Wind power, people, and place

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Preface

This study focuses on the effects of commercial-scale wind farms on the character, quality, and values of landscapes and the visual amenity of communities. It was motivated by my concern at the *way* New Zealand is developing its wind power, what lies behind people's concerns about it, and the limited dialogue about the place of wind power in New Zealand's energy futures.

Wind is one of five major renewable energy sources, along with water (hydro), photosynthesis (biomass), direct sunshine, and the ocean (wave, tidal, and currents). Today's fossil fuels – coal, oil and gas – were, of course, created millions of year ago and are not being replaced within any meaningful timeframe. Nuclear energy sources are similar – stored energy, and non-renewable given today's technologies.

Wind power is very important to the future proofing of our energy supplies as we head into a physically turbulent century as a result of climate change.

New Zealand is expanding its wind power because it is cost effective and because it has no direct greenhouse gas emissions. We also have many sites with good wind flow, and over 80 percent of us support wind power in principle. However, this expansion is happening with limited engagement of most New Zealanders about how best to locate wind farms in the landscape. This is causing tensions within communities and is at the heart of our concerns.

The current wind power model is the same as that used for hydro in the 1960s and gas and coal in the 1980s: large-scale, and dominated by Government agencies. This model is almost certain to generate friction, and we see that in concerns about landscape and visual amenity impacts. Guided by the amendments to the Resource Management Act, recent Environment Court decisions are favouring wind farm developments when balancing the benefits of renewable energy with impacts on landscapes and visual amenity.

Tensions are being exacerbated by the limited scope for most New Zealanders to be involved in wind power development. There is little or no opportunity to invest in most wind farms, nor for smaller-scale developments or local community ownership.

As we learn more about the link between energy sources and global climate change, interest is growing about where personal energy supplies come from, and in the wider dimension of being a more environmentally responsible citizen. Some overseas markets cater to this by supplying 'green' electricity from renewable sources. However, in the case of wind, evidence from Denmark and Germany is that community ownership and smaller-scale wind farms are more acceptable. This is not simply because of their reduced impact on the landscape, but also because local ownership creates a more intimate link between community and energy, and thus a greater sense of security.

I believe we need and want to take more control of our energy futures. This shift fits well with the growing potential to expand the supply of energy from smaller-scale renewable sources, a move that would increase the resilience of energy systems at the household, business and community level.

Our first recommendations are to the Minister of Energy. These address the scale of wind farms and the need to explore the potential for community ownership. The context of wind power is most important. Failure to address these social and community dimensions will seriously limit how wind power can contribute to our wellbeing in a way that does not degrade cherished landscape values. Our conclusions and recommendations also focus on the need for central and local government policy on the location and distribution of wind farms.

State-owned enterprises are the dominant investors in our wind farms so Government, through its shareholding Ministers, is uniquely placed to take the lead in reshaping the ownership and scale of wind power. Given that this is so important in other countries, I am confident they will.

Dr J. Morgan Williams
Parliamentary Commissioner for the Environment

Summary of key findings

Wind energy is a plentiful renewable resource that can be harnessed without harming ecosystems. Using wind power instead of fossil fuels reduces greenhouse gas emissions and reliance on non-renewable energy. To improve the sustainability of the electricity system, we need a long-term strategy that increases the proportion of renewable energy sources (including wind power) and improves energy efficiency.

Wind farms will only ever occupy a very small proportion of New Zealand's landscapes. Wind farms can also have positive impacts. Even if high growth predictions for wind power eventuate over the next 10 years, wind farms will not dominate New Zealand's landscape, meaning impacts nationally will be very minor. Wind farms can be seen as positive elements in the landscape because of their sculptural qualities, and because they are seen to symbolise clean, green energy.

The location of the best wind resources and the push for large-scale wind farms is causing localised impacts on particular valued landscapes and communities. Wind farms are being proposed and built in outstanding natural landscapes, areas of moderate-to-high natural character on the coast, and near to residences. Other factors leading to significant localised adverse effects are the trends towards larger wind farms (both in size and number of turbines) and clustering of wind farms.

Consultation early in a project and meaningful efforts to address community concerns are a vital part of developing wind power. Maintaining and increasing support for renewable energy, including wind power, is a key aspect of a sustainable energy future. Evidence of growing local community opposition to recent proposals is a concern, despite the general public's strong support for wind power.

A strategic framework is needed to address location, scale, distribution, and ownership of wind farms, and to give robust consideration to alternatives through specific policy, plans, and guidance. A case-by-case approach to decision making to date has been reasonably robust. However, trade-offs are more likely to occur under a case-by-case approach. To ensure positive outcomes for wind power, landscapes and communities, stronger leadership from central government and regional councils is needed on the *way* wind power is growing. A range of measures will be needed to achieve this leadership.

Robust national criteria are needed for assessing landscapes, and regional councils should lead landscape management. We need to address the ways landscapes are managed in New Zealand. There is evidence of inconsistency and lack of clarity about how landscapes are managed between regions and districts.

We can learn from other countries' approaches to wind farm development. Smaller-scale, dispersed wind turbines and farms, and community ownership of smaller, commercial wind farms, have proved successful in other countries. Overseas approaches have increased community acceptance, reduced impacts on valued landscapes, distributed benefits and impacts more evenly, and involved communities in sustainable energy projects. Central government should lead in investigating how these approaches could benefit New Zealand.

CHAPTER 1

Introduction

Electricity generated from wind power has grown substantially in the last 10 years in New Zealand. We predict that this growth will continue, and that wind power will play an important role in New Zealand's electricity system.

Wind energy is a plentiful renewable resource and emits no greenhouse gases. It is one of the more environmentally benign forms of electricity generation, and is supported by many New Zealanders.[1] However, good sites for large-scale wind farms can be in landscapes highly valued for scenic, natural, cultural, or recreational attributes. Large-scale wind farms may also directly affect the visual amenity of nearby communities.

A dynamic tension exists therefore between two desirable outcomes. First, we need to ensure wind power helps improve the sustainability of the electricity system. Second, we need to positively integrate wind farms into New Zealand's landscapes and local communities.

This report examines the challenges and opportunities of locating wind farms in New Zealand's landscapes and near communities. The report looks at whether the available mechanisms for managing the growth in wind power adequately address these challenges and opportunities.

1.1 Background to this report

The Parliamentary Commissioner for the Environment (PCE) takes a keen interest in sustainability issues concerning electricity, energy, and the environment. The PCE has investigated energy efficiency and renewable energy[2] and energy scenarios,[3] and undertakes an annual assessment of the Electricity Commission's environmental performance.[4] The PCE has also investigated the management and protection of New Zealand's landscapes and amenity.[5]

Several individuals and groups have contacted the PCE about the impacts of recent wind farm proposals on communities and landscapes. These concerns reflect the strong values many New Zealanders hold towards the environment and the amenity value it provides. They also reflect the uncertainty about how wind farms will affect people living nearby.

Wind power is growing rapidly in New Zealand and proposals around the country are generating considerable interest and debate. It is important that the growth in wind power occurs in a positive way. Therefore, this examination of the future of wind power in New Zealand by the PCE is timely.

1.2 Terms of reference

This investigation was carried out pursuant to s 16(1)(a) of the Environment Act 1986, with the aim of maintaining and improving the quality of the environment.[6]

The terms of reference were to:

- review the current and future development of wind power in New Zealand
- identify the impacts of wind farms on landscape and amenity
- review the current government mechanisms for both facilitating and managing wind farm development in New Zealand, and how these have been used to date
- examine the options for ensuring wind power contributes positively to New Zealand's environmental and social sustainability.

This report focuses on the effects of commercial-scale wind farms on the character, quality, and values of landscapes, and the visual amenity of local communities – where the major tensions lie. The report teases out the complexities of these tensions, and assesses the institutional arrangements for managing them.

The investigation has also covered broader aspects of wind farm development where needed to provide context or to make connections with related issues.

1.3 Research methods

Initial research determined the scope of the investigation. A set of key issues and questions was then developed to guide the investigation (see Appendix A). Three main methods were used for collecting information.

1 We analysed statutory, policy, and institutional frameworks influencing wind power, along with articles and reports examining wind farm development and its impacts. This included international work.

2 We interviewed a broad range of agencies, individuals, and stakeholders with an involvement or an interest in wind farm development (see Appendix B for a list of those interviewed). These interviews were structured around the key issues and questions of the investigation (see Appendix A).

3 We focused on three regions in New Zealand where wind farm development has been progressing, namely Manawatu-Wanganui, Wellington, and Auckland.

1.4 What this report does not cover

This report does not provide an analysis of *all* of the issues associated with wind power development. The following areas have not been investigated in depth, although they may be discussed in the report to provide context:

- technical and economic issues related to the growth of wind power in New Zealand.[7]
- coverage of all the impacts of wind turbines, including noise, telecommunications, or effects on aviation. Visual amenity and landscape impacts were considered the most in need of investigation and we were able to consider them in detail by not considering all types of impacts.
- effects of offshore wind farms. While these may be developed in New Zealand in the future, all current proposals are for land-based wind farms.
- domestic-scale wind turbines (such as those that can be mounted on houses). These are covered in a separate investigation by the PCE that looks at the barriers and opportunities for the uptake of local energy systems[8] in New Zealand. This report does include discussion of smaller-scale commercial wind farms, including possibilities for community ownership.

1.5 Structure of this report

Chapter 1 outlines the terms of reference for the report, including its scope, objectives, and methodology.

Chapter 2 sets the broad context of electricity sustainability within which wind power lies.

Chapter 3 discusses wind power development in New Zealand, including current and likely future growth, and drivers and constraints to this growth.

Chapter 4 provides an overview of international wind power development, focusing on five countries. Comparisons are made between models of growth and approaches to management.

Chapter 5 looks at landscape and community in New Zealand, discusses the types of landscapes valued by New Zealanders, and examines the impacts wind farms can have on landscapes and local communities. It also identifies people's perceptions of wind farms.

Chapter 6 outlines the legal and policy framework for wind farms. This focuses on the Resource Management Act 1991 (RMA), and includes a discussion of case law and central government input.

Chapter 7 presents case studies of wind farm development in Auckland, Wellington, and the Manawatu regions, looking at plan content, submissions, and community attitudes.

Chapter 8 presents the conclusions and recommendations of the report.

CHAPTER 2

Wind power and sustainable energy

2.1 Defining environmentally sustainable energy

The PCE supports measures that help us move towards a more environmentally sustainable electricity system. However, some uncertainty exists about what an environmentally sustainable electricity system might look like and what role wind energy will play in achieving it.

The PCE developed sustainability criteria for assessing the environmental performance of the electricity sector, based on criteria developed by the Organisation for Economic Co-operation and Development (OECD) (see Appendix C).[9] From these criteria, the PCE developed priorities for the environmental performance of the electricity system (see Table 2-1).[10]

Table 2-1: PCE's priorities for environmental performance assessment of the electricity sector

Priority	Environmental considerations and responses
1	Manage growth in electricity demand by promoting: • energy efficiency • active demand-side participation.
2	Promote the development of renewable technologies, particularly new and emerging technologies.
3	Promote the electricity system's security and efficiency by: • use of distributed generation • managing renewable resources within natural rates of replenishment • complementary use of energy sources, particularly renewables.
4	Ensure consistency with government policies on climate change and energy efficiency.
5	Minimise greenhouse gas emissions.
6	Avoid, remedy, or mitigate new or existing effects on the environment.

Essentially, steps to creating a more sustainable energy system start with using energy more efficiently. Use of renewable energy must increase and non-renewable sources must be used more efficiently.[11] We must also make sure we access energy resources in a way that does not lead to irreversible impacts on humans and ecosystems.

Humans are part of the environment. Therefore, the electricity system must sustain the values and services that society considers important. Communities and individuals must support measures to progress towards a sustainable electricity system.

2.2 Wind energy within the electricity system

Wind energy will play an important role in achieving a more environmentally sustainable electricity system, along with other forms of renewable energy and significant improvements in energy efficiency.

Wind energy is important because it is a renewable resource in plentiful supply and generates electricity without emitting greenhouse gases. It can avoid the need for other types of generation with greater environmental impacts. Wind turbines and the associated equipment can be removed with relative ease, making impacts reversible (unlike many other forms of electricity generation).

Wind energy does, however, have environmental effects (including effects on people and communities). These vary depending on the location and scale of the wind farm, and the reaction of the local community. These impacts should be carefully addressed in a robust way. Impacts on landscape and local communities are discussed in Chapter 5.

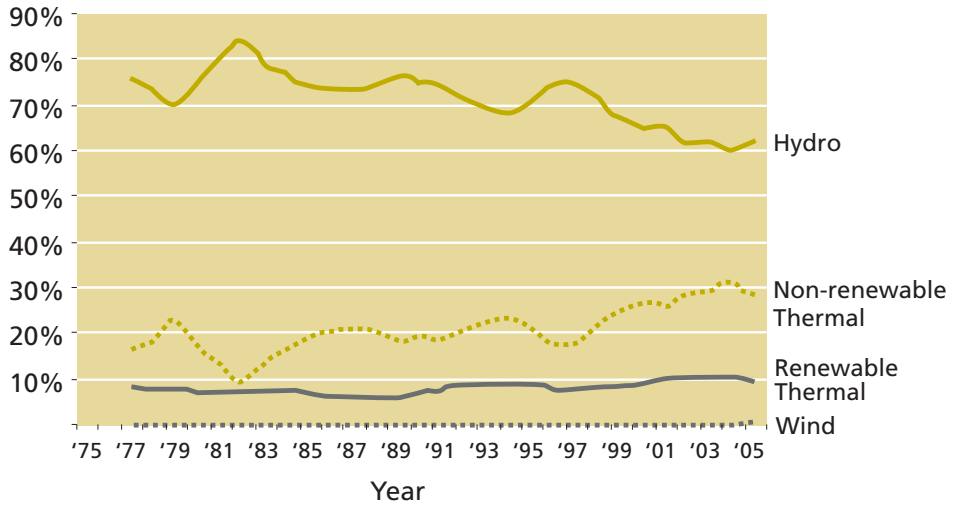
The extent to which wind energy may help to meet New Zealand's future energy needs is discussed in Chapter 3.

2.3 Electricity generation trends

The demand for electricity in New Zealand has been steadily rising at an average of 2.4 percent each year, an increase of 102 percent over the last 30 years. This rise has been because of population increase, but also because of an increase in use per person. There has been a corresponding increase in generation to cater to this demand. New Zealand now uses approximately 42,000GWh of electricity a year, and has installed generation capacity of 8,858MW.[12]

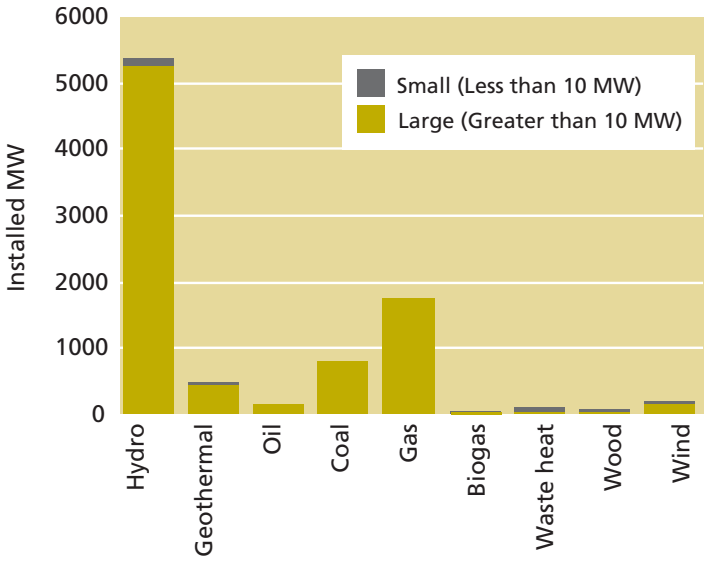
New Zealand is lucky to have a considerable proportion of our electricity needs (around 65 percent) provided through renewable sources (mostly hydropower). However, Figure 2-1 shows that generation from fossil fuels has increased from around 15 percent to around 30 percent since 1977.[13] Carbon dioxide (CO_2) emissions from electricity generation increased by 80 percent between 1990 and 2005.[14]

Figure 2-1: Electricity generation mix 1975–2005 (3-year average) (Source: MED, 2006)



Investment in new electricity generation continues to be mostly large scale and remote from demand. Figure 2-2 shows that only a very small portion of installed electricity generation capacity occurs in amounts of less than 10MW (approximately 3 percent).[15] Most generation is larger than 100MW.

Figure 2-2: Size of generation capacity (Source: MED, 2006)



These trends indicate that New Zealand's electricity system is placing increased pressure on the environment and communities. There are risks of relying increasingly on finite resources that contribute to New Zealand's growing CO_2 emissions.[16]

2.4 Alternative electricity futures

The PCE undertakes targeted studies as part of his work assessing the environmental performance of the electricity sector. The first of these studies was Future currents, a report that described two electricity scenarios for New Zealand to 2050.[17] The report discusses the sustainability of the electricity system (and the wider energy sector) based on the energy services that society needs rather than on providing more electricity. Energy services are lighting, heating, cooling, motive power, and information (i.e. information technology and communications).

In *Future currents* the Commissioner argued that, to be sustainable, energy services must be provided at the least cost to the environment, society, and the economy both now and into the future. He proposed that this be achieved through two interdependent means:

- increasing the efficiency of providing energy services (such as passive solar designed houses, high-efficiency refrigerators, compact fluorescent lights)
- increasing the efficiency of energy provision (energy system efficiency) by processing and transporting energy sources with the minimum loss of energy: for example, minimising transport distances, using waste energy resources, and so on.

The *Sparking new designs* scenario in *Future currents* described such a future unfolding over the next 45 years. To achieve a renewable electricity future requires a real ongoing improvement in overall energy efficiency and an increasing contribution from distributed energy sources, especially those based on renewables and at a smaller scale than traditional forms of energy. Solutions can be found that address economic, social, and environmental aspects without the need for trade-offs between them.

Sparking new designs was compared with an alternative scenario called *Fuelling the future*. This scenario assumed that the improvement in energy efficiency would continue at the historical low rate with no policy preference for renewable energy over fossil fuels. Under this scenario, demand for electricity would double, with a corresponding increase in large-scale generation. Without any policy to discourage the use of fossil fuels, carbon emissions were calculated to increase to levels over five times those of the electricity sector in 1990.

Installed capacity of wind power under both these scenarios was predicted to be around 1800MW[18] by 2050. However, under the *Sparking new designs* scenario, because demand was lower and the provision of energy more efficient, wind contributed a much greater proportion of total generation capacity.

CHAPTER 3

Wind power development in New Zealand

This chapter looks at what is driving growth in wind power in New Zealand, and what constraints are faced. It then discusses what type and amount of wind power we might see in this country over the next 10 years.

3.1 Wind power drivers

3.1.1 New Zealand's wind resource

New Zealand has an excellent wind resource, as it sits in one of the major atmospheric circulatory zones. This is a zone of prevailing westerlies known as the Roaring Forties. The potential for using wind to generate electricity is therefore significant.[19]

Figure 3-1 gives a high-level overview of New Zealand's wind resource. Wind speeds above 8 metres a second are considered economically viable for electricity generation (excluding other factors). The map shows several areas with wind speeds of 5 metres a second or more, indicating that speeds above 8 metres per second will be experienced for prolonged periods. In their 2001 report, EECA identified 13 general areas suitable for wind power development, most of these on the coast.[20]

Local conditions have a significant impact on the siting of wind farms. Only after extensive wind measurements can a site be deemed to have a viable wind resource. For example, the wind-funnelling effect of the Manawatu Gorge (not shown in Figure 3-1) makes it highly desirable as a site.

3.1.2 Mature technology and industry

The development of the electricity generating wind turbine can be traced back to the 1940s.[21] Since the late 1970s, the development of reliable and efficient technology, and support for this by some governments, has promoted wind power to a mainstream energy option. By the mid-1990s the technology was both reliable and competitive with some other commercial forms of electricity generation, especially when located on the best wind sites.

A major reason for the increased uptake of wind energy in New Zealand is that the technology is now known and well understood. The electricity industry can assess overseas experience and the success of existing wind farms.

Figure 3-1: New Zealand wind resource (Source: National Institute of Water and Atmospheric Research Ltd)

3.1.3 Price of and demand for energy

As the cost of wind power technologies has reduced over time, the price of electricity from other sources has increased.[22] This is a global trend. In New Zealand it has been exacerbated by the decline of the Maui gas field. Electricity demand is growing at about 2 percent a year (about 1000GWh). New sources of energy for electricity generation are being sought, including hydropower, natural gas, geothermal, coal (with or without carbon sequestration), wind, and tidal. Wind energy from the best sites is now considered to be competitive with these other options.

3.1.4 Ownership and scale drivers

Wind power can be developed at different scales. Scale relates to both the physical size and generation capacity of each turbine, and the number of turbines in each wind farm. The structure of the electricity market significantly influences who will invest in wind power and the type of investment that will be made.

The major electricity market players are the 'gentailers' (the major generators who also own the energy retailer companies), the lines companies, and grid operator Transpower. The lines companies and Transpower are discouraged[23] from non-line business by a regulatory framework designed to prevent any abuse of their natural monopoly power.[24] Despite these disincentives some lines companies have sought the regulatory approvals necessary for them to invest in wind power.[25]

Future investment in wind power will probably continue to be dominated by existing generators because they:

- already have an existing retail base with a known demand
- can manage any variability in electricity generated from wind by using other parts of their generation portfolio as reserve generation
- have an existing cash flow and asset base that can be used to leverage new debt
- can buy in bulk and gain advantageous terms.

