commissioner for the Environment, Wellington.

Pasqualetti, M., 2001. Wind energy landscapes: society and technology in the California Desert. Society and Natural Resources 14, 689-699.

Scottish Executive Central Research Unit, 2000. Public Attitudes towards Wind Farms in Scotland. Scottish Executive, Edinburgh

Sibille, A., Cloquell-Ballester, V-A., Cloquell-Ballester, V-A., Darton, R., 2009. Development and validation of a multicriteria indicator for the assessment of objective aesthetic impact of wind farms. Renewable and Sustainable Energy Reviews, 13(1), 40-66, doi:10.1016/j.rser.2007.05.002.

Thayer R.L., Freeman, C.N., 1987. Altamont: public perception of a wind energy landscape. Landscape and Urban Planning 14, 379-398.

Toke, D., 2005. Explaining wind power planning outcomes: Some findings from a study in England and Wales. Energy Policy 33, 1527-1539.

Van der Horst, D., 2007. NIMBY or not? Exploring the relevance of location and the politics of voiced opinions in renewable energy siting controversies. Energy Policy 35, 2705-2714.

"Public perceptions of wind energy developments: Case studies from New Zealand" - Revised personal version of paper to appear in *Energy Policy* (in press 12 February 2009). NOTE: Final official version can be found using Digital Object Identifier (DOI) listed here: doi:10.1016/j.enpol.2008.12.035

Vorkinn, M., Riese, H., 2001. Environmental concern in a local context: the significance of place attachment. *Environment and Behaviour* 33, 249-263

Warren, C., Lumsden, C., O'Down, S., Birnie, R. 2005. 'Green on Green': Public Perceptions of Wind Power in Scotland and Ireland. *Journal of Environmental Planning and Management* 48(6), 853-875

Willems, S., Baumert, K., 2004. Institutional capacity and climate actions. *OECD Papers* 4(2), 1-50.

Wolsink, M., 2000. Wind power and the NIMBY-myth: institutional capacity and the limited significance of public support. *Renewable Energy* 21, 49-64

Wolsink, M., 2005. Wind power implementation: the nature of public attitudes: equity and fairness instead of 'backyard motives'. *Renewable & Sustainable Energy Reviews* 11, 1188-1207.

Wolsink, M., 2007. Planning of renewables schemes: deliberative and fair decision-making on landscape issues instead of reproachful accusations of non-cooperation. *Energy Policy* 35, 2692-2704.