Some investment in wind power by lines companies may occur, but under the current regime, is limited by regulatory requirements.

To be competitive with other forms of generation, investment in wind power by existing generators is largely driven by economies of scale. Projects are therefore mostly large scale, in both size of turbines and number of turbines in each wind farm. While small projects (such as those under 20MW) may still be built in New Zealand, there is a strong trend towards larger wind farms. The proposed Meridian Energy wind farm at Rocklands in Otago's Lammerlaw Range is an example. This wind farm is projected to have installed capacity of up to 630MW and 176 turbines.[26] If built, it will be the biggest wind farm in the world.

In saying that, a few examples of small-scale wind power are emerging in New Zealand (see box).

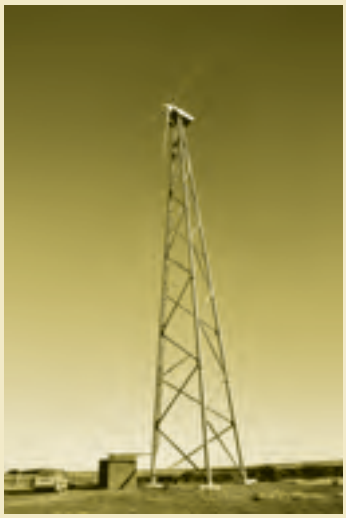
Small-scale wind power

Energy3 has constructed a single wind turbine, located 5 kilometres from Southbridge near Christchurch in the South Island. The turbine is 100kW in size and is constructed on a 45-metre lattice tower.

This one turbine generates enough electricity to meet the annual electricity needs of approximately 30 average homes.

Energy3 develops commercial distributed generation to bring renewable energy to individual consumers.

See www.energy3.co.nz for more information.



3.1.5 Government policy

While the Government encourages the use of renewable energy, it has no specific policy to promote wind power. The most direct government support has come from climate change policy initiatives.

The 2002 climate change policy package established the Projects to Reduce Emissions (PRE) mechanism that enabled proponents of wind farms to bid to receive carbon credits if their project would not otherwise have been commercially viable. These carbon credits could be traded internationally. This has provided some support to power development, with 13 wind farm proposals awarded credits.

In November 2005, as a result of reviewing climate change policies, the Government announced that the carbon tax would not be implemented. The Government directed officials to develop new policies to meet Kyoto commitments. The results have yet to be announced and it is uncertain if or when another tender round for Projects to Reduce Emissions will occur.

The only other government support for wind power comes from the Energy Efficiency and Conservation Authority (EECA), as part of its work in supporting the objectives of the National Energy Efficiency and Conservation Strategy (NEECS). The strategy has a renewable energy target of 30 additional petajoules by 2012, but this target is not mandatory. The Minister of Energy announced on 30 March 2006 that the NEECS would be replaced.[27] The existing strategy will stay in force until the new strategy comes into effect.

3.2 Constraints to uptake of wind power

All energy technologies face constraints to their uptake. This section summarises the main constraints facing wind power in New Zealand.

3.2.1 Compatibility with the electricity system

The main long-term constraint facing wind power in New Zealand is the ability of the electricity system to accommodate the characteristics of the power it produces. The Electricity Commission is studying this issue.[28]

For generated electricity to be incorporated into the overall system, it must:

- meet the quality standards
- be predictable (the electricity promised must be delivered).

Most of the concern about wind power relates to the second point. Wind strength varies within short periods of time. The system must accommodate this variability, which is known as intermittency. Other forms of generation, or measures that can reduce demand, must be available to compensate instantaneously, otherwise the integrity of the system could be compromised.

Debate exists within the industry about whether the electricity system can already cope with the variability arising from wind power without the need for additional measures. However, the need to invest in these additional measures is cited by some as the major technical and economic constraint facing wind energy.

New Zealand has an advantage over many other countries in this regard because of its existing substantial hydroelectric capacity. Hydro generation can very quickly substitute for wind power when it is not windy. Treating the wind and hydro systems together may help to maximise the potential of both resources and help to overcome the problems arising from New Zealand's limited hydro storage capacity.[29] This is probably one of the reasons why Meridian Energy, the main hydro generator in New Zealand, sees a significant role for wind power within its portfolio of generation assets.

Encouraging the geographic dispersion of wind farms, as opposed to clustering, was also noted by a Ministry of Economic Development (MED) report as an important aspect of integrating high levels of wind power.[30]

Countries such as Denmark have successfully integrated high levels of wind power (up to 20 percent) into their electricity systems.

3.2.2 Access to the national grid or local network

Another constraint limiting wind farm proposals is suitability of access to either the national grid or local network. An investor in a wind farm must consider two issues:

1 Whether the grid or network has capacity to take the electricity at that location in terms of both quantity and quality.

2 The distance from the wind site to the nearest connection to the electricity system. The installation costs of new power lines are significant and if the wind project is already marginally economic, this can be the deciding factor.

3.2.3 Accessibility of the site

Another important consideration is the physical accessibility of the site. Most of the best wind sites in New Zealand are on ridges that often have difficult terrain. The practical difficulty and costs associated with getting the heavy equipment and components to the site can also be a deciding factor for a project. Developing road access and building turbine platforms can require significant earth works.

3.2.4 Likelihood of resource consents

Many potential wind farm sites in New Zealand are in areas that have existing values and attributes. Some sites such as those in national parks have such high values that it is unlikely a wind project would receive the necessary approvals. Other sites may also have values and attributes that could affect the likelihood of receiving the necessary approvals. These sites will be discussed in Chapter 5, particularly as they relate to visual amenity and landscape effects. If a particular site is deemed to have 'consentability' difficulties, the developer may modify the project, or consider another site.

3.3 Stakeholder views

We interviewed a range of stakeholders asking them what they thought about the opportunities and challenges facing wind power development.

Opportunities for wind power development:

- New Zealand's wind resource is the best in the world
- Wind power can address climate change
- Wind farms can enhance the environment when designed and placed sympathetically
- Rural areas can be made available for renewable energy development and safeguarded from further residential development
- Wind farms can foster local pride and identity
- Wind farms have a short lead-in time compared with other forms of generation
- Wind farms are largely reversible.

Challenges to wind power development:

- 'Cowboy' developers may give the wind industry a bad name
- The rush to develop wind farm sites encourages 'cherry picking' of the best sites, and in doing so, overdevelops these sites
- When we think of wind power in New Zealand, we think big, and this is likely to create tensions
- Local communities may oppose wind farm developments, and it is difficult to balance national and local interests
- Finding appropriate sites that meet all requirements (economic, social, and environmental) is difficult
- There is a danger in considering all wind power as a good thing, regardless of effects
- The lack of strategic energy policy in New Zealand means uncertainty as to the extent and success of wind farm development
- Misinformation exists and we lack objective information on both the impacts and the benefits of wind power.

3.4 Growth in capacity

The following section discusses the current and likely future growth of wind power in New Zealand in terms of number of turbines, size, and spread of wind farms. This will help us to assess the potential impacts on New Zealand's landscapes and communities over the medium and long term.

3.4.1 Existing wind farms

In 1993 the first modern wind turbine in New Zealand was commissioned at Brooklyn in Wellington. Since then just over 170MW of wind power capacity has been installed, most of this being in the Manawatu region. This provides 2 percent of New Zealand's electricity needs, enough to power around 75,000 households (assuming they are operational for about 40 percent of the time). Table 3-1 lists existing wind farms.

Table 3-1: Existing wind farms in New Zealand

Date commissioned	Name of project	Developers	No. and size of turbines	Total size (MW)	Location
1993	Brooklyn Wind Turbine	Meridian Energy	1 (225kW)	0.23	Wellington
1997	Hau Nui Wind Farm	Genesis Energy	7 (550kW)	3.5	Wairarapa
1999	Tararua Wind Farm I	TrustPower	48 (660kW)	31.7	Tararua Ranges, Manawatu
2003	Gebbies Pass	WindFlow NZ	1 (500kW)	0.5	Gebbies Pass, Banks Peninsula
2004	Tararua Wind Farm II	TrustPower	55 (660kW)	36	Tararua Ranges, Manawatu
2004	Te Apiti Wind Farm	Meridian Energy	55 (1.65MW)	90.75	Ruahine Ranges, Manawatu
2004	Hau Nui Expansion	Genesis Energy	8 (600kW)	5	Wairarapa
2005	Southbridge	Energy[3]	1 (100kW)	0.10	Southbridge, Canterbury
2006	Te Rere Hau Stage I	Wind Farm Developments Ltd	5 (500KW)	2.5	Tararua Ranges, Manawatu
				170MW	

3.4.2 Wind farms proposed and being developed

The wind power industry is growing rapidly. Many potential wind farms (shown in Figure 3-2) are either:

- under construction
- consented
- seeking consent, or
- being evaluated for their feasibility.

These total a capacity of about 2,800MW and would lift overall capacity to about 3,000MW. Two wind farms totalling 163MW are under construction: one in the Manawatu (TrustPower's Tararua Stage 3) and one in Southland (Meridian's White Hill wind farm). An additional five wind farms totalling 638MW have been granted resource consent or are at appeal.[31]

Some of the potential projects shown in Figure 3-2 may not proceed and additional projects may be added. However, the projects shown give an idea of potential future locations and the extent of wind farm development.

Figure 3-2: Existing and proposed wind farms in New Zealand (Source: Transpower)[32]

3.4.3 Ten-year growth predictions

High growth scenarios for wind farm development in New Zealand

The proposed developments in Figure 3-2 indicate potential extent of growth. However, these may not be indicative of actual growth as some are at early stages of investigation. We have used the Electricity Commission's scenarios for growth as the basis for estimating maximum potential growth, and corresponding physical impact, of wind farms over the next 10 years.[33]

The Electricity Commission developed growth scenarios for wind power in December 2005 (updated in April 2006) as part of the Wind Generation Investigation Project.[34] This project is to assess the likely impact of further wind power development on the integrity of the electricity system and market. The 'high-penetration scenario' predicted 2,000MW of additional capacity in the next 10 years.[35] This would mean that in 2016, about 17 percent of total installed capacity and about 14 percent of total electricity provision would come from wind power.[36]

Using the Electricity Commission's high-penetration scenario, the PCE has estimated the number of wind turbines and wind farms that might be developed in New Zealand over the next 10 years. Converting megawatts of installed capacity to the number of turbines and wind farms illustrates better the scale of physical impacts on landscape and the effect on community values.[37] Using the high-penetration scenario gives an idea of *maximum physical impact* on landscapes. Our assumptions follow:

- turbines used in commercial wind farms will range between 1.5MW and 3MW in size (in some situations, larger turbines have been proposed and smaller turbines have also been used). A 1.5MW turbine has a tower height of about 60 metres. A 3MW turbine has a tower height of about 80 metres.
- the number of turbines in each wind farm will range from 20 to 100. (This range is based on rough application of minimum and maximum numbers in existing and proposed projects).

Using these parameters we have estimated two possibilities for a high level of development by 2016 (see Table 3-2).

Table 3-2: Potential maximum wind turbines and wind farms in New Zealand by 2016 – two scenarios

	Smaller scale wind farms and turbines 1.5MW turbines 20 turbines per farm	Larger scale wind farms and turbines 3MW turbines 100 turbines per farm
Number of turbines	1,300	670
Number of wind farms	65	7

Table 3-2 shows that if 1.5MW turbines are used in smaller wind farms, we could expect 1,300 turbines in 65 wind farms. The other example, with larger turbines and larger wind farms, would mean 670 turbines located in seven wind farms. These are extreme examples, and the reality based on present trends is somewhere in between – about 1,000 turbines in 36 wind farms.

The installation of 670–1,300 turbines represents relatively small numbers over 10 years, taking into account New Zealand's land area and relatively low population density. Remember too that these numbers represent the likely upper limits of growth. In comparison Denmark has over 5,200 turbines on a land area almost equal to the Canterbury region, or a sixth of New Zealand's land area. When compared with commercial forestry, which has resulted in widespread landscape change in many rural parts of New Zealand, wind farms will not alter the environment to the same extent.

As well as indicating total overall growth, this analysis has illustrated that wind farm development could proceed in different ways to achieve the same end:

- large wind farms that concentrate generation and impacts
- smaller, more dispersed wind farms
- a combination of both.

Preferences and comparative benefits and costs of these options from social and environmental perspectives have not been explored in New Zealand.

Distribution of wind farms

This analysis does not take account of how these turbines might be distributed around the country. Figure 3-2 shows that there are proposals in many parts of New Zealand. However, the spread is not uniform. Certain areas (with good wind resource) will have significantly more installed turbines than others. In some areas wind farms will be more geographically concentrated, and some projects will be closer to urban areas.

For example, proposals in the Otago region, which are reasonably remote from populated areas, total 975MW. By contrast, around Palmerston North nearly 550MW could be located in a relatively small area, most within view of an urban area. Wellington is in a similar situation with around 430MW proposed. Hawke's Bay has three projects totalling 378MW, but all within a few kilometres of each other. Wind farms are very likely to be clustered in areas with good wind resource, good transmission connections, and favourable access.

Along with aggregated national scenarios, the Electricity Commission developed regional scenarios, based on 10 regions where wind farms might be located. Under its high-penetration scenario of 2,000MW, it distributed 70 percent in the North Island and 30 percent in the South Island (see Table 3-3).

Table 3-3: Electricity Commission regional high-penetration scenario (Source: Electricity Commission, 2005)

Region	Wind generation
Northland	150MW
Auckland	300MW
Waikato	100MW
Hawke's Bay	300MW
Manawatu Gorge	200MW (additional)
Wellington	300MW
Marlborough	50MW
Otago	300MW
Southland	300MW
Total	**2,000MW**

This scenario shows a reasonably even distribution among the regions identified, with a minimum of 50MW and a maximum of 300MW. This indicates between 30 and 200 turbines could be built in each of the ten regions.[38] Again, this is not a huge number given the size of each region.

The most important issue to consider in relation to impacts on landscapes and amenity is that impacts are likely to be concentrated on particular localities within regions. We also need to consider that the regional scenarios listed in Table 3-3 may not represent what happens in reality. Wind farms may have more concentrated impacts. For example, the proposed wind farms in Otago could total 975MW rather than the 300MW indicated in Table 3-5.

Projections of growth further into the future would produce a greater number of turbines, particularly if energy efficiency does not improve, and an aggressive approach to renewables development is taken.

CHAPTER 4

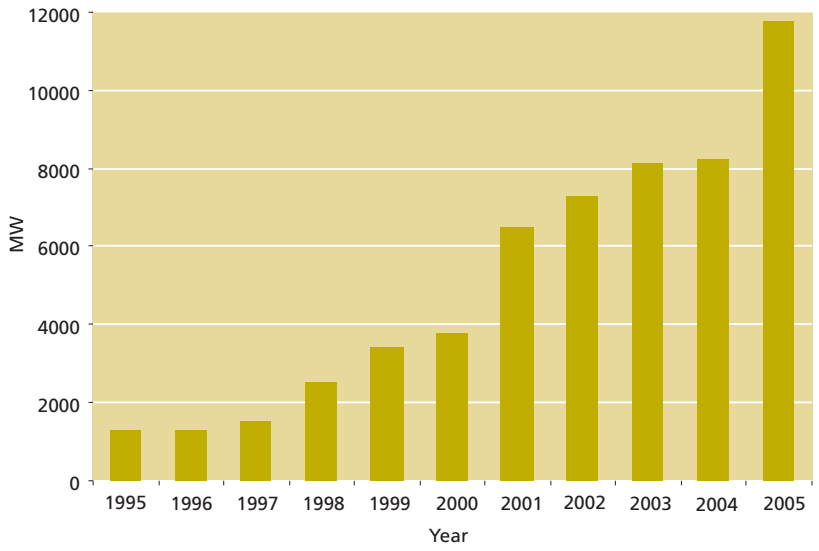
International wind power

4.1 Growth in capacity

Over recent decades, the wind power industry has been one of the fastest growing renewable technology markets in the world (see Figure 4-1). In 1995, global wind capacity was 4,800MW. By the end of 2005 capacity had grown to around 59,322MW. The World Wind Energy Association expects 120,000MW to be installed by 2010.[39] New Zealand's total installed capacity from all electricity generation sources is 8,858MW.[40]

About 76 percent of the total capacity has been installed in just five countries: Germany, Spain, the United States, India, and Denmark (see Table 4-1).

Figure 4-1: Global annual installed wind power capacity 1995–2005



4.2 Trends in uptake

This section briefly describes the wind industry growth models and policy frameworks adopted in Germany, Denmark, the United States, the United Kingdom, and Australia. We chose these countries as examples of how the extent of wind power and approaches to its development can differ. This international experience can inform our own approaches to it.

Table 4-1: Top ten countries: Installed wind power capacity

Total capacity	MW	%
Germany	18,482	31.0
Spain	10,027	16.9
US	9,149	15.4
India	4,430	7.5
Denmark	3,122	5.3
Italy	1,717	2.9
UK	1,353	2.3
China	1.260	2.1
Japan	1,231	2.1
NL	1,219	2.1
Top 10 Total	**51,936**	**87.5**
Rest of world	**7,368**	**12.5**
World Total	**59,322**	**100**

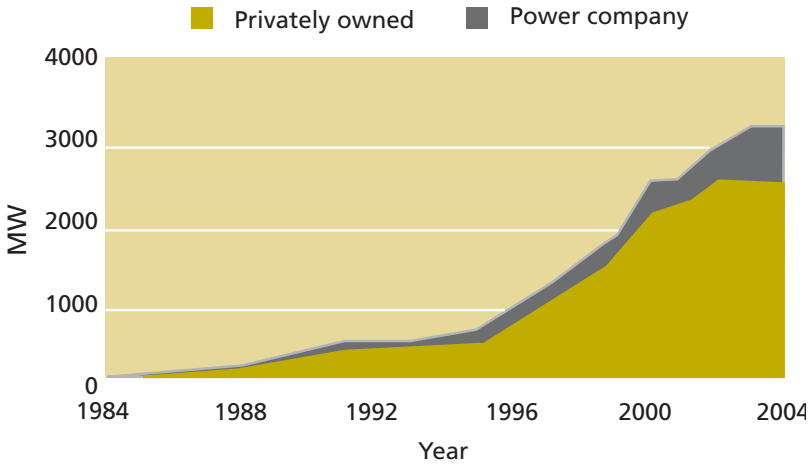
4.2.1 Denmark

The wind industry in Denmark dates from the late 1970s, making Denmark one of the pioneering nations of wind power. Denmark has the fifth largest wind capacity in the world, and 20 percent of the country's generation comes from wind power[41] – a government target that was achieved by 2003.[42] The wind industry now provides about 45,000 jobs throughout the country, and Danish turbine manufacturers have a market share of around 40 percent of global sales. Over 5,200 turbines are installed on land in Denmark, a country with 5.4 million people. Denmark has also developed several offshore wind farms (See Figure 4-2).

Figure 4-2: Offshore wind farm, near Copenhagen (Source: ©iStockphoto.com/ Tore Johannesen)

Denmark's significant growth is based on strong and consistent government support, along with high levels of citizen investment facilitated by well-designed community ownership schemes. About 5 percent of the population, or 100,000 households, own shares in approximately 85 percent of all the wind turbines throughout the country.[43] A quarter of all wind farms are locally owned,[44] mostly through cooperatives that have developed from Danish cultural and agricultural interests.[45] Only 12 percent of Denmark's wind farms are corporate owned (see Figure 4-3).

Figure 4-3: Wind power in Denmark (Source: Danish Wind Industry Association)



Government support has been in the form of extensive investment in research and development since the 1970s,[46] targeted financial support, and a structured planning and decision making framework.

From 1979 to 1989, the Government offered an installation subsidy of 30 percent of total project costs, and 2,567 turbines were built. Many of these turbines were much smaller than those installed now. A feed-in tariff was introduced in 1992.[47] This tariff required network utilities to allow turbine owners access to the grid, while paying them a price of 85 percent of the electricity price for household consumers. This stimulated investment as it gave favourable and certain returns, particularly to smaller players.

The community ownership approach has meant 85 percent of the wind capacity is made up of small turbine clusters (up to three) rather than large wind farms that are distributed around the country. Large wind farms are rare, and are generally found in low-populated areas or offshore. Impacts on landscapes and people are therefore more dispersed, although total numbers of turbines are considerable.

The recent trend has been towards commercial ownership, as smaller turbines are replaced with larger ones, and government support reduces.[48]

4.2.2 Germany

Germany is the world leader in wind energy. Germany has 31 percent of the world's total installed capacity, with 17,574 turbines providing a substantial 18,428MW.[49] Wind power contributes 5.5 percent to Germany's total electricity needs, with most power coming from coal, nuclear power, and natural gas.

Like Denmark, wind industry development has been dominated by community ownership, with 300,000 individuals owning shares in wind projects.[50] At the end of 2000, 88 percent of the total wind capacity was community owned, with around a third developed by associations of local landowners and nearby residents.[51] International studies have shown that local ownership of turbines increases acceptance of wind farms.[52]

Support from the Government has boosted growth in the number of wind turbines.

- In 1989 the Government launched the '100MW Wind Programme' (extended to 250MW in 1999). This programme provided investment subsidies of up to 25 percent of a project's cost and helped to set up 1,560 wind turbines with a total capacity of 362MW.
- A feed-in law (Stromeinspeisegesetz) was introduced in 1991 similar to Denmark's feed-in tariff. This was replaced in 2000 by the Renewable Energy Law (REL).[53]

The feed-in law was the driving force behind the success of the German wind industry, and has enabled community investment in wind power.

> *Wind energy's general acceptance in Denmark and Germany has often been attributed to the dispersal of the wind turbines across the landscape and the distribution of ownership across hundreds of thousands of individual participants.*[54]

Community wind ownership

'Community wind' can be defined as commercial-scale wind projects where one or more members of the local community have a significant direct financial stake in the project other than through land lease payments. Essentially, community wind is about making opportunities for the whole community.[55] Community wind ownership can take a variety of forms, but the most common structure is when cooperatives form to purchase a turbine/s, sell the electricity to power retailers, and share the revenue among their members.

An example of community wind in Denmark is the Ronland wind farm located on a pier on the north-western coast of Denmark. This wind farm began generating in 2002 and consists of five 2MW turbines. More than 1,000 people from the local population of 4,000 own shares in the wind farm (that is, more than half the households). Local people, who had first priority for shares, own 90 percent of the wind farm.[56]

4.2.3 United States of America

Industry growth in the United States has mostly been spurred by large, commercially owned wind farm developments.[57] The United States now installs more capacity each year than any other country. Despite this, wind generates less than 1 percent of electricity.

Texas has the second largest wind capacity in the country. Seventy-eight percent of its wind farms have over 20 turbines, and 39 percent have more than 100. Project sizes are increasing.[58]

The use of land rental agreements is very common in the United States, where the developer pays farm or ranch owners for the right to install turbines on their land.[59] Farmers can also receive grants to install turbines on their land.

The infamous wind farms of the Altamont Pass in California have been branded as 'what not to do'. This area is part of a known bird migratory corridor. Several developments have caused many bird deaths, and have a cluttered, jumbled appearance.

The Production Tax Credit (PTC) was introduced in 1992, and helped fund more than 5,400MW of wind power from 1995 to 2004. The PTC provides a credit of 1.8 cents/kWh for wind-generated power during the first 10 years of a project's operation. The credit is available for other renewables, including solar, geothermal, and biomass. The PTC has traditionally been suited only to larger companies and has encouraged large wind farm development. This is because large companies can write off their tax credits against their large portfolios.[60]

One of the most common state-level policies is the Renewable Portfolio Standard system. The Renewable Portfolio Standard places an obligation on power companies to purchase an increasing percentage of their power from renewable sources, and by the end of 2005 had been adopted in 20 states and the District of Columbia.

In recent years community ownership schemes have begun to emerge, especially throughout the mid-west. For example, the state of Minnesota established a Community-Based Energy Development (C-BED) tariff designed to optimise local, regional, and state benefits from wind energy development, and to help develop community-based wind energy projects.[61]

4.2.4 United Kingdom

Even though the United Kingdom (UK) has the best wind resource in Europe, the wind power industry has struggled to keep up with the high growth rates seen on the continent. At present there are just over 1,600 onshore turbines in 130 projects in the UK, which has a land area of similar size to New Zealand, but a population of 60.5 million.[62]

Public opposition to projects led to a high number of refusals, particularly in England in the 1990s.[63] The type of Government support mechanisms and the lack of a clear

decision making framework have also been blamed for the lack of growth in wind power in the past.[64] From 1990 to 1998 the Non-Fossil Fuel Obligation (NFFO) required electricity suppliers to develop a specified portion of electricity from non-fossil fuel-based generators. However, many projects that won contracts were never built. The NFFO also generated controversy as it caused the 'cherry picking' of the best sites, with resulting conflicts over land use.

The UK wind industry has begun to grow more steadily in recent years, particularly in Scotland. In April 2002, the Government replaced the NFFO with the Renewables Obligation (RO). The UK is using the RO scheme to achieve its renewable energy target of 10 percent by 2010. This scheme requires electricity suppliers in England and Wales to source specified portions of their wholesale electricity from generators of renewable energy. In addition, the number of planning refusals has decreased in recent years.[65]

As in the United States, wind projects in the UK have traditionally been large and generally owned by commercial developers. An example of this is Whitelee wind farm near Glasgow, which has recently been granted planning permission. With 140 turbines at 322MW, it will be the largest in Europe.

The UK also has four offshore wind farms in operation (214MW) with another 10 either under construction or consented (totalling 950MW).[66] However, the high costs of offshore wind farms are said to be a constraint on further development.

4.2.5 Australia

Australia is a relative newcomer on the global wind industry scene, with only 10MW of generating capacity installed at the beginning of 2000. However, in 2001 the Australian Government introduced the Mandatory Renewable Energy Target scheme (MRET), which quickly boosted the industry up to 708MW in only five years.

The MRET requires electricity retailers to purchase an increasing amount of power from renewable sources, building up to 2 percent by 2010. This makes it similar to the Renewables Obligation scheme in the United Kingdom. To date, 32 wind developments producing just over 470MW have benefited from the MRET system. In 2004, the Federal Government announced that it would neither increase nor extend the MRET scheme.

Both large-scale and small-scale projects are being developed, with just over half of all wind projects consisting of five turbines or less. However, project sizes are increasing.[67] Most of the wind capacity is owned by either wind power developers or electricity generators, with only a few community-owned projects.

Some wind farm developments in Australia, especially proposals for developments near the coast, have been controversial, and political views of their benefits and impacts have been mixed.[68] In May 2006, the Government released a discussion paper on the need for a national code for wind farms.[69]

4.3 Public and community views towards wind farms

Opinion polls in many countries show strong support for wind energy as a preferred means of energy generation – typically around 80 percent.[70] Some studies show that support has tended to stay at a high level, even with increases in installed capacity.[71] For example, in Denmark, which has over 5,000 turbines, a recent study showed 68 percent of people supported further wind power development.[72]

International studies have also looked at the perceptions of local communities towards wind farm development in their area. These studies can be more helpful than general surveys. Some of the findings are listed below:

- strongly negative perceptions by people near operational wind farms appear to be in the minority. For example, in a survey of residents near several wind farms undertaken by the Scottish Government, 20 percent thought the wind farm had had a positive effect, 74 percent said neither positive nor negative, or had no opinion, and 7 percent thought it had had a negative effect.[73]
- many commentators refer to 'NIMBYism' (not in my back yard) or the "juxtaposition of high and stable levels of general public support with frequent local opposition to actual development".[74] Studies in several countries have shown that distance from an existing wind farm does not necessarily determine people's attitudes, particularly as people become familiar with actual developments.[75]
- some research shows that negative perceptions by local residents towards wind farms tend to decrease once the wind farm is operational. However, several studies do not support this finding.[76]
- several studies in different countries have found that people prefer smaller wind farms, with clusters of up to eight turbines the most strongly supported.[77]

Despite the high levels of public support found in these studies, wind farm proposals in many countries have generated vocal, passionate opposition. Many organisations have formed specifically to oppose wind farms.[78] A report issued by the European Renewable Energy Council called *Energy sustainable communities: experiences, success factors, and opportunities in the EU25* commented:

> *For many years, wind energy was considered environmentally sound. But recently, major social objections and land use concerns related to operation and siting of turbines have been raised. Social acceptance is one of the limiting factors of wind's potential growth.*[79]

Other factors that influence negative perceptions people have towards wind farms is the process by which a wind farm is developed, and the type of developers. The extent of community engagement, involvement, and ownership has been found to be an important factor influencing the level of support for wind farm development:[80]

> *…negative perceptions of wind farms may be motivated not only by negative evaluations of visual impact but also by a sense of lack of control over development or land use planning processes, and dissatisfaction with these procedures.*[81]

The recurring theme in many studies is the importance of taking into account the views of the community: "Placing turbines in the landscape and keeping the public involved in the process are two of the most critical steps in the acceptance of wind power."[82]

4.4 Encouraging community involvement and ownership in wind power

4.4.1 United Kingdom: Countryside Renewables Initiative

In the United Kingdom, the Countryside Agency's Community Renewables Initiative (CRI)[83] specifically promotes community-based renewable schemes that:

- are environmentally sensitive
- have support of all stakeholders
- are appropriate to the circumstances of the locality
- link to other diversification and regeneration schemes.

The CRI provides free expert advice and support through local support teams comprising local councils, energy experts, and other specialists. Community-owned wind power is a key CRI initiative.

4.4.2 United Kingdom: Community benefits from wind power

In 2005 the Department of Trade and Industry (DTI) undertook research to improve community benefits from, and involvement in, wind power in the UK The study looked at several European countries where community ownership and benefits are much more established. It concluded that integrating community benefits into wind power developments is important. It was found that policy mechanisms in the United Kingdom did not facilitate community-based wind initiatives.

The report recommended the following to the Renewables Advisory Board:

- a best practice 'toolkit' on community benefits
- best practice guidelines to legitimise community benefits within the planning process
- guidance on community engagement (possibly in the form of a protocol)
- a review of the potential for local taxes to accrue locally
- financially viable ownership structures for community ownership.

4.4.3 United Kingdom: Community engagement protocol

The South West public engagement protocol and guidance for wind energy developed by the South West Renewable Energy Agency in England[84] shows the importance of early and effective community engagement. The protocol sets up an agreed process that wind farm developers, local authorities, and other stakeholders should adopt, and outlines the responsibilities of the parties. The protocol sets out key principles:

- all parties must support the process
- the process must be inclusive, transparent, accessible, and accountable.

4.4.4 United States: Wind Farmers Network

The Wind Farmers Network is a non-government, membership-based exchange in the United States. The network aims to bring together a broad range of landowners, farmers, and ranchers to exchange their experiences in wind development and educate others who would like to develop wind resources.[85]

4.5 Planning for wind farm development

The growth in wind power must fit within a land use planning and decision making framework. In some cases, governments have developed decision making frameworks and guidance specifically for wind power. Examples of these are given in Sections 4.5.1 to 4.5.5.

4.5.1 Denmark: Strong, tiered land use planning framework

National wind power planning procedures were developed in 1992, with directives to local councils. These directives included the setting of regional targets for wind power.[86] In 1994 the Minister of the Environment and Energy ordered municipalities (regional councils) to find suitable sites for wind turbines, taking account of the landscape, visual impact, and other siting aspects.

Areas for wind turbines and farms are defined in regional plans.[87] Local plans cannot allow wind farms in areas not defined in the regional plans. Rules govern setback distances from residential properties, forests, historic buildings, and other specially designated sites. Plans may also include rules about turbine height, number and design of turbines per cluster, and layout. Schemes incorporating three or fewer turbines of less than 80 metres high are not required to undergo an environmental impact assessment (EIA). Those proposing wind power schemes must adhere to the local and regional plans.

4.5.2 United Kingdom: Central government policy and guidance

The Planning policy statement 22: Renewable energy (PPS22) was introduced by the Government in 2004 to support the Energy white paper (2002).[88] The white paper sets energy policy for the country, including targets for renewables. PPS22 provides national directives to regional and local authorities in planning and decision making.

Key directives are:

- local authorities must promote renewable energy in local plans, including the need for regional renewables targets (minimums).
- regional land use and planning strategies should favour renewable energy developments, but specific policies for locating these developments may be needed for some designations or areas (for example, national parks, areas of outstanding natural beauty, locally designated areas, and green belts). Large-scale developments in national parks are discouraged; however, 'no go' areas are also discouraged.
- local authorities need to develop criteria for assessing renewable energy developments.
- local authorities should foster community involvement and greater acceptance of renewable energy developments that are appropriately located, and developers should consult at an early stage.[89]

These national policy directives set a framework for renewable energy developments that local government must work within and plan for. The main aim of PPS22 appears to be the removal of restrictions to renewable energy development. However, it also attempts to establish a more structured policy framework for integrating renewable energy goals and land use decision making.

4.5.3 Landscape guidance in the United Kingdom and Australia

Several agencies provide policy guidelines for dealing specifically with the landscape impacts of wind farms. These guidelines build on general government policy. For example, Scottish Natural Heritage has developed specific guidelines on the cumulative effects of wind farms on natural heritage.[90] English Heritage has released guidelines called *Wind energy and the historic environment.*[91]

The Australian Wind Energy Association (AusWEA) and Australian Council of National Trusts are investigating in partnership how wind farms affect landscape values.[92] The study aims to help develop an agreed national framework for wind farm development, including effective methods of assessing landscapes.

4.5.4 Vermont, United States: State planning for integrating landscape and wind power

The Vermont Department of Public Service carried out the Wind Siting Consensus Building Project in 2002 to build consensus on the appropriate siting of utility-scale wind energy developments in the State. The project gave special attention to the aesthetic impact of these developments on Vermont's scenic landscape.[93]

Workshops discussed a report called *Wind energy and Vermont's scenic landscape* to gain a range of stakeholders views.[94] From this, a report was prepared called *Wind*

energy planning resources for utility-scale systems in Vermont.[95] It aims to provide guidance and information to city and regional planners in deciding how to plan wind farm development over the long term.

In addition, in 2004, the Vermont Agency of Natural Resources released policy prohibiting large, utility-scale wind farm development on state lands in order to protect natural resources.[96]

4.5.5 Other measures

Many approaches have been applied by other countries seeking good management of wind farm location, scale, and design.

Many countries with significant wind resource have carried out:

- detailed mapping of the wind resource for each region
- constraint and opportunity mapping (that is, mapping areas sensitive to wind farm development and areas with good wind resource) to work out development potential for each region, including appropriate project sizes.[97]

4.6 Success factors for wind power growth

Strong, well-structured, consistent support and direction from central government is a major influence on wind power growth. Targets, financial support, and a strategic approach to renewable energy are key elements of this support.

The choice of *which* policy mechanisms and financial incentives are used also has a strong influence on the distribution, ownership, and size of wind turbines and farms. For example, the feed-in tariff adopted in Denmark and Germany has facilitated wind power development with community and cooperative ownership, and led to a wide distribution of small projects around the country. The incentives in the United Kingdom and Australia promoting competition among generators have resulted in larger developments on the best sites by large-scale generators, potentially increasing tensions with local communities.

The success of German and Danish community ownership schemes proves that community wind can make a significant contribution to the overall industry. It shows that countries need not rely solely on large commercial developers, or large wind farms. Other countries are attempting to emulate this success. Government support is a key factor in kick-starting community ownership.

Community involvement in decision making has been found to be a key aspect of ensuring acceptance and support for large-scale commercial wind farm development.

Most countries recognise the need for a planned approach to deciding where to locate wind farms, particularly with rapid wind power growth. A planned approach helps to provide certainty, reduce resource conflicts, and allow consideration of

alternatives and effects of multiple developments. People recognise that wind farm development is not appropriate in all places or at all scales, and that measures are needed to protect certain locations. Governments differ, however, in how much control they have over deciding where to locate wind farms.

Policy and guidance that specifically addresses wind power helps to support planning and decision making. Most countries have carried out studies and developed guidance that focuses on wind power and its impacts, especially on the landscape.

Factors such as total population and population density, topography and wind resource, design and capacity of transmission systems, land use pressures, and societal values differ between each country. All these factors influence the extent, distribution, and location of projects in each country, and must be taken into account to make sure policy and planning are appropriate.

CHAPTER 5

Wind farms, landscape, and community

All types of electricity generation have environmental impacts, including wind farms. EECA's 2004 *Guidelines for local authorities: Wind power* lists effects of wind farms on the environment. These include:

- landscape and amenity effects
- noise
- ecological effects (including bird deaths)
- archaeological and historical effects
- effects on water
- telecommunications, aviation, and traffic
- tourism and recreational effects
- intrinsic values
- public safety
- other land uses.

All effects of wind farms must be carefully considered for any particular proposal.

This report concentrates on the impacts on landscape, natural character, visual amenity, and local communities.

5.1 Key concepts

The terms 'landscape', 'amenity values', 'natural character', 'rural character' and 'community' are used in various Acts and policy documents for managing New Zealand's environment. Their meanings overlap and they can mean different things to different people. To avoid confusion we comment in Sections 5.1.1 to 5.1.5 on the meanings of these terms in the context of this report.

5.1.1 Landscape

'Landscape' describes both a physical area and the relationship and interaction between people and the environment within that area. 'Landscape values' means more than just the visual aesthetic and the natural environment, but also includes a sense of place.[98]

Landscape is not defined in the Resource Management Act (RMA). However, the Environment Court in recent judgements has confirmed this meaning.[99]

5.1.2 Amenity values

'Amenity values' are defined in the RMA as "those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes".[100] A previous PCE report noted the following about amenity values:

> *The term 'amenity values' potentially encompasses a wide range of natural and physical qualities and characteristics (given the RMA definition) and also non-physical values. These values are not static and because of their dynamic nature they will change with time and with cultural preferences and socio-economic status.*[101]

Amenity values differ depending on the type of environment.[102] This report focuses on visual amenity values. However, amenity can also be affected by other senses (for example, noise, odour, and so on).

5.1.3 Natural character

'Natural character' is included in Part 2 of the RMA in reference to the coastal environment. This is because of the high values New Zealanders attach to the natural qualities of the coast. Natural character is a combination of natural elements, processes, and patterns. Natural character is thought to exist on a spectrum from pristine, indigenous nature through to an urban environment.[103]

'Natural' has been interpreted to mean a product of nature, and can include pasture, exotic trees species, and wildlife, as opposed to human-made structures, roads, and machinery.[104]

5.1.4 Rural character

The Ministry for the Environment (MFE) states in its report *The impact of development on rural landscape values*:

> *Rural landscapes are, by their nature, strongly influenced by the type of rural activity and the intensity of associated settlement. Human-induced patterns and processes are related predominantly to productive land uses such as agriculture, horticulture, and forestry… the patterns of human activity are generally large scale, reflected in generally low-density settlement, few structures and often a sense of spaciousness.*[105]

Rural character generally includes a sense of spaciousness, privacy, quietness, and a lack of structures and artificial features.[106] The Ministry's brochure Thinking about living in the country? describes the rural environment as "both a beautiful landscape and a place of production".[107]

5.1.5 Local community

People and communities are part of the environment, not apart from it. This is recognised in several pieces of environmental legislation, including the RMA and the Environment Act 1986, and in Maori culture. A community may be geographically based (such as a neighbourhood, city, or town) or a network of relationships based around a common identity or interest. Community does not imply a single integrated unit – communities are made up of individuals, all of whom have differing views and experiences. Community is a concept used to represent generally shared cultural and social expectations.

This report focuses on the 'local' interpretation of community. Local community means the community living in the locality, city, district, or region where the development occurs.

5.2 Sustaining landscape and community

The following section discusses the interactions, values, and associations related to landscapes in New Zealand and their relationship to sustainability.

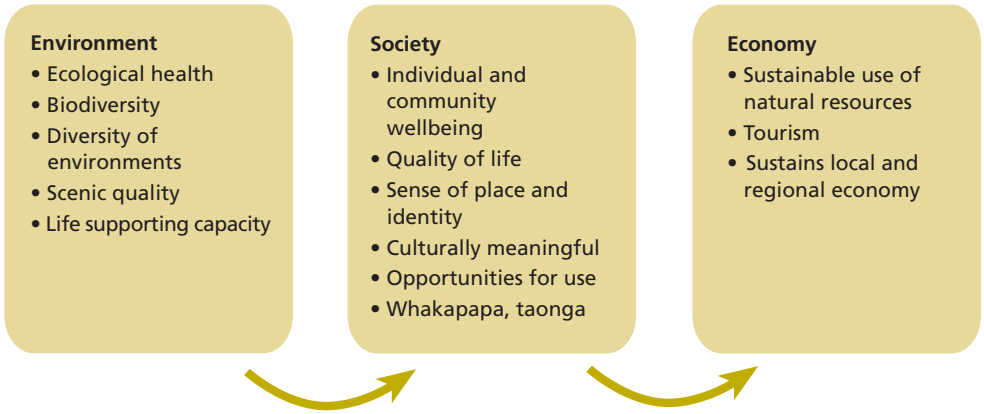
5.2.1 Landscape, sustainability, and well-being

Landscapes, spaces, and places reflect layers of natural and cultural processes as they have developed through time, providing connections to the past, with the present, and into the future. Landscapes reflect a culture's relationship with the land and are therefore integrally connected to societal well-being:

> *A strong connection to the land can give us identity, a perspective of ourselves in time and place. We can see ourselves as New Zealanders in New Zealand. We start to know who we are by knowing where we feel 'at home'.*[108]

Landscapes are constantly changing. The nature and rate of this change requires careful management if the values and integrity of landscapes are to be sustained. Change and development within landscapes should maintain and enhance the elements of landscape sustainability shown in Figure 5-1.

Figure 5-1: Elements of landscape sustainability (Adapted from Environmental Defence Society, 2005)



Landscape sustainability centres on the ecological health of the natural processes and systems in a place. Landscape sustainability is also connected to the way people interact with and experience these natural processes and systems.

Local communities are integrally connected to the places and spaces around them and often form close bonds with the landscapes they see every day. Therefore, they have a key interest in influencing and promoting landscape sustainability.

5.2.2 Valued landscapes in New Zealand

New Zealand's unique natural and cultural history has created a great diversity of landscapes. These include native bush, wild coastal areas, farmland and horticultural areas, mountainous areas, and urban and semi-urban landscapes. These different landscapes hold different values for different people depending on their associations, experiences, and preferences. Landscapes can be valued for their:

- scenic or aesthetic quality
- recreational attributes
- sense of place or identity
- historical associations and attributes
- cultural associations
- scientific and geomorphological qualities
- intrinsic values
- ecological integrity.[109]

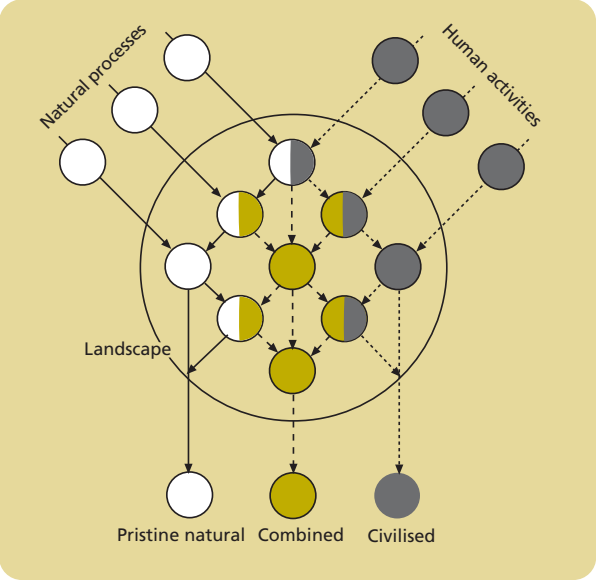
Newton *et al.* found that most New Zealanders value highly landscapes with the following characteristics:

- evidence of physical landform and relief
- lack of clutter or structures and/or obvious human influence
- presence of water (lakes, rivers, sea)
- presence of vegetation (especially native vegetation) and other ecological patterns.[110]

Landscapes with these combined characteristics are often judged as outstanding. Swaffield identifies that both 'wild nature' and 'cultured nature' are valued.[111] Along with national parks, rural landscapes are also valued, particularly if landform and relief are evident.[112] See Figure 5-2 for a representation of the combining of natural and cultural elements in a landscape.

The importance of 'heritage landscapes' is also beginning to be realised. These landscapes reflect past and present interactions between people and the land, and a draft heritage landscapes policy has recently been developed.[113] These landscapes are important expressions of the diversity and distinctiveness of New Zealand cultures and communities. They provide historical touch points, and enrich local, regional and national identity.

Figure 5-2: Combining of natural and cultural elements in the landscape (Source: Maplesdon, 2000)



Maori may view the landscape differently. As stated by Wihongi and Tukua at the Heritage Landscapes conference in 2005:

> *In contemporary Aotearoa, the viewing and valuing of landscape varies considerably between the two dominant cultural paradigms, Te Ao Pakeha and Te Ao Maori... An intrinsic belonging to these landscapes for Tangata Whenua does not stem from western cadastral concepts of possession or ownership, rather through whakapapa to the act of formation of ancestral human life from whenua to create, literally, people of the earth.*[114]

5.2.3 Threats and change to valued landscapes

Subdivision, use, and development can threaten valued landscapes. The Environmental Defence Society's (EDS) *Community guide to landscape protection under the Resource Management Act* recognises the following potential threats to valued landscapes:

- buildings, structures, and associated infrastructure: singularly or cumulatively
- earthworks and vegetation removal
- construction of roads and infrastructure

- utilities, including electricity infrastructure
- poor land management practices.[115]

Landscapes are not static. They are in a constant state of change, and not all change represents a threat. Whether change is a threat depends on the vulnerability and sensitivity of a landscape to change and how that change is introduced. Lifestyle developments have been one of the more recent threats to rural landscapes. People have different views about appropriate levels of change within different landscapes, and the extent to which development can be limited on private land. As stated in a report prepared for the Ministry for the Environment:

> *Those communities and councils who are concerned at the rate and extent of change to the features and landscapes in their districts face the challenge of working through what landscape values they will seek to protect, and how.*[116]

Managing change within landscapes is largely mediated through the RMA, which identifies outstanding natural landscapes as being of national importance, and requires assessment of effects to include effects on landscape.[117] Landscapes can be managed through regulatory or voluntary approaches.

5.3 Wind energy in the landscape

Bringing wind power into the debate about what we want from our landscapes brings a whole new dimension to how we evaluate and manage change. This debate introduces a 'green on green' dimension, with 'nature' being represented in two ways: first as landscape and amenity values at a local level; second as a global system facing climate change and resource limits.[118] As stated by Pasqualetti:

> *It is a question of how to best balance the nature we want with the energy we need… [The debate reflects] the ongoing conflict between convenience and cost, livelihood and landscape, nature and need.*[119]

Wind farms bring into question the values we hold for places in New Zealand:

> *…when a large-scale development is proposed in a natural environment, but that development is also good for the environment in other ways, the importance of landscape values becomes more difficult to assess.*[120]

In addition, Stephen Brown, landscape architect, indicates the difficulties of balancing location priorities of wind farms and landscape:

> *The location of wind farms is a vexed issue in terms of sections 6(a) and (b) and 7(c) of the Resource Management Act: located too close to areas of residential occupation and towns like Waiuku, they inevitably provoke concern about effects in relation to residential and general amenity values; located in*

> *more remote areas they are almost bound to contravene district and regional policies designed to protect natural character and landscape values. It is almost impossible to find locations for wind farms that are both sufficiently remote, yet not too remote.*[121]

The United Kingdom's Sustainable Development Commission (SDC) concluded in its report *Wind power in the UK* that landscape and visual effects are the most significant and common concerns associated with wind farms in the United Kingdom. The report stated that in a sample of 50 wind developments that have been refused planning permission, 85 percent were refused on grounds of landscape and visual impact.[122]

At a physical level, the impact of wind farms is influenced by three main factors: siting, scale, and design. These factors are integrally related. The impact of wind farms goes beyond physical impacts on the receiving environment, however. The social, cultural, economic, and individual perceptions and values directed towards wind farms are also important.

5.4 Wind farm characteristics

5.4.1 Siting

Wind turbines must be located where there is sufficient wind resource. This is the most critical siting consideration for developers. In New Zealand, land with the highest and most consistent wind speed is found in open, elevated, and/or coastal environments.

The other key considerations are that sites must be near transmission or distribution lines, and with good road access for construction purposes. The issue is that these sites in many cases:

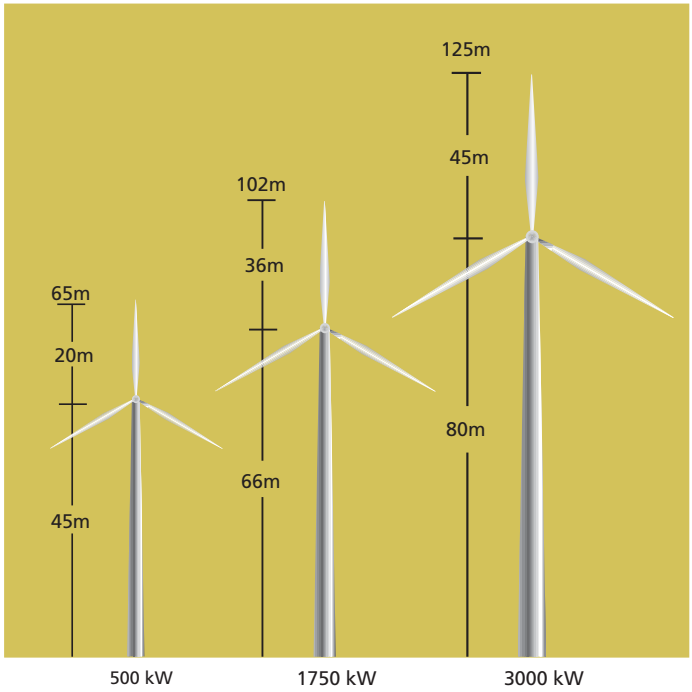
- have high landscape, natural, or cultural values
- are highly visible (on top of ridgelines and hilltops)
- are near urban settlements and rural lifestyle areas.

5.4.2 Scale

Scale refers both to the size of each turbine, and to the number of turbines in each wind farm. Turbine sizes have increased significantly as technology advances. Taller turbines with larger blades can harness a greater amount of the available wind resource.[123] A typical grid-connected turbine (between 1.5MW and 3MW) stands 60–80 metres tall with a rotor diameter of 60–90 metres (the wingspan of a Boeing 747 is 60 metres). Figure 5-3 shows relative heights of wind turbines.

The scale of each wind farm is also increasing. Most proposed wind farms in New Zealand include over 20 turbines, and some, over 100.

Figure 5-3: Different turbine sizes (Source: Greater Wellington Regional Council)



5.4.3 Design

Wind turbines are unique structures, with a strong vertical presence and sculptural quality. Unlike most other structures in the landscape that are static, the rotor blades of wind turbines rotate when the wind is blowing. This movement contributes to their visibility and attracts the eye.

Turbines can come in several different forms. Key design elements include:

- height
- number of blades (two or three bladed)
- spacing (between each turbine, and pattern of spacing)
- colour (usually off-white)
- tower type (lattice or tubular)

Wind farms also include roads, buildings, transmission lines, and other physical infrastructure. The nature of New Zealand's topography means that roading and earth works can be substantial.

5.5 Wind farms, landscape, and local communities

Wind farms can affect different landscapes and communities in different ways, both positive and negative. In this section we discuss these effects, and offer suggestions for minimising potential negative effects.

5.5.1 Creation of sustainable landscapes

Wind farms symbolise progress towards sustainable energy technologies. For this reason, to many people they symbolise 'clean, green energy' and a positive use and change within a landscape. This symbolic value also relates to the fact that wind power can supplant other forms of generation that may have greater environmental impacts, such as large-scale fossil fuel generation.

Wind farms can foster a sustainable landscape aesthetic.[124] This requires a shift in thinking beyond picturesque aesthetic values. Robert Thayer states in *Gray world, green heart: Technology, nature, and the sustainable landscape:*

> *An acceptance of sustainable techniques and technologies into our concept of nature and human nature is an essential part of the process… Landscapes that create the illusion of a better world while depriving us of the actual means of achieving it are not sustainable.*[125]

Submissions to applications for wind farm proposals in New Zealand have indicated value in 'sustainable energy landscapes'.

Wind farms can often be located in rural landscapes with relatively low biodiversity and degraded ecological systems from past land use practices. Replanting or covenanting native bush on the site as part of the development can have ecological benefits. For example, the developers of the Awhitu wind farm (in Franklin, Auckland) are required to undertake planting to stabilise areas on the site. Creating links between sustainable energy generation, sustainable land management, and landscape appreciation is an area that could be further explored.

An important factor to consider when assessing long-term impact of wind farms on landscape sustainability is that the structures can be removed. Therefore the effects of wind farms on the landscape will be reversible if sites are rehabilitated.

5.5.2 Effects on valued and significant landscapes and features

The impact of a wind farm is influenced considerably by the significance and value of the landscape at a particular site. International literature recognises that some landscapes are more sensitive to the impacts of wind turbines than others. These include areas that:

- are of high scenic quality
- have distinct or unique visual or cultural attributes
- are of recognised natural value where modern, built structures are out of place
- contain landscapes where a particular historic period has been preserved.[126]

Some countries have decided to avoid locating wind farms in highly sensitive landscapes such as those above or to allow only small-scale development.

In New Zealand, landscapes can be significant to national, regional, or local communities, and to different users. Landscapes sensitive to the impacts of wind farms include:

- outstanding natural landscapes
- conservation areas and national parks
- coastline with high natural and/or recreational value
- landscapes with significant ecological, cultural, or heritage characteristics
- landscapes that provide amenity and sense of place to local communities (such as ridgelines and scenic rural areas).

The highly modern, technological, and large-scale nature of wind farms can dominate and be out of place in these landscapes. A wind farm can cause the loss or damage of specific elements that make up the fabric of the landscape, or cause changes to the perceived character and quality of the landscape.[127] A wind farm can also affect the values and experiences associated with the landscape.

Large-scale wind turbines and wind farms cannot easily be hidden or screened. The size of modern wind turbines, and their often prominent locations, means impacts can extend well beyond the site.[128] Authorities in some other countries have required buffer zones around valued landscapes.

The scale and design of a wind farm can influence the extent to which landscape is affected. Van de Wardt and Staats (1988) found that greater numbers of turbines have greater effects on landscape. Some countries have placed tight restrictions on the size of wind farms in more sensitive landscapes.

Wind farm scale relative to landscape scale is also important. A large-scale, expansive landscape may be able to accommodate larger numbers of turbines without the turbines dominating their surroundings. In landscapes able to accommodate wind farms, some suggest wind farms should be accentuated rather than hidden or screened.[129] When placing wind farms in the landscape, we need to consider:

- the baseline landscape character, values and quality, sensitivity, and capacity to absorb change
- whether the wind farm or wind farms will become:
    - an element within the wider landscape
    - a significant or dominant characteristic of the landscape[130]
- what level of wind farm development is acceptable for different landscapes.

To help integrate wind farms more positively into the landscape, design of wind farms should consider:

- uniformity of turbine design
- balanced proportions and visual cohesion
- careful placing and layout (that is, avoiding stacking)
- low-reflectivity colour
- smaller numbers of turbines and clustering
- few ancillary structures and little change to the land (for example, from roading).[131]

Larger turbines (over 1.5MW) are spaced widely (for example, over 200 metres apart) meaning underlying character and features can remain.[132] Large turbines also spin more slowly so they may appear more graceful. However, wide spacing means that they occupy large land areas. The landscape architect for Meridian's West Wind proposal in Wellington noted:

> *Groups of turbines are potentially impressive and highly visible because of a combination of height, repeating elements and the geographical area they cover. Irregular spacing between groups of turbines or separation of groups by landform helps to retain the open character of a landscape and the legibility of its landforms.*[133]

The following sections discuss particular landscape types that can be affected by wind farms.

Natural character of the coast

The coast is under pressure from a diverse range of uses and development. Wind farms add an extra threat, particularly given the good wind resource available in many coastal areas. A study in Australia found that coastal locations are more sensitive than inland locations to large-scale wind farms with many turbines.[134] On the other hand, a wind farm harnesses a natural coastal resource – the wind.

Wind turbines may reduce the natural character of the coast and affect beach users' enjoyment. The degree of natural character on the coast is a key factor in assessing impact. Areas of very high natural character will be very sensitive to wind farm development. It is important to identify these areas within a region or district at an early stage in the planning process.

Outstanding natural landscapes and features

Outstanding natural landscapes and features often have good wind resources. These landscapes – especially 'iconic' landscapes of national significance, such as national parks and other important natural areas – present particular challenges for wind farm developments. They can be highly valued, and can contain areas of ecological significance. See the box for examples of proposed developments that may affect natural landscapes.

Proposed wind farms in Central Otago high country

TrustPower and Meridian Energy have proposed large wind farms on high-country tussockland in Central Otago, in the South Island. High-country tussockland has been expressed as iconic South Island landscape.

Ridgelines and hilltops

Ridgelines that have no or very few existing structures, or even vegetation, are often appreciated for their distinct and legible landform. Changes on ridgelines tend to be highly noticeable because they elevate the dividing line between the land and the sky.[135]

Wind farms tend to locate on ridgelines to harness the best wind resource. They can therefore introduce clutter to a previously 'clean' ridgeline. However, as opposed to housing, wind farms are strongly vertical, and so do not interrupt the line of the ridge horizontally. They are also spaced widely. In this way, they can often be accommodated without compromising landform legibility.

Design and siting of wind turbines on ridges must be carefully considered so that effects are minimised. The following factors need to be considered:

- the visibility and height of the ridgeline, and whether it is an important focal point of the surrounding area
- the shape of the ridgeline (whether it has an unusual or distinctive topographic form)
- the contours of the ridgeline.

Rural character

To date, all wind farms in New Zealand are located in rural areas.[136] This brings into question the particular impacts they can have on rural character.

In evidence to the Environment Court at the Awhitu hearing, the landscape architect for Genesis Energy Limited (the wind farm developer) stated that wind farms have quite different effects on rural landscapes, including visibility from greater distances (over 10 kilometres).[137]

Wind farms can impact on rural character in several ways. They introduce large, potentially discordant structures that are not associated with normal types of rural activity. The associated works such as roading and earth works can be at a scale that is unfamiliar in rural areas. We can compare wind farms with electricity pylons that are similarly large in scale and can locate in rural areas.

Rural areas do accommodate some types of industrial and large-scale uses. Rural areas are also productive places in a constant state of change. Wind farms can therefore be consistent with the objectives of the rural area, using a natural resource in an efficient way.

Historic and cultural significance

Wind turbines are modern, large-scale structures, and therefore may affect the character and fabric of places of historic and cultural significance.

Wind farms may threaten historic sites through disturbance of the site (such as a waahi tapu, building, or registered site) or of the setting associated with the site. A wind farm may alter the original relationship between the site and the surrounding area and/or affect visual catchments (the area from which the wind farms would be potentially visible).

Because Maori have intrinsic links to the natural environment and specific cultural values, they must be involved in the decision making on wind farms. Good wind farm sites are often on coastal land and hilltops, which may contain sites of significance to Maori. For example, the proposal for a wind farm on Baring Head was opposed by iwi because of the cultural values Maori attributed to the headland. This was one reason why the Hutt City Council declined the application in 1995.

5.5.3 Cumulative effects

We must consider not only the effects of individual wind farms, but also the effects of several wind farms located close together. The cumulative effects of wind farms relate particularly to landscape and visual impact.

Scottish Natural Heritage (SNH) provides the most comprehensive guidance on cumulative effects. Their guidelines note that the cumulative effects of wind farms on visual amenity and landscape arise from:

- the number of and distance between individual wind farms
- how wind farms relate to each other visually
- the overall character of the landscape and its sensitivity to wind farms
- the siting and design of the wind farms.[138]

Cumulative landscape effects are those that affect the physical fabric, character and integrity of landscapes of special value.[139]

Scottish Natural Heritage states that "it may often be cumulative impact which will determine an upper limit to an acceptable level of development".[140] Determining the 'threshold' beyond which wind farm development in a particular area is unacceptable is particularly important. In relation to design aspects, SNH states:

> *Cumulative effects may also be judged unacceptable on the basis of incompatibility in design between windfarms in the same vicinity. While two windfarms of similar design on adjacent hills may be judged acceptable in landscape terms, two windfarms which contrast in size, turbine height, or layout may give rise to a visual conflict and be judged unacceptable.*[141]

The Tararua Ranges provide an example where several wind farms of different design have been developed in one location, raising the question of cumulative impacts. See Chapter 7 for more discussion.

Cumulative impacts of wind farms in New Zealand were a frequently cited issue of concern by those interviewed in relation to this investigation, and are relevant for several reasons:

- clustering of wind farms exists in parts of New Zealand with good wind resource (such as the Manawatu, Wellington, the Hawke's Bay).
- further turbines can be added to existing wind farms (if wind resource, transmission capacity, and access are favourable). Staged development has occurred at the TrustPower wind farm in the Manawatu and the Hau Nui wind farm in the Wairarapa.
- there are convincing economic and technical reasons for locating additional turbines near to, or within, an existing wind farm (such as existing land access, transmission access, and roading).
- previous PCE studies have shown that cumulative effects of subdivision and development are not very well addressed under the RMA. This could also occur with wind turbines.[142]

While the total cumulative extent of proposed wind farms over the whole of New Zealand will not be significant, as was demonstrated in Section 3.4.3, cumulative effects at a regional, district, or localised level may be.

5.5.4 Effects on visual amenity

Amenity values relate to the enjoyment of places – such as residences, recreational areas, and travel routes. It is important to distinguish visual amenity from broader landscape values.

In his evidence for the wind farm on the Awhitu Peninsula, John Hudson, landscape architect for Genesis Energy, found that four main factors influence visual amenity. They are:

- the nature of the topography and land cover
- rotor movement and orientation
- light and atmospheric conditions
- perception and distance.[143]

Wind farms are likely to have a considerably greater impact when located on prominent topography, and in landscapes that are open and exposed.[144]

In relation to distance, evidence presented at wind farm hearings has considered visual impact using views from different publicly accessible points.[145] Boyden Evans, landscape architect for TrustPower, presented the table below at the hearing for the Tararua Stage 3 application.[146] In his opinion, the potential for visual effects from 1–3 kilometres is substantial, and from 3–6 kilometres is moderate (see Tables 5-1 and 5-2). This table has been generally supported by other landscape experts, although its accuracy has been debated. The size of the turbine being assessed, weather conditions, and topography all influence visual impact.

Table 5-1: Visual effects and distance

At less than 1km turbines tend to dominate the landscape and the potential for visual effects is substantial.
At 1–3km turbines are prominent and the potential for visual effects is substantial.
At 3–6km, while still prominent, the potential for visual effects is moderate.
At 10km turbines are not prominent and potential for visual effects is only slight.
At 20km, while turbines are distinguishable, the potential for visual effects is negligible.
At 25+km turbines and an entire wind farm become very difficult to distinguish and visual effects are not an issue.

Table 5-2: Explanation of terms in Table 5-1

Magnitude	Definition
Dominant	The feature has a defining influence on the view and is the focus in the view.
Prominent	The feature is clearly visible in the view and forms an important but not defining element of the view.
Present	The feature is neither dominant nor prominent, but is visible in the view.
Negligible	The feature is visible but may go unnoticed as a minor element in the view, or is not visible.

The viewer's perceptions are also a key factor. To many people wind turbines are aesthetically pleasing. For example, the following submission was made about TrustPower's wind farm on the Tararua Ranges in the Manawatu: "Visually I believe the larger turbines to be majestic and graceful". The sculptural quality of wind turbines is often seen to improve an area. The stark modernity of turbines and their strong sense of order can provide an effective contrast with open, rural areas.

To other people, wind farms prompt a negative aesthetic response. Wind turbines considerably exceed the 'human scale' and can be seen as an overpowering, intrusive, and unacceptable presence.[147] The following submission was made on the same Tararua wind farm in the Manawatu: "Wind farms will become an eyesore on the Tararua Ranges".

Therefore the extent to which visual impact is pleasing or adverse is influenced by the values of the person viewing the wind farm.

> *The overall visual impact of a wind development will principally depend on the area from where it is seen (the extent of visibility) and how it appears within these views (the nature of visibility). It is not necessarily whether it can be seen or not, but how it is seen and how it looks when it is seen. Wind developments will be most acceptable where they look appropriate to the area and create what is perceived as being a positive visual image. However, it is evident that for some, wind turbines are ugly and unsightly structures that are out of place in any rural setting and it is unlikely that design and mitigation measures will be able to change these opinions.*[148]

Visual amenity is an important part of people's appreciation and enjoyment of place and must be provided for when managing the effects of change. Wind farm developments need to have regard for the factors and values that sustain visual amenity.

5.5.5 Effects on the local community

The United Kingdom Sustainable Development Commission stated: "The benefits of wind power are shared by the whole nation but it is local communities that are most directly affected by wind farm developments".[149] This is one of the key tensions evident in New Zealand when large-scale, commercially owned wind farms are located near communities.

Visual effects on residences

Wind farms have the potential to dominate the landscapes around residents, and visually dominate nearby residences. In the hearing for the extension to the Tararua wind farm (Tararua Stage 3), a social impact assessment expert for TrustPower noted the importance of separation distance between turbines and houses:

> *For the immediate community of interest and neighbours, separation distance between dwellings and turbines is a critical factor in assessing the significance of effects. This highlights the importance of buffer areas between turbines and dwellings. A separation distance of 2.0–2.5 km appears to be the threshold below which acceptance is more likely to be replaced by negative sentiments for neighbours who experience no direct benefits. However, factors such as local topography and house orientation are also likely to have a bearing on this.*[150]

Wind turbines are more likely to dominate the view if:

- residences are oriented towards the turbine
- there is little visual complexity in the view
- the turbine is above the residence.

International studies have found that smaller-scale wind farms (three to ten turbines) may be seen as more acceptable by local communities. Research is needed to determine whether this applies in New Zealand.

It is difficult to separate landscape and visual impacts from wider issues associated with wind farm development that influence local community acceptance. For example, members of the community can feel powerless when a large-scale, commercially owned wind farm is proposed, particularly when their only involvement is through the formal consultation and submission process.

Community involvement

International agencies recognise the value of high levels of community involvement and/or ownership in wind farm development. Involvement helps to increase benefits to the local community and the community's acceptance of wind farm developments. The United Kingdom Government's *Energy white paper* specifically identifies "the

value of community engagement" and "providing local residents with a direct benefit from the renewables development".[151]

Local communities are made up of diverse individuals. Many in the community may not feel adversely affected by the wind farm, and may even see it as beneficial. When linked to community identity and sense of place, wind farms can become an accepted element in the landscape.[152] For example, the wind farms in the Manawatu region are promoted as part of the identity of the Manawatu community.[153]

Other benefits should also be enhanced. Economic benefits can flow to the local community from wind farm development and operation, through jobs and visitors to turbines. Recreation opportunities may also be enhanced through increased land access. Wind farms located near rural and urban communities can also increase energy security and contribute towards developing sustainable energy in the region or district.

Local opposition to wind farm development tends to decrease once the wind farm has been constructed, and actual effects on residents are not as significant as originally thought. This was found by Shepherd in his study of the attitudes of Ashhurst residents to wind farms in the Manawatu.[154] People tend to become more accepting of landscape change once it has occurred. In the case of wind farms, the change in attitude may be greater given that it is relatively new technology, so its real effects are less known.

Productive land use and financial benefits

For the owner of a wind farm site, wind farm development represents a new means of using the land productively, by diversifying land use options and providing an additional income stream. The New Zealand Wind Energy Association website states that farmers can typically expect 1–2 percent of the gross revenue of the wind farm through formal lease agreements (or about $1,500 to $5,000 a year for each megawatt installed).[155]

Tensions (or divisions) within communities have been noted with recent proposals,[156] partly because only the landowner benefits financially. Economic benefits can be distributed more evenly within the community as in these examples:

- some wind farm developers in the United States allocate a proportion of the financial returns to neighbouring residents
- community members can have the chance to buy shares in the company
- community-owned trusts or companies are offered greater ability to invest in wind power (including lines companies)
- the community can initiate direct ownership of some smaller wind farms (see Sections 4.2.2 and 6.3)
- developers can set up community funds.

Noise impacts

A detailed analysis of noise impacts from wind farms is not within the scope of this investigation. However, noise is part of amenity, and will often arise along with visual amenity concerns (see box).

Noise impacts from wind farms

Noise is one of the most frequently cited concerns about wind farms, both in New Zealand and overseas.[157] It most often relates to noise heard at nearby residences. Wind farm noise is influenced by several factors including the design and operation of the turbines, the distance of turbines to houses, topography and land cover, existing background noise levels, and the sensitivity of the person to the noise. Modern turbines are quieter than older turbines.

The sources of wind turbine sound are from the mechanical operation of the turbines (from the interaction of turbine components such as the gearbox, generator etc) and aerodynamic sound (from the flow of air over the turbine blades).

In 1998, Standards New Zealand produced a standard for assessing and measuring sound from wind turbines (NZS6808).[158] This is not a mandatory standard, and councils can apply their own noise limits in district plans and through resource consent conditions. However, the standard provides guidance on acceptable noise levels from a wind farm. The standard states that the sound levels measured at the boundary of any residential site must not exceed the greater of 40 decibels or background noise plus 5 decibels. 40 decibels is similar to the sound in a quiet home or office. The standard was reviewed in 2004, and is being reviewed again in 2006.

5.5.6 Attitude of the general public to wind farms

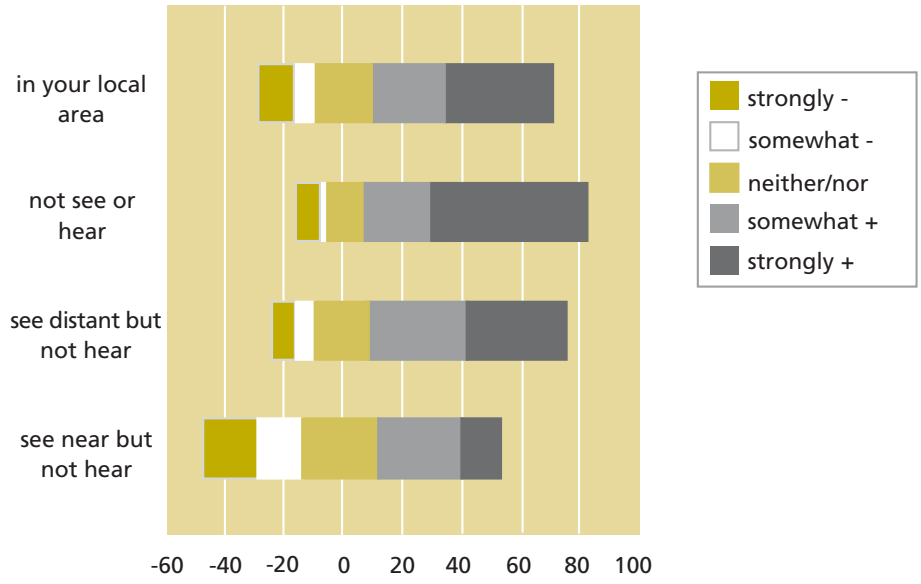
Interest in wind farms is high. Organised local community groups that are strongly opposed to a proposed development are becoming common.[159] In Auckland one group has formed in support of a wind farm proposal (WISE – Waiuku in Support of Wind Energy). Several non-governmental environmental organisations publicly support wind power. Media reports on wind farm development are frequent.

The 2004 public opinion survey of 750 people by UMR Research Ltd[160] for EECA included these findings:

- wind power has one of the highest approval ratings among the options for generation at 82 percent (hydropower was 79 percent).[161] Approval of wind power by Aucklanders was lower at 76 percent.
- wind power and hydropower were identified as the most preferred methods of generation at 40.9 percent and 40.7 percent respectively. This indicates that while support for wind power is high at a general level, hydropower also has a similar level of support, despite considerable opposition to many actual hydro projects.

- the greatest benefit of wind power was seen by 58.9 percent of people to be that it is environmentally friendly. Only 0.1 percent saw wind turbines as an aesthetic benefit.
- the main disadvantages of wind power were its unreliability (25.5 percent), that wind farms were seen as ugly (24.9 percent), and noise (14.7 percent).
- the survey found that 35 percent of respondents would strongly support a wind farm being built in their local area and 25 percent would moderately support a wind farm in their local area. Eighteen percent were against having a wind farm in their local area. Strong support increased if the wind farm could not be seen or heard from their house (see Figure 5-4).[162]

Figure 5-4: Perspectives on wind farms (Source: James Baines, 2005)



Surveys to date have not asked about preferred wind farm size (size and number of turbines) or preferred locations other than in relation to the respondents' houses. This information would be helpful in future research.

5.6 Summary

This discussion shows that many factors influence impacts of wind power and the perceptions of the public. Figure 5-5 presents these factors schematically.

The public has a relatively high level of acceptance of wind power being located in New Zealand's landscapes. Wind farm development is appropriate for or can be accommodated in many areas. However, all impacts of wind farm development must

Figure 5-5: Factors involved in integrating wind farms and landscapes

be considered, not just the benefits. The United Kingdom Sustainable Development Commission states:

> *Taking a holistic sustainable development view does not automatically mean a 'green light' for wind developments, as it would require consideration of a wide range of landscape, natural heritage, and environmental issues as well as social and economic ones.*[163]

Developers and decision makers must carefully consider location, scale, and design that sustain important local community and landscape values for both individual and multiple wind farm developments.

The question is not just of national benefit versus local impact. Greater complexities are involved, including:

- differing views within local communities towards the benefits of wind farms
- the importance of particular landscapes and landscape values
- the acceptability of change.

Recognising these complexities, providing for community values, and avoiding or taking care in high-value, sensitive locations are key aspects of positive wind farm development.

CHAPTER 6

Legal and policy framework for wind farms

This chapter discusses the decision making framework and the mechanisms available to central, regional, and local government for managing wind farm development in New Zealand. It also assesses the input of central government agencies to the development and management of wind power.

6.1 Policy framework

In 2005 Professor Barry Barton published a comprehensive paper that "describes and appraises provisions in New Zealand law that promote the use of renewable sources of energy".[164] Barton notes that since a change in government in 1999, laws and policies have placed a greater emphasis on the development of renewable sources of energy. Barton concludes that, despite the change in laws and the relatively modest scope of the policies, wind energy is growing rapidly.

Barton notes the following initiatives as being key to the central government's progressive, though limited, encouragement of renewable energy resources:

- development of a National Energy Policy Framework, released in October 2000
- enactment of the Energy Efficiency and Conservation Act 2000, with the consequential establishment of the Energy Efficiency and Conservation Authority
- development of the National Energy Efficiency and Conservation Strategy (NEECS), made under the Energy Efficiency and Conservation Act, in 2001
- the development of government policy relating to climate change (including the ratification of the Kyoto Protocol on 19 December 2002 and the subsequent enactment of the Climate Change Response Act 2003)
- amendments to the RMA intended to promote renewable energy and to leave consideration of the causes of climate change to central government.[165]

6.2 Resource Management Act 1991

The Resource Management Act 1991 (RMA) is the key piece of legislation controlling the environmental impacts associated with use of land in New Zealand. Any land-based wind farm, or a wind farm located within the coastal marine area, must be authorised in some form under the RMA, whether it is through permissive plan provisions, resource consent, or a designation.[166]

The RMA has a single overarching purpose: "to promote the sustainable management of natural and physical resources".[167]

The RMA's underlying philosophy is a focus on controlling the effects of activities rather than controlling the activities themselves.

The RMA provides a range of regulatory tools to achieve its purpose. They include:

- the extensive provisions of the RMA itself, in particular the guidance provided in Part 2 of the Act – Purpose and Principles
- a range of regulatory instruments:
  - national policy statements
  - the New Zealand Coastal Policy Statement
  - national environmental standards
  - regional policy statements
  - regional plans
  - district plans.[168]

Part 2 of the RMA is the central and guiding portion of the Act. Section 6 lists matters of national importance that must be recognised and provided for. The following elements of s 6 are most relevant to this report:

> *(a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development*
>
> *(b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development*
>
> *(f) The protection of historic heritage from inappropriate subdivision, use, and development.*

The following matters of s 7, to which particular regard must be given, have the potential to impact on wind farm development:

> *(b) The efficient use and development of natural and physical resources*
>
> *(ba) The efficiency of the end use of energy*
>
> *(c) The maintenance and enhancement of amenity values*
>
> *(f) Maintenance and enhancement of the quality of the environment*
>
> *(g) Any finite characteristics of natural and physical resources*
>
> *(i) the effects of climate change*
>
> *(j) the benefits to be derived from the use and development of renewable energy.*

Under s 8 the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) must be taken into account. This is particularly relevant in cases where a wind farm development may impact on matters of concern to tangata whenua.

The combined elements of Part 2 set the overall framework within which wind farm proposals need to be assessed and evaluated. Different agencies have different responsibilities under the Act, including central government agencies such as the Department of Conservation (DOC) and the Ministry for the Environment (MFE), and regional and district authorities.

6.2.1 Outstanding natural landscapes

The protection of outstanding natural landscapes from inappropriate subdivision, use, and development (under s 6(b) of the RMA) has been, and continues to be, a major part of the argument against the development of wind farms at some localities. Landscape protection under the RMA is controversial.

Landscape was an issue in both appeals that the Environment Court has decided on wind farm applications.[169] We expect that it will be a key issue in other appeals on wind farms yet to be heard by the Court.

The Court has given considerable attention to what is an outstanding natural landscape. Barton has provided a comprehensive analysis of the relevant case law on s 6(b).[170] The key points he identifies are:

- *Different aspects of s 6(b) – outstanding, natural, landscape, feature – shows that the Environment Court has had a good deal of work to do on each term. But a hunt for the synonyms does not seem to be desirable. The difficulty is not so much the language as the underlying judgements.*
- *This is so to an even greater degree with the question of what constitutes protection from inappropriate development. It goes to the heart of the RMA decision making, and will always be contested territory.*
- *Also sure to be contested territory for some time, if not indefinitely, is the matter of effects, especially mitigation. The Court is likely to be asked to address more specific effects questions about environmental compensation and permitted baselines.*
- *Concerns about outcomes are persistent, from both pro-landscape and pro-development parties. They are not easy to reconcile. It is important to remember that Environment Court decision making is only part of the system.*

Barton comments that making decisions within the 'open language' of Part 2 is difficult, and that unpredictable decisions can result. He hopes that the next generation of plans will provide greater clarity to landscape management to reduce this uncertainty.

The Environmental Defence Society's *A place to stand* analysed the effectiveness of landscape protection mechanisms around New Zealand in 2004, and pointed to several weaknesses.[171] These include:

- problematic landscape assessments with inadequate budgets, lack of strong methodology, and little public input to incorporate local values
- plans and policy statements that often poorly identify important landscapes, and no national identification of important landscapes
- regional councils' plans that do not consider landscape
- district council planning that becomes polarised in the absence of external checks and balances
- policy approaches that are often weak in addressing cumulative effects.

Defining and assessing landscapes, and using this analysis to inform policy and decision making, are key aspects of meeting the requirements of s 6(b) of the RMA and more general goals for landscape management. This work will greatly influence the ability to assess new developments, including wind farms. Particular landscapes may need to be assessed specifically for their sensitivity and ability to accommodate wind farm development.

6.2.2 New Zealand Coastal Policy Statement

The purpose of the New Zealand Coastal Policy Statement (NZCPS) is "to state policies in order to achieve the purpose of this Act [RMA] in relation to the coastal environment of New Zealand".[172] Coastal environment is not defined under the RMA, but has been addressed in case law.[173]

The Minister of Conservation is responsible for the development of the NZCPS, which has been in force since May 1994. It contains several provisions that can impact on the development of wind farms in the coastal area, including natural character and landscape matters.

The Minister has recently announced that a Board of Inquiry will be appointed to review the NZCPS and issues relating to coastal development.[174] Given the prevalence of wind resource in coastal areas, an updated NZCPS should specifically address the impacts of wind farm developments (and potentially other renewable energy initiatives such as tidal and wave power generation) in coastal areas.

6.2.3 Regional policy statements, and regional and district plans

Under the RMA, central government delegates extensive responsibility to regional councils and territorial authorities to give effect to the broad directions of the RMA contained in Part 2 through regional policy statements, and regional and district plans.

Regional policy statements are prepared by regional councils to "achieve the purpose of the Act by providing an overview of the resource management issues of the region and policies and methods to achieve integrated management of the natural and physical resources of the whole region".[175] These statements set the scene for RMA planning and implementation within a region. Both regional plans and district plans must give effect to a regional policy statement.[176]

Many of the first generation of district plans developed under the RMA did not deal particularly well with issues such as landscape, let alone renewable energy. A study carried out for the Ministry for the Environment in 2003 found that most regional policy statements contained policy on renewable energy. However, few district or regional plans contained energy policy.[177]

Some, but not all, statements have provided relatively certain guidance in terms of landscapes. It is hoped that as second generation regional policy statements are developed, they will deal more effectively with landscapes.

The potential exists for far more strategic planning in terms of energy and infrastructure at the regional and district level than has generally occurred to date. Through recent RMA amendments, Parliament has signalled that it wants local government to adopt a strategic approach. In particular, we note the new requirement in s 30(1)(gb) to address "the strategic integration of infrastructure with land use through objectives, policies, and methods". This requirement should prompt regional councils to consider how energy infrastructure, including wind farms, may be integrated into the region and its landscapes.

District plan provisions are the key mechanism for giving effect to aspects of land use policy laid out in a regional policy statement. These provisions give local specificity to land use planning, and set up a regulatory framework for considering resource consent applications for land use.

6.2.4 Consultation and participation in decision making

Community participation in decision making is a key aspect of the RMA, and at a more general level is a core component of democratic society. Consultation means different things to different people, and consultation can occur at different levels. Figure 6-1 shows these levels.

Consultation under the RMA can take place at the stage of policy statement and plan preparation, and at resource consent stage, both informally and formally (the submissions process).

Figure 6-1: Levels of community engagement (Source: South West Renewable Energy Agency, 2004)

There is no general obligation to consult under the RMA in relation to applications to carry out activities.[178] However, it is extremely good practice for resource consent applicants, or requiring authorities, to consult widely before lodging an application or notice of requirement.

Consultation serves a range of purposes including:

- helping to identify affected parties
- informing affected parties about what is proposed and enabling proponents to gauge support and opposition
- helping applicants to demonstrate that they have provided information to, and obtained information from, tangata whenua where relevant.

Applicants can also use consultation to make sure concerns are heard and proposals modified as far as possible to address those concerns.

6.2.5 Pre-hearing processes

When a proponent of a major project engages in pre-application consultation or information dissemination, they may experience distrust from the community. Distrust may be greater in those cases where a proposal involves new or unfamiliar technologies.

The 2005 amendment to the RMA significantly extended s 99 (pre-hearing meetings)[179] and introduced s 99A (mediation).[180]

The pre-hearing meeting provisions could enable a consent authority to develop pre-hearing processes to consider differing points of view in a relatively informal forum,[181] to act as an independent facilitator, and, where appropriate, to explain or interpret technical information.

6.2.6 Consideration of alternatives

Decisions on the appropriate scale and location of wind farms raise questions about whether alternatives need to be considered.

Under clause 1(b) of the Fourth Schedule to the RMA, an assessment of an activity's effects on the environment should "[w]here it is likely that an activity will result in any significant adverse effect on the environment, [include] a description of any possible alternative locations or methods for undertaking the activity". Developments will need to be assessed on a case-by-case basis, but given the scale of many wind farm developments, this threshold (significant effects) is likely to be passed in some cases.

Environment Court case law has established that an applicant under the RMA is not required to establish that their proposed site is the best possible site.[182] It has been held, in those cases where alternative sites or methods do need to be considered, "that the alternatives to be considered are limited to those within the applicant's capability and within the natural and physical resources of the land which is the subject of the resource consent application".[183] In a wind farm application, suitable wind resource, ability to link to transmission systems, and access to land all constrain a wind farm's potential location.

The Environment Court has also found that considering alternative sites does not apply to a consent authority (or the Environment Court) in a resource consent application.[184] Accordingly, the consent authority is not able to consider potential alternative locations for a wind farm when deciding on a resource consent application. However, the consent authority can consider whether environmental effects were adequately assessed.

This highlights the importance of considering all appropriate locations for wind farms during the policy and plan development process, and the mandatory s 32 analysis for this process – part of evaluating the efficiency and effectiveness of plans under the RMA by considering alternatives, benefits, and costs.

6.2.7 Resource Management (Energy and Climate Change) Amendment Act 2004

In early 2004 the Resource Management (Energy and Climate Change) Amendment Act 2004 was passed. This was developed as part of the Government's climate change policy to give greater weight to renewable energy and to the efficient use of energy. It also sought to have RMA decision makers focus more specifically on the effects of climate change.

Several sections of the RMA were amended to reflect this (particularly s 7).[185] These have been important in RMA decision making. The change to s 7 influenced the Environment Court's decision on the Awhitu and Hawke's Bay applications.[186] It is also likely to influence regional and district councils' approaches to planning.

Climate change and the RMA

The Amendment Act specifically prohibits the consideration of climate change when planning or consenting activities involving the discharge of greenhouse gases (for example, power stations that use fossil fuels as an energy source and that emit CO2). The Government felt that this issue was best dealt with at a national level by the New Zealand Climate Change Office, and potentially by the creation of relevant national environmental standards.[187]

To date no carbon tax has been imposed, and no relevant national environmental standard made. The Government announced in early 2006 that it no longer intends to implement a carbon tax. The carbon tax was a major balancing factor alongside specific directions and considerations included in the RMA, as part of a holistic approach to emissions management and control. The Government may therefore need to revisit the amendments made to the RMA by the 2004 Amendment Act. The Local Government and Environment Committee is considering this as it deals with a Member's Bill, the Resource Management (Climate Protection) Amendment Bill.

6.2.8 Resource Management Amendment Act 2005

The Resource Management Amendment Act 2005 made many changes to the RMA to improve resource consent decision making, to provide a means to work with local authorities dealing with large decisions, and to strengthen national leadership.[188] Some of the changes may affect the way wind farm proposals are processed, both at a national and local level.

Of particular significance are:

- the changes made to the type and extent of action the Minister for the Environment can take in cases where local authorities are not effectively meeting their obligations under the Act[189]
- a new function for regional councils, being "the strategic integration of infrastructure with land use through objectives, policies, and methods" (infrastructure includes "facilities for the generation of electricity for supply to another")[190]
- provisions that make implementation of national environmental standards easier, and their effect more certain[191]
- changes aimed at simplifying the development and implementation of national policy statements, including the New Zealand Coastal Policy Statement[192]
- new provisions relating to 'call in' and provision of assistance in considering applications for proposals of national significance[193]
- strengthening of the status of regional policy statements. (Until the implementation of the Amendment Act, regional plans and district plans were

required to be not inconsistent with the regional policy statement (RPS); now they must give effect to the RPS.)[194]

As this Amendment Act is relatively recent, it remains to be seen how it will influence future wind farm developments and the implementation of policies and plans that impact on them. Recent work by central government related to these amendments, and to wind power, is discussed in Section 6.3.

6.2.9 Environment Court case law

To date the Environment Court has made decisions on three appeals involving wind farm applications.[195] One other application (Meridian Energy's Project West Wind) is awaiting a decision. The following is a brief summary of the cases decided, with relevant extracts that may show how the Court might approach similar cases.

Genesis Power Limited v Franklin District Council[196]

This case involved an appeal by the applicant (Genesis Energy) and another party (EECA) against a decision by hearing commissioners appointed by Franklin District Council. The decision declined a resource consent application for 18 wind turbines of a maximum height (including rotor blades) of 90 metres to be located on the Awhitu Peninsula. The turbines are expected to contribute about 63MWh a year – sufficient electricity to meet the annual requirements of about 7,500 homes (or 37 percent of the homes located within the Franklin District).[197]

Several other parties participated in the appeal hearing. The Auckland Regional Council, Environmental Defence Society, Mighty River Power, and Greenpeace New Zealand supported the proposal. The Kariotahi Equestrian Environmental Protection Society Inc, Waiuku Wind Farm Information Group Inc, and Te Iwi o Ngati Te Ata opposed the proposal.

The Court identified the potential benefits of the project as non-site specific and needing to be considered in the wider context of Part 2 of the RMA and in a national context.[198]

It said:

> *In summary, climate change and renewable electricity generation are key issues for New Zealand. This project, if approved, would provide clean and renewable energy to provide essential electricity and to prevent CO_2 emissions that could have been created by generating electricity through the burning of coal or gas.*

> *These are all matters which need to be considered and put into the crucible containing the evidential material to be weighed against the alleged and more site-specific potential effects. The agreed statement of fact also underlays some recent changes to legislation in New Zealand including the addition of the provisions of sections 7(i) and 7(j) to the Resource Management Act.*[199]

The potential negative effects of the proposal were identified as:

(i) *effects on the visual amenity of the area – including effects on landscape and natural character;*

(ii) *noise effects on areas of recreation and work places;*

(iii) *various horse-related effects; and*

(iv) *effects on tangata whenua.*[200]

In relation to visual effects the Court found that:

> *…although the actual foundations and site works associated with the turbines would largely occur outside of the area defined as 'regionally significant' or 'outstanding', the scale of the turbines is such that they would dominate the surrounding area and undermine visual integrity of the natural character and landscape of the coastal environment. We consider this to be a significant adverse effect… The proposed turbines are of such a large scale, 90 metres high, that their visual impact cannot be adequately mitigated.*[201]

The Court found that noise effects would be, at most, minor.[202]

The Awhitu Peninsula is of major cultural significance to Ngati Te Ata and evidence of early Maori occupation is found on the property where the wind farm is to be located. However, the Court found that most of the archaeological sites have been destroyed or are of low-to-moderate significance. It was the Court's view that if a significant site was discovered during earth works, conditions could be imposed to make sure the site is protected.[203]

The Court then made clear that what was required was, in effect, a weighing exercise between the positive and the negative effects of the wind farm against the Act, particularly Part 2.[204]

The Court held that:

> *The ultimate question for us is whether the purpose of the Resource Management Act would be better served by granting consent or refusing it. We find that the proposal meets the sustainable management purpose of the Resource Management Act. Notwithstanding the effects on the coastal environment we consider the proposal to be appropriate in the circumstances*

> *of this case. We find that the benefits of the proposal, when seen in the national context, outweigh the site-specific effects, and the effects on the surrounding area. To grant consent would reflect the purpose of the Act as set out in section 5.*[205]

As was pertinently noted by one of the witnesses presenting evidence to the Court:

> *A decision to decline this wind farm would have very serious implications for the wind farm industry as the majority of wind resource sites have similar or greater character issues to address.*[206]

Key messages from this decision follow:

- A consent authority will need to assess both the positive and negative effects of an application. In doing so it will need to recognise that many, if not all, of the positive effects will be non-site specific and will need to be considered in the context of Part 2 of the RMA and in a wider national context. Most, if not all, of the negative effects are likely to be site specific and will have local or regional impact. The weighing of such competing considerations is not a simple task.
- When carrying out the weighing described above, guidance is to be taken from s 5 of the RMA. The most important question is "whether the purpose of the RMA would be better served by granting consent or refusing it".[207]
- The Resource Management (Energy and Climate Change) Amendment Act 2004 will be influential in guiding decision makers considering applications that involve renewable energy projects, including wind farms.

Unison Networks Limited and Hawke's Bay Wind Farm Limited v Hastings District Council [208]

This case involved Environment Court decisions on two independent, though adjacent, wind farm developments in northern Hawke's Bay. Both applications are close to Transpower-owned transmission lines, and the cities of Napier and Hastings.

The appeal hearings on the two separate applications were combined in one court proceeding, on the understanding that the application that was lodged first (the Unison Networks Limited application) would be decided first. The second application (the Hawke's Bay Wind Farm Limited application) would then be decided in light of the first decision. The decision on both applications was reported in a single judgement of the Court.

Comparative information on the two proposals is shown in Table 6-1.

Table 6-1: Details of Hawke's Bay wind farm proposals

	Unison Networks Ltd	Hawke's Bay Wind Farm Ltd
Number of turbines	15	Up to 75
Indicative turbine type	Vestas V90 3MW – 85m towers with a rotor diameter of 90m giving a maximum height with the blade vertical of about 130m	
Length of access roading to be constructed	11.3km	39km
Total earth works volume	550,000 m^3	1,300,000m^3
Total generating capacity	45MW	Up to 225MW
Number of households electricity supply	16,800	100,000
Approximate wind farm site area	320ha	3,000ha (but with only about 1100ha being directly affected by the proposal)

Both sites are presently farmed and include along their eastern frontages an identified outstanding natural feature (ONF 7), as defined in the Hastings District Plan (Maungaharuru Range–Titiokura Saddle–Te Waka Range). No turbines at either site are to be positioned in the ONF 7, although the Hawke's Bay Wind Farm proposal would have some access roading within it. In addition, the Court applied the criteria used in earlier decisions to determine an outstanding landscape[209] to the whole area of the proposals, and identified the whole area as an outstanding landscape.[210]

Opposition to the two proposals was based on:

- adverse impacts on the natural and heritage landscape character of the sites, including adverse effects on the skyline
- adverse effects of earthworks on the landscape
- cumulative effects of the two proposals.

Both applications were classified as non-complying activities under the rural zone provisions of the district plan. Therefore the applications had to pass through one of the thresholds contained in s 104D of the RMA before they could be considered under s 104 and Part 2 of the RMA. The thresholds in s 104D are:

- whether the adverse effects will be minor
- whether the proposal is contrary to the objectives and policies of the district plan.

The Court held that the effects of either or both proposals on landscape and visual amenity would be more than minor. The proposals were then assessed against the district plan. The Court found that neither proposal was contrary to the district plan's objectives and policies and noted:

> *The Plan also encourages uses that are efficient and innovative, diverse and complementary to rural resources. A windfarm would be an efficient means of producing electricity, particularly in a location in close proximity to consumers and the national grid. In addition, a windfarm would add to the diversity of uses in the rural area, making use of the wind, a natural resource, without significantly impacting on more traditional forms of production from rural land. A small area would be taken up by turbines, roading and service buildings, with the remainder of the land used as before. Also there would not be any long-term adverse effect, with soil and the land able to be reinstated for other rural uses if in the future the technology or economics meant the windfarms were no longer required.*[211]

The Court decided that the earthworks, access roads, and ancillary buildings associated with the proposals would not visually compromise the area, with the mitigation measures proposed. However, it found that "the siting of many of the turbines would have an effect on the skyline ridge, and particularly as viewed from a distance from places like Napier's Bluff Hill, and Hospital Hill and the airport".[212] The Court noted that "[w]hat there would be is a significant change in the landscape for the life of the wind farms, but no irreversible effect on the features contributing to the significance of the outstanding natural landscape".[213]

The Court made the following observations about landscape issues and wind turbines:

> *It is self-apparent that landscape issues are matters about which reasonable and informed people may hold conflicting views. It is not possible to say that one view is right and another wrong… It is the case... that the choices are stark; in the nature of things turbines need to be on or near ridgelines, and will often be on skylines, and there is no real prospect of remedying or mitigating their adverse visual effects. Either the activity proceeds, or the effects are avoided by refusing consent.*[214]

The Court then proceeded to a balancing exercise, considering the relevant factors from ss 6, 7, and 8 in the light of the overall guidance provided by s 5. When considering ss 6 and 7, in the context of a wind farm application, the Court adopted the approach taken in the Genesis Power case.

It decided to approve both applications and stated in relation to s 5:

> *For the reasons just set out, the capacity to produce a reliable, and relatively affordable, supply of electricity is vital to enable people and communities to provide for their social and economic well-being, and for their health and safety. Producing electricity in the way proposed will, even if in a small way considered globally, help slow the rate of climate change and thus contribute to sustaining the potential of the planet's resources to meet the needs of future generations. It will do that by helping to safeguard the life-supporting capacity of those resources.*
>
> *There is a price to be paid for that – the acknowledged compromising and impairment of the landscape and visual amenity provided by Titiokura – Maungaharuru, and the concern of Maori at the presence of man-made structures there. While recognising all that the RMA and the District Plan say about the protection and recognition to be given to those values, we are in no doubt that in an overall balancing of the competing factors, the purpose of sustainable management, as set out in s 5, will be best promoted by granting these consents. That said, we should not be understood as indicating that electricity generation from renewable sources will always be favoured in the balancing exercise. We make this decision on a site-specific basis. It may well be that other sites, perhaps for example more iconic character, or closer to houses or clusters of population, will call for a different result.*[215]

This joint decision contains the following key messages:

- the Court adopted and applied the general approach to balancing competing issues that was applied in the Genesis Power case
- a finding that a wind farm development will have a more-than-minor adverse effect on landscape and visual amenity (albeit a reversible impact) will not preclude the granting of consent – even in the context of an outstanding landscape
- factors that may militate against the development of a wind farm in a particular location include the iconic character of the site and/or proximity to human habitation
- the decisions set a relatively high threshold against which future applications are to be measured. The application of the RMA appears to favour the development of renewable energy (particularly wind farms) over impact on landscape and visual amenity, even where landscapes are 'outstanding'.

6.2.10 Purpose and potential impact of the Local Government Act 2002

The purpose of the Local Government Act 2002 (LGA) is twofold:

> *(a) to enable democratic local decision-making and action by, and on behalf of, communities; and*
>
> *(b) to promote the social, economic, environmental, and cultural well-being of communities, in the present and for the future.*[216]

Under the LGA local authorities must act in accordance with several principles.[217] Section 14(h) is of particular importance when considering the interfaces between the LGA and the RMA:

> *(h) in taking a sustainable development approach, a local authority should take into account—*
>
> *(i) the social, economic, and cultural well-being of people and communities; and*
>
> *(ii) the need to maintain and enhance the quality of the environment; and*
>
> *(iii) the reasonably foreseeable needs of future generations.*

The key planning tool under the LGA is the Long-Term Council Community Plan (LTCCP), which is mandatory and is likely to have a significant effect on RMA policy and plan development.[218]

The LTCCP allows the community to express its concerns and aspirations about wind power. Local government can use the LTCCP process to consider how best to deal with wind power issues. However, local authorities need not wait for communities to raise issues about effective management of wind power before developing policies.

6.2.11 Other legislation

Several pieces of legislation provide other protection to land and may make obtaining consent for wind farm development more difficult. Examples are:

- National Parks Act 1980
- Reserves Act 1977
- Marine Reserves Act 1971
- Wildlife Act 1953
- Te Ture Whenua Maori Act/Maori Land Act 1993.

The special requirements of Te Ture Whenua Maori/Maori Land Act can impact on the way land is used, and the rights that can be granted over land covered by the Act.

It may create barriers to development that will vary from case to case. The Act may discourage wind farm developers from siting wind farms on Maori land.

In some cases Maori landowners may encourage wind farm development on their land. As noted by then Minister for Economic Development, the Hon. Jim Anderton in a speech given in 2005 called *Maori and the sustainable energy business*: "That's a big opportunity for Maori with land in windy places around New Zealand… Maori can have a very important role in the development of sustainable energy".[219]

6.3 Central government's role in wind power development

Central government agencies have roles in both facilitating and managing the growth in wind power in New Zealand to support and supplement the policy and legislation discussed in Section 6.2.

We have examined the roles and work of central government agencies with responsibilities for wind power (see Table 6-2). This is to assess whether these agencies are working to ensure sustainable outcomes for wind farm development in New Zealand in the long term.

The table shows that central government agencies' work and responsibilities specifically related to wind power has focused mostly on:

- providing support for wind power growth (through Projects to Reduce Emissions, submissions on applications, and data gathering)
- addressing technical and economic considerations (through research reports and analysis).

Central government has had little influence on the location, scale, or distribution of wind farms in New Zealand. Wind farm developers are driving these sorts of decisions, within the constraints of legislation.

MED's work on distributed generation supports diversifying the scale and distribution of wind farms and turbines. The report *Wind energy integration in New Zealand* emphasised the benefits of smaller-scale, dispersed wind farms, owned by smaller generators. The report acknowledged the barriers to them and suggested that smaller wind farms should be investigated.[220]

Table 6-2: Central government agencies' roles and work related to wind power

Government agency	Roles and work in relation to wind power
Energy Efficiency and Conservation Authority	Responsible for: • encouraging, promoting and supporting energy efficiency, energy conservation and renewable energy • developing the Government's National Energy Efficiency and Conservation Strategy (NEECS). Current work relevant to wind power: • Scoping a review of NEECS (possibly giving greater support to wind power) • Regional Renewable Energy Assessments (RREAs) to help councils identify renewable energy resources and to outline the roles that councils might play in the development of renewable energy potential (in progress) • Submissions in support of resource consent applications for wind farms and council plan changes that provide for wind energy • Environment Court appeals. Previous work: Various reports about aspects of wind energy: • *Renewable energy – Industry status report. Hydro, geothermal and wind energy.* (2004, 2005, and 2006) (prepared by East Harbour Management Services Ltd) • Ashby, M. (2004). *Wind's up: Planning for the future now.* Recommended a strategic approach to integrate all levels of government in decision making and plan development • *Review of New Zealand's wind energy potential to 2015* (2001) • *Guidelines for local authorities: Wind power* (updated August 2004) • Bellhouse, G. (2004). *Low frequency noise and infrasound from wind turbine generators: A literature review.* Found no evidence exists to indicate that low-frequency sound or infrasound from current models of wind turbine generators should cause concern • A draft non-statutory guidance note to support renewable energy amendment to the RMA.

Ministry of Economic Development	Develops and oversees energy-related policies and law including: • energy strategies • energy-related legislation and regulations • government policy statements on energy. Current work relevant to wind power: • Developing a national energy strategy to guide government efforts for all forms of energy • Developing distributed generation regulations (including looking at rules for lines companies) • Considering and consulting on possible legislative changes to increase distributors' ability to generate and retail electricity • Scoping National Policy Statement (NPS) on electricity generation to provide national guidance to local authorities (with MFE and other central and local government representatives/stakeholders). Previous work: • *Wind energy integration in New Zealand.* Noted that 20 percent of NZ's electricity could be provided by wind (a joint project commissioned and managed with EECA, prepared by MWH NZ and Energy Link Ltd) • *Stocktake and analysis of regional and district plans and policy statements – Review of the provision for the national benefits of infrastructure* (June 2005) (prepared by MWH NZ) (part of scoping for NPS).
Ministry for the Environment	Responsible for the Climate Change Programme of Action, and enabling implementation of the RMA. Current work: • Climate change policy review (in progress) • Guidance to local authorities on recent amendments to the RMA • Quality Planning website providing relevant literature and guidance • Scoping NPS on electricity generation to provide national guidance on generation to local authorities (with MED and other central and local government representatives/stakeholders).

Department of Conservation	Responsible for management of conservation land, and implementation of the NZCPS. Current work: • Reviewing NZCPS • Implementing national memorandum of understanding (MOU) with Meridian Energy for investigation and development of wind farms on public conservation land • Implementing policies: 11.3 of the General Policy developed under the Conservation Act and 10.3 of General Policy developed under the National Parks Act.
Electricity Commission	Responsible for the daily oversight of the electricity industry and markets to ensure that electricity is produced and delivered to all classes of consumers in an efficient, fair, reliable and environmentally sustainable manner. Current work: • Model contracts for distributed generation (DG) including small-scale DG • Wind Generation Investigation Project (WGIP): to identify and quantify the technical and electricity market impacts of wind generation on New Zealand's power system over the next 10 years and make any necessary rule changes (due end of 2006) • Considering rule changes to the Electricity Governance Rules as a result of the findings of the tactical project outlined below to accommodate further wind generation Previous work: *Tactical Project:* Transpower investigated the impact of Manawatu wind generation on the integrity of the electricity system in 2004 and 2005.
Foundation for Research, Science and Technology (FRST)/Ministry of Research Science and Technology (MORST)	Wind mapping/modelling delivered through NIWA's National Climate Centre as part of the "Adaption to Climate Change Variability and Change" research programme funded by FRST.

Central government has given local authorities little guidance on planning for wind farms, managing impacts, or addressing resource tensions. EECA's guidelines give some information on assessing impacts at resource consent level. The Quality Planning website (www.qualityplanning.org.nz) gives some direction on planning for renewable energy development.

Local authorities also lack central government guidance on managing landscapes on private land, including nationally outstanding landscapes. Many local authorities face difficulties in responding to diverse and often opposing viewpoints and pressures, and in developing landscape management measures.

6.3.1 Promising initiatives

Several projects may provide additional guidance and strategic direction for energy and electricity generation, including:

- scoping an NPS on electricity generation under the RMA (MED and MFE)
- preparing regional renewable resource assessments to assist regional councils with developing and managing renewable resources in their regions (EECA)
- developing a New Zealand energy strategy (MED)
- reviewing the NEECS (EECA).

This policy guidance will be particularly helpful for wind power if it combines strong policy support for renewable energy with specific measures and guidance about land-use policy. Further support for renewable energy (possibly through the NEECS) may help to diversify wind power to include smaller-scale development.

6.3.2 Looking forward

The New Zealand Government has taken a different approach from that in other countries experiencing and encouraging considerable wind power growth. A key question of this investigation is whether additional guidance and leadership is needed from central government. The following comments were made by stakeholders in answer to it (see box).

Stakeholder views: Greater central government guidance needed?

- The majority interviewed thought additional guidance from central government would be beneficial, in particular to address tensions between matters of national importance in the RMA (natural character, outstanding natural landscapes, and renewable energy).
- Stakeholders highlighted the lack of leadership to enable a strategic approach.
- Some thought central government guidance would not be effective. Some were concerned that the possible NPS on generation could become a 'National Development Act' with national imperatives overriding local aspirations.
- Stakeholders commented that guidance should not be prescriptive, but should provide a framework that local government could then implement.
- Some thought central government should address the gap in understanding and/or expertise on how to manage landscapes.

We consider that central government needs to take a stronger role in *how* wind farm development occurs, rather than just *how much*. Roper states the following about wind farm management in the United Kingdom:

> *It is clear that the general characteristics of wind farm developments call for a well-structured planning system, from the national level down to the local authority level, and one which addresses the obvious dilemma between the promotion of wind power by the national governments, and the various political structures of the regional / local planning system that regulates the siting of turbines, and allows for citizen participation.*[221]

It is important that central government does not just promote wind power *per se*, but also creates a framework for managing the speed of growth, extent, and location of wind farms, particularly as this relates to impacts on landscapes and local communities.

Central government can:

- influence the investment in wind power – using policy and economic instruments and support to diversify wind farm locations, scales, distribution, and ownership
- guide local government decision making – providing policy and guidance on planning for wind farm development (especially related to, for example, cumulative effects, outstanding landscapes, and natural character).

Central government needs to make sure agencies are working together effectively (Electricity Commission, MED, DOC, MFE, and EECA in particular) so that outcomes for electricity generation are environmentally and socially sustainable.

New Zealand would benefit from a national level strategic approach tailored to the characteristics of wind power that will provide consistent planning for the rapid growth of wind power.

6.3.3 Community wind power

The benefits of community wind power justify serious consideration by central government. The Government is not promoting smaller-scale, community-led initiatives that have been a key aspect of the success of wind power in Denmark and other countries (see Chapter 4). The structure of the electricity market and investment difficulties for wind power discourage participation other than from the large players. Other countries have used financial, policy, and institutional support from central government to introduce smaller-scale wind farms.

Large-scale, commercially-owned wind power has benefits, including larger contributions to electricity supply, economies of scale, and industry knowledge and

capability. However, smaller-scale, community-owned wind farms can also have social and environmental benefits, including:

- reducing impacts of each project on landscape and amenity (if sited well)
- promoting public acceptance of wind power, particularly within the local community – public opinion surveys for Sustainable Energy Ireland, a state-funded agency, found that acceptance of wind energy was greatest for projects with 10 turbines or less [222]
- providing locals with a sense of control and involvement
- promoting dispersed wind farm development and thereby benefiting the transmission system by locating generation closer to demand and reducing transmission losses
- distributing economic benefits to the local community – with large, commercially driven wind projects, the economic benefits tend to 'leak' outside the local area; with community wind developments, the economic benefits are more likely to stay local.[223]

Bolinger identifies factors that have contributed to the success of community wind power in Germany, Denmark, and Sweden. These include feed-in laws, tax advantages, and standard interconnection agreements.[224]

A recent Master's dissertation studied the driving forces behind community and corporate ownership of wind energy in Europe, and the implications and opportunities for New Zealand. This study emphasised the importance of energy policy, economic incentives, and addressing barriers to community-owned wind power projects.[225]

Barriers can include:

- high set-up costs and investment risks
- finding a buyer for the electricity generated
- gaining grid access
- obtaining finance
- the lack of expertise and familiarity with wind power in New Zealand.

CHAPTER 7

Case studies

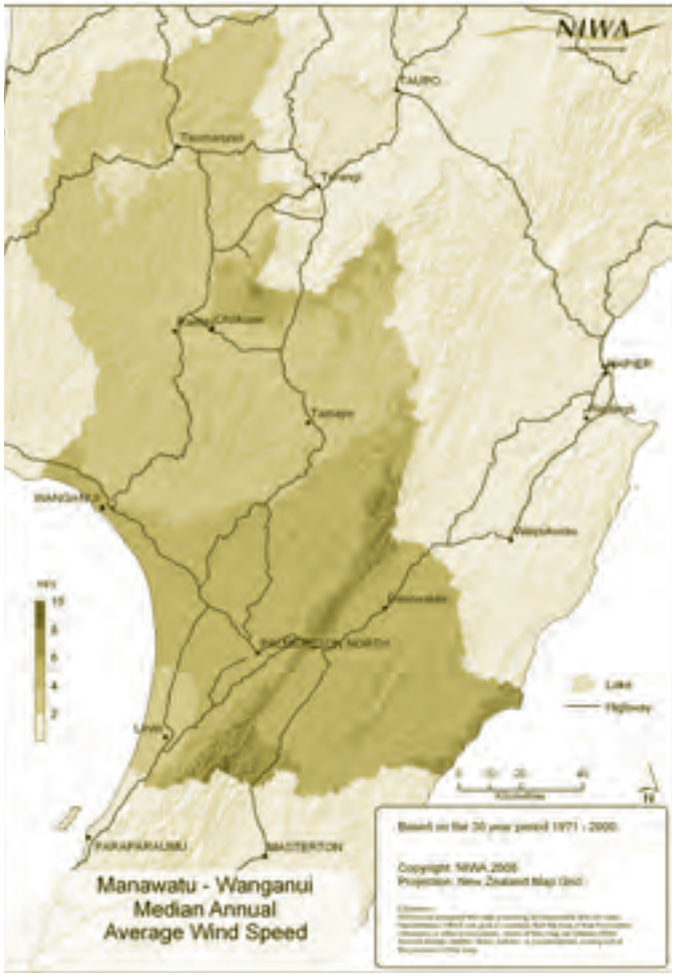
The Manawatu-Wanganui, Auckland, and Wellington regions were studied to gauge how local authorities are addressing wind farm development and how local communities are responding. We chose these areas because they already have wind farms or have been dealing with proposals.

7.1 Manawatu-Wanganui (the Tararua Ranges)

7.1.1 Existing and proposed wind farms

Nearly 80 percent of all New Zealand wind power is generated in the Manawatu. The wind farms are clustered on the northern end of the Tararua Ranges and southern end of Ruahines, near Palmerston North.

Figure 7-1: Manawatu-Wanganui wind resource



Operating wind farms total 158 turbines and 160.5MW of installed capacity. One more wind farm and one extension to an existing wind farm have received resource consent, and are under construction. A further two wind farms are proposed. One of the proposals is an initiative by the Palmerston North City Council to develop a wind farm on Council reserve land (Turitea Reserve). Sites are also being investigated on the Puketoi and Waewaepa Ranges in the Tararua District. See Table 7-1 for details of existing wind farms and those under construction.

Figure 7-2: Te Apiti wind farm (Source: Dana Moran)

The Tararua Ranges form a definite and prominent skyline that can be seen from many places on the Manawatu Plains. The Ranges have relatively few structures on them, being predominantly in rural use.

Table 7-1 contains details of the wind farms currently operating in the region and those that have received resource consent, but have not yet been built.

7.1.2 Content of local authority plans

The Horizons Regional Council has jurisdiction over the Manawatu-Wanganui region, which includes seven territorial local authorities (TLAs).[226] Parts of the Tararua Ranges are located within the Tararua District and parts within Palmerston North City Council (PNCC) jurisdiction, with the ridgeline delineating the boundary between the two. The Te Apiti wind farm is on the border with Manawatu District Council (Figure 7-2).

Table 7-1: Wind farms in the Manawatu

Name	Applicant	Local authority	Year of consent	No. of turbines	Installed capacity	Status		Submissions
Tararua Stage 1	Tararua Windpower Ltd	Tararua District Council	1996	48	31.7MW	Built	Notified, consent granted	23 submissions, 9 in opposition
Tararua Stage 2	Wind Farm Developments Ltd	Tararua District Council and PNCC	2001	55	36.3MW	Built	Non-notified, consent granted	n/a
Te Apiti	Meridian Energy Ltd	Tararua District Council	2003	55	90.8MW	Built	Notified, consent granted	20 submissions, 11 in support
Tararua Stage 3	TrustPower Ltd	Tararua District Council and PNCC	2005	40 (9 refused)	93MW	Under construc-tion	Notified, consent granted	340 submissions, 106 in support, 230 in opposition
Te Rere Hau	New Zealand Windfarms Ltd	PNCC	2005	104 (7 withdrawn through Consent Order)	48.5MW	Partly built (2.5MW)	Notified, consent granted	71 submissions, 27 in support, 44 in opposition

Under the Palmerston North City District Plan, the Tararua Ranges are zoned rural, with part being within a rural-residential area. The district plan specifies wind farms as a discretionary activity in the rural zone and includes them in the category 'Rural industries, sawmills, and wind farms'. The plan states:

> *Their usually, "one-off" location also increases their visual impact… In the case of wind farms, the largely unknown effects of the activity mean that it is essential that it be examined on a case by case basis.*[227]

The Tararua District Plan contains no reference to wind farms. However, wind farms fall within 'rural industries' as a discretionary activity in the rural management area.

Both TLA plans also contain other policies relevant to wind farm proposals, including rural amenity, efficient use of rural resources, and rural subdivision.

Horizons Regional Council's Manawatu-Wanganui Regional Policy Statement (RPS) is another key document. The RPS identifies the Tararua Ranges skyline as an outstanding natural feature (ONF) of regional significance for:

> *(p) its scenic qualities provided by its prominence throughout much of the Region and its backdrop vista in contrast to the Region's plains.*[228]

These scenic qualities are identified as being particularly important when viewed from a distance.

The Tararua Ranges skyline is identified in the Tararua District Plan as a Category B significant natural feature and landscape, but not in the Palmerston North City Plan.

The RPS also supports the use and development of renewable resources, provided effects can be avoided, remedied, or mitigated. It notes that the region is a net importer of energy.

The Palmerston North City Council's LTCCP[229] aims to take a proactive approach to electricity and energy for the community:

> *The Council belongs to the EECA EnergyWise Councils Partnership Programme and is developing a strategy to become a leader in environmental and urban sustainability. A key objective is to become increasingly self-sufficient in electricity… Further out, there are plans – subject to reserve management plan review and resource consent – to harness wind energy in partnership with Mighty River Power, which has been awarded the lease to build a wind farm of at least 100MW on the Turitea Reserve ridgeline.*[230]

7.1.3 Decision making on resource consents

In this section we analyse the key points of planners' reports, hearing reports, assessments of environmental effects, and evidence from individual applications.

Process

Wind farms have been built within both Tararua District and Palmerston North City boundaries. Tararua Stage 3 required a joint hearing as it straddled the boundaries between the two authorities. All applications, except Tararua Stage 2, have been publicly notified.

No appeals were heard by the Environment Court, although the Te Rere Hau proposal was appealed, then settled through Consent Order.

Council experts assessed visual, noise, and ecological effects for all applications. These assessments and the decision reports became more complex and detailed with later applications.

Consultation by applicants

For Tararua Stages 1, 2, and 3, TrustPower (and its precursor) consulted with several organisations and surrounding landowners. For Tararua Stage 3, TrustPower held two open days. Written approvals were gained from 14 neighbouring property owners and affected parties.

For the Te Apiti wind farm, Meridian Energy prepared a project brochure, held open days around the site, and consulted with key stakeholders.

The community has had increasing involvement in consent conditions for the more recent proposals.

Submissions

The first applications attracted few submissions (see Table 7-1) but more recent applications attracted a greater number of submissions. The most recently approved applications (Tararua Stage 3 and Te Rere Hau) attracted more opposition than support. All of the 230 opposing submissions to the Tararua Stage 3 application came from within PNCC's jurisdiction.

Submissions to all proposals reflect a divergence of views as to the effects of the wind farms. Some consider they result in industrialisation of the landscape, and some consider them to be beautiful and sculptural, and representative of clean, green electricity.

Submissions on the Tararua Stage 3 application suggest some parts of the community may be reaching their level of tolerance for wind farm expansion on the Tararua Ranges, and that opposition within the local community is increasing.

Input from agencies

Horizons Regional Council made a submission on the first wind farm proposal (Tararua Stage 1). This submission was neutral and only highlighted the objectives and policies in the RPS relevant to the proposal. Since then, the regional council has not been involved in any of the hearings, despite the RPS identifying the Tararua Ranges as an outstanding natural feature of regional significance.

Central government agencies including DOC, EECA, and MED have also made submissions. DOC has raised some issues with ecological and cumulative effects at the hearing for the Te Rere Hau development. EECA have supported the developments, and emphasised relevant policy and legislation in their submission.

Activity status

The hearings report for the Tararua Stage 3 decision noted that the discretionary activity status recognised that wind farms are:

> *…contemplated as being generally appropriate, or, to put it another way, not inconsistent with the Plan objectives and policies.*[231]

Effects on the Tararua Ranges landscape

Much of the discussion at the hearings related to what was considered to be 'appropriate development' for the Tararua Ranges as a regionally outstanding feature.

The general findings of the hearings, supported by several landscape experts, were that the Tararua Ranges are a large-scale landscape, modified by previous land use activities, and therefore capable of visually absorbing large-scale wind farms. The section of the Ranges where the wind farms are located is not the most valued portion. Expert witnesses had differing views on the acceptability of the landscape effects, particularly in regard to Tararua Stage 3 and Te Rere Hau.[232]

In later decisions, because wind farms were already located in the Tararua Ranges, effects were found to be no more than minor, as argued by the landscape architect for TrustPower:

> *It is primarily a working rural landscape where the production of wind energy is a prominent and accepted land use.*[233]

Effects on visual amenity of residences

The first wind farms (Tararua Stages 1 and 2) were set back considerably from property boundaries, meaning direct visual effects were less significant. For Tararua Stage 3, the closest turbines are 1.2–1.5 kilometres from two houses, and 2 kilometres from the next few houses.

Visual impacts (and noise) appear to be resulting in greater tensions and opposition from neighbouring residents. However, the orientation of nearby houses away from turbines was found by experts and the hearing panel to reduce visual impacts.

Addressing cumulative effects

The issue of cumulative effects was raised in recent applications (Tararua Stage 3 and Te Rere Hau). Cumulative effects include:

- the spread of wind farms along the horizon
- the intensity of wind farms in any one location
- the progressive incursion of wind farm development down the hill slopes from the ridge top.[234]

Differences in size and design between wind farms (for example, lattice and tubular tower, two-bladed and three-bladed turbines, different heights) have also arisen as an issue.

Cumulative effects are a key issue in the Manawatu as two more wind farms are proposed for the area. Decisions to date have found cumulative effects to be 'less than minor'. However, discussion of cumulative effects in later decision reports indicate their growing relevance and recognition.

Mitigation measures

Mitigation of adverse effects has required changes to some applications that have reduced effects on the local community. Examples of mitigation measures are:

- the Tararua Stage 3 decision required the deletion of nine turbines because of adverse effects on the visual amenity of neighbouring properties, and landscape values
- the Tararua Stage 3 decision included a condition requiring that a neighbourhood liaison group be set up to address community issues
- although not part of the consent, Meridian and TrustPower have provided some funding to the local community[235]
- the Te Rere Hau application involved the formation of a QEII covenant on the property to protect indigenous vegetation.[236]

7.1.4 Future plan development

Planning officers at the Palmerston North City Council note that a landscape assessment as part of the district plan review is planned. This assessment will cover lifestyle development and wind farm development on the Tararua Ranges as significant resource management issues facing the city.

The Horizons Regional Council is reviewing its RPS and regional plans and developing the 'One Plan' to combine these plans. The new plan is intended to better define the extent of the landscape and landscape values requiring protection from inappropriate development. This is to be achieved through a collaborative approach involving the district and city councils. It is hoped that the regional and territorial authorities will respond in an integrated way to future development proposals affecting significant landscapes.

The One Plan has identified energy issues, particularly how renewable energy will be recognised in resource consent processes. Energy provisions in the One Plan are supported by a recent inventory of renewable energy opportunities in the region.

7.2 Auckland region

7.2.1 Existing and proposed wind farms

In April 2004, Genesis Energy applied for resource consent to develop a wind farm on the Awhitu Peninsula consisting of 19 turbines at a maximum height of 90 metres. This was the first wind farm proposed for the Auckland region. The site is in the Franklin District, in the south of the Auckland region. It consists of 227 hectares 6 kilometres west of Waiuku and 1 kilometre north of Kariotahi Beach, on a plateau at the top of coastal cliffs. The proposal involved the turbines being no closer than 200 metres from the cliff edge. The area is mostly rural, with lifestyle properties nearby.

The Awhitu Peninsula is predominantly rural with several small settlements and areas of indigenous vegetation. The coast has natural, rugged qualities, typical of Auckland's west coast with few structures, but modified by grazing practices.

The site's proximity to the Auckland metropolitan area was partly why it was selected for the wind farm.

7.2.2 Content of local authority plans

The Auckland Regional Council and Franklin District Council are the local authorities responsible for the management of this area, and for the assessment of wind farm developments.

The wind farm falls as a discretionary activity in the rural zone of the Franklin District Plan, and is classed as a network utility. The plan lists the following assessment criteria for network utilities:

- proposed location, site, and route
- external appearance (including screening if any)
- adverse effects on the environment and the degree to which they are remedied or mitigated
- alternative routes and sites available
- reasons for particular choice of site or route
- bulk and location of structures within the site
- effect on amenity values, particularly visual amenities
- the probability of risks associated with construction and operation of the activity and any methods of avoidance or mitigation, particularly in terms of the technology used
- the importance of any proposed utility facility and any social and economic benefits it may have for the community.[237]

Even though these criteria are for network utilities in general, they are also useful for assessing wind farm proposals.

The Franklin District Plan does not list the wind farm site or its surroundings as an outstanding landscape, or any other special designation. However, the general objectives and policies on rural amenity and character contained in the plan are relevant.

Issues noted in the district plan point to the conflicts between activities in the rural zone.[238] Land fragmentation is affecting the availability of the soil resource for productive use – one of the most significant resource management issues facing

the district. Objectives and policies in the rural zone emphasise the importance of retaining the life-supporting capacity of the soil resource.

The Franklin District Council has notified a plan change to the rural zone. This plan change is intended to address pressures for rural residential subdivision in the Franklin District, and to direct growth to particular areas.[239] The site falls partly within the newly zoned Awhitu Rural Management Area and partly within the Tasman Coast Management Area, which has stronger objectives and policies relating to coastal character and amenity. This plan change is not yet fully operative.

The Auckland Regional Policy Statement (ARPS) provides a framework for decision making for issues of regional significance. Of most relevance to the wind farm application are policies on regionally significant infrastructure, energy, natural character, and landscape. The ARPS has standard policies associated with the promotion of renewable energy resources, provided adverse effects can be addressed.

The Auckland Regional Council's planning framework has a long history of landscape and natural character policy. A 1984 study identified outstanding and regionally significant landscapes through public preference assessment. This study also assessed the visual absorption capacity of different landscapes. An updated landscape assessment was carried out in 2003, and a plan change notified in September 2005. The change is not yet operative, but was referred to in the Environment Court hearing for the Awhitu application to aid assessment of the wind farm.

The Kariotahi coastline in Franklin, where the wind farm site is located, is listed as a regionally significant landscape in the ARPS and an outstanding natural landscape under the regional coastal plan. The actual site is not defined as either of these.

7.2.3 Decision making on resource consent

The following key issues are relevant to the application. This discussion builds on the analysis of the Environment Court decision in Chapter 6.

Process

The application was publicly notified. Genesis provided a comprehensive assessment of environmental effects (AEE) including a detailed assessment of natural character and visual amenity.

The planner's report for the Franklin District Council recommended that the wind farm be approved. However, independent commissioners rejected the application in September 2004 on the following grounds:

- visual effects on landscape
- effects on horses
- effects on Maori and cultural sites.

This decision was appealed by Genesis.

The assessment of the Awhitu application was complex, and took considerable staff time from the consent planners at the council. This can be a significant factor when councils are confronted with large, complex applications.

Consultation by applicant

Genesis contacted surrounding landowners, then held a public meeting and later a 'drop by' display evening.[240]

Submissions

A total of 262 submissions were received:

- 237 opposed the proposal
- 179 submissions raised concerns about the visual impacts of the wind farm
- 161 submitters raised concerns about noise
- 88 submitters raised the issue that the wind farm should not be constructed in a rural lifestyle area populated by so many people

In addition, three petitions opposing the development with a total of 614 signatures were submitted.

Most of the opposing submissions came from the local community. Some supportive submissions came from national organisations, such as the Environmental Defence Society, Greenpeace, and central government agencies EECA and MED.

While the submissions appear to reflect majority opposition by the local community, opinion was divided. Community groups have formed that both support the proposal (Waiuku in Support of Wind Energy [WISE]) and oppose it (Waiuku Windfarm Information Group [WWIG]).

Input from agencies

The Auckland Regional Council submitted on the resource consent application, and appeared at the district council hearing. The regional council also provided evidence at the Environment Court. It argued that the proposal was consistent with council policies on renewable energy, and landscape and natural character. While adverse effects on natural character and landscape would occur, the wind farm would be best accommodated at the proposed site – sites further up the coast are areas of higher significance.

The RPS has strong landscape policy allowing the values and significance of the site to be compared with other areas in the region. This robust landscape and natural character policy helped with assessing the viability of the site and the likely effects of the proposal by Genesis.

EECA was a party to the appeal in order to ensure renewable energy matters were appropriately addressed before the Environment Court.

Scale and location

Compared with most other wind farm proposals around New Zealand, this development has a small number of turbines. However, the proposal generated more submissions than many larger developments, perhaps because of its coastal site, its location in the Auckland region, and the number of rural lifestyle dwellers in the area.

Effects on natural character and visual amenity

The planners' report prepared by the Franklin District Council found that the proposal would have minor effects on visual amenity and landscape values. The Environment Court found the proposal would have significant adverse effects on natural character and landscape, but overall that the proposal achieved sustainable management. This difference indicates a degree of uncertainty in assessing appropriateness and weighing significant adverse effects against positive effects.

The Environment Court found that removing one turbine from the proposal and relocating others before the hearing meant effects on residences and the surrounding area would "not be invasive".[241]

The site and surroundings were found to have moderate-to-high natural character, although the modified state of the land was noted. Because of the large-scale nature of the wind turbines, views from the beach, which has high natural character, would be affected. The Court found effects on natural character and landscape to be significantly adverse, and that a greater buffer would be needed to protect the visual integrity of the coast.

Evidence presented in the Environment Court hearing by Stephen Brown, witness for the Auckland Regional Council, referred to both the positive and negative effects on character and amenity:

> *..the wind turbines could well be visually intrusive simply because of their distinctive character, movement, and contrast with the more natural characteristics and qualities of the nearby coastline… In a more positive sense, the dynamism implicit in the type of change proposed would also contribute a focal, landmark quality to the Genesis proposal – within a landscape that is often rather barren and largely devoid of features of notable landmarks at present.* [242]

Overall, the Court found that the wider benefits of the proposal to sustainable management outweighed the local site-specific effects on natural character and visual amenity.[243]

Mitigation measures

Measures to mitigate adverse effects included:

- relocating two turbines further away from adjoining properties, and removing one turbine (prior to the Environment Court hearing)
- planting to partially screen the wind farm from some neighbouring properties (offered at the Council hearing)
- revegetation to rehabilitate the site from its current eroded state (part of the resource consent conditions).

As discussed in Chapter 6, the Environment Court has allowed the appeal by Genesis and granted the consent. Construction has not yet started. Recent media reports from Genesis are that the project is not currently economic because of a weaker New Zealand dollar and higher turbine prices.

7.2.4 Future policy and plan development

The Franklin District Council has not indicated plans to incorporate provisions on wind farms into its district plan. The rural plan change, incorporating the landscape assessment, will update district plan provisions to better manage subdivision pressure.

The Auckland Regional Council has recently considered its future role in energy management. The regional council has decided to take an "enhanced business as usual" approach, but not to be proactive on energy issues. A report prepared for the council suggested that it could become a leader by developing a regional energy strategy:

> *It is likely that over the next 20 years advantage will be taken of the high wind resources on the exposed west coast and many more wind farms will be developed in the region.*[244]

The Council is continuing to take a strong role in landscape and natural character management at a regional level. The plan change to the RPS will further develop and update its landscape policy.

7.3 Wellington region

7.3.1 Existing and proposed wind farms

The Wellington region has only one wind farm, but given its excellent wind resource and location near transmission lines and population, the probability of future growth is high. Figure 3-2 in Chapter 3 shows multiple wind farm proposals in Wellington. The existing Hau Nui wind farm is located on the hills south of Martinborough in the Wairarapa.

A second wind farm proposal (Project West Wind) is under appeal to the Environment Court. The project is located at Makara, on the north-western edge of Wellington City, adjoining the west coast. Makara has approximately 400 residents including settlements at Makara village and Makara Beach.

Makara is largely rural in character with lifestyle properties and some regenerating land, particularly in the south. If built, Project West Wind will be the largest wind farm in the southern hemisphere, incorporating seventy 2–3MW turbines up to 125 metres high, with a total capacity of 210MW.

The Wellington Regional Council has initiated another wind farm proposal to be built on reserve land at Puketiro, to the north of Wellington City, inviting tenders from developers. The regional council also plans to invite companies to investigate and develop a wind farm at Stoney Creek in south Wairarapa.[245] Wind farm sites are being investigated in other parts of the region.

The first wind farm proposal in the Wellington Region was refused consent. It was for 47 turbines on Baring Head and was a non-complying activity under the district plan. The Hutt City Council refused the application in 1995 on the basis that the site was

Figure 7-3: Wellington wind resource

outstanding for landscape and geological reasons and was also of cultural significance to tangata whenua.[246] This decision was made before the RMA amendment to recognise the importance of renewable energy.

Consent for the Hau Nui wind farm was sought in two stages. The first application was for seven turbines, generating 3.9MW. This application was approved on a non-notified basis in 1997. The second stage was for eight turbines, totalling 8.65MW. This application was also approved on a non-notified basis in 2004. Written approvals were obtained from neighbouring property owners.

7.3.2 Local authority plan content

This discussion focuses on the decision making for Project West Wind. It should be noted that the Environment Court decision may be released before this report. This discussion focuses on the Council hearing.

The proposed West Wind wind farm is within Wellington City. The Wellington City Council Operative District Plan gives wind farms a discretionary activity within the rural zone as 'Non-rural activities, buildings and structures, and factory farming'. The plan includes assessment criteria relating to the scale, location, consideration of alternatives, effects on landscape, and noise. These criteria seek to limit adverse effects from one-off non-rural uses. The plan also requires consent for the construction of any structure on a hilltop or ridgeline. Assessment criteria are based around the extent to which the proposal affects the ridgeline.

District plan objectives and policies relevant to Project West Wind include those seeking the efficient use of rural resources, maintenance and enhancement of rural character, and natural features. No objectives or policies relating to renewable energy are contained in the plan.

Several non-statutory documents cover the Makara area. These include the Makara Community Plan (dated February 2002), and the Rural Design Guide. The community plan states that the primary objective of Makara residents is to protect the unique character and rural amenity of Makara. These documents have no statutory weight under the RMA.

The Wellington City Council (WCC) has developed several strategies that have influenced recent changes to the district plan. Of particular relevance is the sustainability framework under the LTCCP. The WCC seeks a greater role in energy management, including projects initiated by the council that demonstrate sustainable energy to the public.

Two changes to the district plan relevant to wind farm developments were notified in 2004 by the WCC:

- Plan Change 32 – to further promote renewable energy through additional objectives, policies, and rules

- Plan Change 33 – to provide greater clarity for protecting Wellington's significant ridgelines and hilltops.[247]

The plan changes do not propose any guidelines for directing wind farms to certain locations, other than recognising that the rural zone is generally appropriate for wind farm development.[248] A definition of a 'wind energy facility' is included. These plan changes are both under appeal.

Plan Change 32 includes assessment criteria for renewable developments. In relation to the visual effects, these include:

- the extent to which the proposal will impact on rural character
- the extent to which the proposal will be visible from residences, key public places including roads, and recreation areas
- the relationship of the proposal to the ridgeline and hilltop overlay
- the visibility of the proposed development
- the extent to which the proposal will impact on the natural character of the coastal environment, including on cliffs and coastal escarpments
- the extent to which any proposal can be sited underground
- the scale of any proposed development, including the number of turbines, their height, and the cumulative visual effect of the development as a whole.

As part of Plan Change 33, consultants for the council created an inventory of important ridgelines and hilltops. Assessment of significance was made based on visual values only, although Quartz Hill in Makara was included on the basis of geological values as well as landscape values. The hearings committee noted that other values were also important to landscape such as natural, heritage, and recreational values.[249]

The Wellington Regional Policy Statement (RPS) promotes the use of renewable energy sources, while avoiding, remedying, or mitigating the adverse environmental effects of energy production, transportation, transmission, conversion, and end use.

The RPS lists regionally and nationally significant landscapes in the coastal area (including Cape Terawhiti and the marine terraces at Tongue Point). In 1996–1997 the Wellington Regional Council prepared a Proposed Regional Landscape Plan, which identified landscapes and features of both outstanding and regional significance. However, this plan was withdrawn and, as a result, regional planning documents do not comprehensively identify regionally significant landscapes.

Other regional documents, including the Regional Coastal Plan, contain provisions relevant to the wind farm application.

7.3.3 Consent decision making

Project West Wind required consents from both the Wellington City Council and the Greater Wellington Regional Council. Regional consents were required for:

- cut-and-fill volumes of up to 1.7 million cubic metres for turbine platforms and roads
- a temporary berthing structure, jetty, and breakwater on the coast for construction.

Process

The West Wind application was publicly notified in July 2005, and heard from September to November 2005. The council hearings panel consisted of two independent commissioners and two councillors. Meridian presented evidence from over 20 experts and witnesses in support of its application. Numerous experts assessed the application and gave evidence on behalf of the Greater Wellington Regional Council (GWRC) and WCC. The hearing and evidence were complex and wide-ranging, reflecting the scale and potential effects of the proposal, and the high level of public interest.

Consultation by applicant

Meridian's consultation philosophy is to approach stakeholders once a project has been formed. Consultation was carried out with key stakeholders beginning four weeks before the application was lodged. Consultation included open days and specific consultation with key stakeholders. Meridian consulted the local community after the application for consent was lodged, as stated by the commissioners:

> *Meridian did not consult the Makara community before lodging the application, but did undertake communication with certain key stakeholders and community groups after lodging the application on 1 July 2005. It is apparent that the tension between Meridian and the Makara community resulted in ineffective communication.*[250]

Submissions

The application attracted 3,757 submissions:

- 800 opposed the proposal
- 437 gave conditional support
- 2,520 gave unconditional support.

Many of the supportive submissions came from Wellington city residents. It should be noted that Meridian distributed a *pro forma* submission to encourage supporting submissions. Opposing submissions came mainly from the Makara community,

including community and environmental groups. A wide range of concerns was raised including noise, landscape, heritage, and visual impacts.

Activity status

The West Wind proposal is a discretionary activity in the rural zone, with a small portion in a conservation zone.[251]

History of site

As stated in the hearings report, the former Electricity Corporation of New Zealand (ECNZ) began investigating Quartz Hill as a site for a wind farm in 1995. Before ECNZ split into separate state owned enterprises (SOEs) in 1999, it considered three options: 50 turbines, 80 turbines, and 8–10 turbines.

The smallest option was chosen because it was commercially viable and likely to be accepted by the public, and was announced in 1997. Makara Guardians then formed to oppose it, but the proposal did not continue after ECNZ split into three SOEs.

The history of community documents and council involvement is also relevant. As stated in the hearings report for Plan Changes 32 and 33:

> *The trust developed with the Council in the period up to the Community Plan completion has, according to many of the submitters, been broken… it is clear that the council faces a real challenge in restoring the trust which will be an important underlay to discussions on the effects of renewable energy proposals, and their effect on the Makara community.*[252]

Assessment of effects

This discussion focuses on summarising the visual amenity, natural character, and landscape impacts.

The West Wind proposal covered 56 square kilometres and required consideration of an extensive range of potential effects on the environment including those relating to:

- ecology (including coastal ecology)
- water quality
- historic sites
- issues of significance to Maori
- recreational issues
- natural character
- rural character
- landscape and visual effects

- noise, traffic, and other construction effects.

The range of effects needing consideration reflects the diverse environments and values associated with the Makara area, and the range of activities involved in the proposal.

There are approximately 125 dwellings within 2 kilometres of proposed turbines. Turbines would be visible from some 42 of these dwellings.[253] Turbines are also proposed near the coast, and on ridgelines within the rural environment. The area contains several sites of particular historical, archaeological, cultural, ecological, and scientific significance.

Meridian's landscape architect divided the coastal environment into landscape units to aid assessment, and assessed natural character within each unit.[254] Natural character was found to be 'moderate to high' in most units, with indications that some parts of the coast have the highest natural character in the Wellington region. The Tongue Point marine terraces are identified as an outstanding natural feature in the regional plan.

The evidence included video and photo visual simulations of the site taken from multiple points. Effects were assessed on their appearance from public spaces, including the road, the public walkway, the beach, and from residential properties.

The commissioners found that the adverse landscape, visual, and coastal effects will be significant. In particular, two turbines were considered to have significant adverse effects on the coastal environment, and in particular, on Tongue Point. On balance, it was decided not to refuse these turbines. The commissioners determined that four of the turbines would have significant adverse effects on the amenity of the residences as a result of visual dominance. The adverse effects could be mitigated by removing the turbines from the proposal. However, it was decided not to refuse them.

> *In weighing this issue, the Commissioners concluded that, in general terms, the global and national benefits outweigh the local costs; but there was also another view that worthwhile mitigation could be achieved by not granting consent to some of the turbines. In exercising their responsibilities under the Act, the Commissioners' overall resolution was not to remove any of the turbines which potentially affect the residences.*[255]

A major factor in approving the application in full was the balance between local adverse environmental effects and the wider benefits of the proposal. Even though effects were found to be significant, the benefits were found to outweigh impacts.

Appeals

The decision was appealed by ten parties,[256] including Meridian Energy, and was heard at the Environment Court during June and July 2006. The decision is awaited.

7.3.4 Future plan development

The GWRC is undertaking further work on landscape assessment to better document the attributes and values of the region's landscapes. This is in recognition that landscape management is an important issue that is not being addressed comprehensively at the regional level.

Plan Changes 32 and 33 of the district plan will provide Wellington City Council with further provisions to guide decision making on future wind farm proposals. Both the GWRC and WCC are placing a strong emphasis on sustainable energy as part of plans to improve sustainability of the region and city.

7.4 Discussion

7.4.1 Guidance from plans and policy statements

Status of wind farms in district plans

In all the district plans, wind farms fell under discretionary activity status. This seems appropriate given the scale and degree of effects of large-scale wind farms. Using controlled or restricted discretionary status for some wind farms may be appropriate (for example, those with fewer and smaller turbines, set back from property boundaries, and not near any identified special features or landscapes).

District councils deal with wind farms in much the same way as other one-off large-scale infrastructure projects in the rural zone: on a case-by-case basis, rather than through specific zoning or mapping, or exclusion from particular areas. The viability of a site is not known until specific wind measurements are taken. Directing wind farms to specific areas may therefore be difficult and inappropriate, and may also discourage distributed wind farms. However, it would be helpful for plans (or supplementary guidance to plans) to provide greater specificity on preferred locations and scales of wind farms, and the effects that should be avoided and addressed.

Specificity for wind farms in district plans

District plans differ in the specificity of their provisions for wind farms. They range from no reference to wind farms (Franklin District Plan, Tararua District Plan), to specifying wind farms as an activity (Palmerston North City District Plan), to including specific assessment criteria for wind farms (Wellington City Council Plan Change).

The value of referring specifically to wind farms through a plan change includes:

- involving the community at the policy level, rather than only at the point an application is received
- allowing greater specificity of assessment methods for decision makers.

Any plan change should, in consultation with the community, consider conflicts with other policy areas (natural character, rural character, landscapes), and alternative locations and scales.

This process should ideally have strong input from regional councils, and be informed by a wider regional strategy for the integration of renewable energy development and land use.

Landscape and natural character policy

Regions' and districts' plans and policy statements show considerable differences in the way they address landscape and natural character.

The Auckland Regional Council's detailed landscape provisions enabled an informed judgement about selection of the Awhitu wind farm site in comparison to more sensitive coastal areas.[257] This increases certainty for developers and communities. Poor regional landscape policy can result in a lack of information about sensitive places and values, and make informed judgement less likely.

Landscape assessments carried out in the development of plans usually relate to residential development. These assessments may not be particularly suited to assessing wind farm development. Specific assessments of the sensitivity of particular landscapes to wind farm development may be needed, because of the unique effects (positive and negative) of wind farms.

Decisions show that, even if a site is recognised as outstanding, and a wind farm is shown to potentially cause significant adverse effects, a development may still be allowed. Local authorities must therefore seriously consider:

- the potential for resource tensions in their district or region
- whether specific policies and provisions would help to deal with these tensions.

To influence decisions, including Environment Court decisions, these provisions would need to be very clear and direct, and include likely locations and scales for wind farms; and assessment of the sensitivity of particular valued landscapes and coastal areas with good wind resource to different levels of wind farm development.

7.4.2 Wind farm decision making

Process

The large-scale nature of wind farm proposals means a complex and usually lengthy process. The resource consent process is providing a reasonably robust means of addressing the effects of an *individual* wind farm, including effects on landscape and visual amenity. However it is costly and time consuming for all parties.

As noted by Richard Fisher in his review of the regulatory and policy lessons for wind farm development, the process for considering applications has matured.[258]

Changes to the process from early to more recent wind farm applications include:

- more sophisticated methods to assess the effects of a wind farm, including involvement of experts by both the applicant and council

- more comprehensive submissions in support and opposition
- increasing complexity and length of process and detail of decisions.

The involvement of landscape professionals appears to be resulting in attention to good design (that is, fitting the wind farm to the locality as much as possible). Assessment methods and techniques are likely to continue to evolve and improve.

Consultation with communities

Wind farm developers are undertaking reasonably comprehensive consultation with communities and stakeholders by:

- holding open days and public meetings
- meeting with particular individuals and organisations before lodging an application.

Notification of most wind farm applications is allowing input from the community.

Direct consultation with local communities is mostly occurring after consent has been lodged, and following approval of the wind farm. This includes the establishment of community liaison groups while the project is being built.

Although not a requirement of the RMA, consultation with communities before the wind farm design is finalised has been found to be a key aspect of good practice internationally. There appears to be little evidence of this occurring in New Zealand.

Involving the local community at an early stage can be a way of easing tensions and finding common ground. While this may be difficult when strong opposition exists, meaningful involvement of the local community can benefit both the developer and the community. Councils can encourage this through early contact with the developer, and use of the new provisions under the RMA for pre-hearing meetings.

Location decisions

Wind farm developers, rather than councils or communities, are determining locations and sizes of wind farms, within the constraints of plans and legislation. Decisions made by council hearings committees, commissioners, and the Environment Court suggest few places, particularly in rural areas, are *not* suited, in landscape or visual terms, as locations.

Decisions have allowed wind farms:

- in or adjacent to areas of moderate-to-high natural character on the coast
- on or near outstanding natural features and regionally significant landscapes
- within 1–2 kilometres of residential properties.

From these decisions we conclude that the amendment to s 7 of the RMA is setting a high threshold of effects for wind farms against other Part 2 matters, including matters of national importance. Positive effects of wind farms are being given weight in all the areas of our case studies and Environment Court cases regardless of whether district plans have been amended to incorporate the benefits of renewable energy.

A wind farm may constitute appropriate development, even on a regionally significant landscape such as the Tararua Ranges. Locating a wind farm so that the values of a landscape are not significantly degraded shows that renewable electricity generation can be an appropriate development for important landscapes, unlike residential development. However, continued wind farm development may at some point begin to override the values of regionally significant or outstanding landscapes.

Addressing effects

Cumulative effects of multiple wind farms on the Tararua Ranges are becoming a concern. This concern is likely to arise in other areas with good wind resource. Existing wind farms on the Tararua Ranges have formed the baseline for assessing landscape character. Additional wind farms are then assessed against a 'compromised environment' and are more likely to be found to be acceptable. Determining the threshold beyond which multiple wind farms create unacceptable adverse effects in a particular location, district, or region is an important step needed at an early stage.

Whether to mitigate significant adverse effects through removing some turbines from a proposal is a difficult question that has arisen in most decisions to date. Developers often see their proposals as being complete units that will not be viable if any turbines are removed. Developers and decision makers need to give serious thought to ways of avoiding *significant* adverse effects on local communities and landscapes, while keeping in mind the benefits of renewable energy.

Questions remain about how best to manage and assess some effects of wind farms. We need to turn attention to:

- effects of significant earthworks and roading requirements in steeper topography
- dominance effects on dwellings (proximity of turbines)
- the difficulty of assessing effects on visual amenity because of subjectivity
- effects on distinct, rural ridgelines, and the appropriateness of siting turbines on them
- the appropriateness of wind farms in areas of ecological value
- effects of the scale of wind farms in different landscapes.
- effects on the natural experience of beach users

Developing best practice to address these effects is an important goal for developers and decision makers.

7.4.3 Local community attitudes

Local communities have diverse views on existing and proposed wind farms. However, some trends are emerging. Submissions in all case study areas (including the Manawatu where considerable development has occurred) indicate support for wind farms from local communities. But many in the community are also likely to be ambivalent.

Recent wind farm proposals are attracting higher numbers of submissions, including more in opposition. Some groups within local communities are becoming resistant, and organised groups have formed to oppose existing and proposed wind farms. Appeals by these groups to proposals such as West Wind and Awhitu, indicate the strength of people's concerns.

Often media reports highlight divisions in the community between the landowner and the rest of the community, particularly neighbouring residents. Reports of divided communities may not accurately reflect attitudes. However, the landowner has a leasehold agreement with the developer and will financially benefit from the wind farm. The rest of the community will be directly affected by the wind farm but will receive no direct benefit.

Wind farm developers could become more innovative in the way they distribute benefits to the community to reduce these divisions. For example, Meridian Energy's new funding model benefits communities.[259] International approaches have also aimed to establish direct financial benefits to surrounding landowners.

7.4.4 Proactive local authority initiatives

Wind farms and landscape assessment

Palmerston North City Council's plans to undertake a more comprehensive landscape assessment, including the effects of further wind farms on the Tararua Ranges, is a proactive step to understanding and addressing further tensions between landscape values and wind power. Coordination with Horizons Regional Council and neighbouring districts will be important.

Regions and districts with good wind resource would be wise to evaluate regionally and outstanding natural landscapes *before* significant wind farm development.

Renewable energy strategies

Some councils such as PNCC, Greater Wellington Regional Council, and Horizons Regional Council, intend to work towards greater energy self-sufficiency and sustainability. They will promote renewable energy resources and develop a more strategic approach. Information from EECA's regional renewable resource inventories can support and guide councils.

Sustainable energy strategies must be integrated with land use and resource policy. The strategies must consider location, scale, and design of developments to meet economic, social, and environmental criteria. Ways of involving the community in developing these resources should also be a key objective.

Developing wind resources on council land

Greater Wellington Regional Council and Palmerston North City Council have made council reserve land available for developing wind power. Council-led development can incorporate a high degree of community involvement and consultation given the requirements of the LGA.

Wind resources on council land can contribute to the growth of wind power, and benefits can also be distributed to the local community. Councils have a responsibility to make sure sites are carefully selected, including consideration of alternatives, and making sure the values and quality of the reserve are not compromised by the wind farm.

7.4.5 Wind power and the role of local government

Stakeholders interviewed for this investigation made several comments about local authority roles and responsibilities in relation to wind power development (see box).

Interview comments on local government roles and responsibilities

- Regional councils have a key role in providing a strategic approach to wind farm development by balancing renewable energy and landscape goals.
- Coordinating regional and territorial roles to assess local visual amenity, and wider landscape and natural character effects, can be difficult.
- Although the assessment of individual wind farms through the consent process may be robust, a case-by-case approach may not deal adequately with multiple applications. However, several supported the case-by-case approach.
- A proactive rather than reactive approach is desirable, although this can be difficult to achieve.
- Councils' ability to improve policy quickly enough to deal with a rush of applications is a concern.

Most regions and districts in New Zealand take a quite different approach to that of other countries. For example:

- regional plans in Denmark developed specific locations for wind turbines and farms

- local plans in the United Kingdom are required to include policy and assessment criteria for wind farm development, including specific criteria on designated landscapes etc.

Regional strategies and leadership have been important aspects of planning in other countries.

We consider regional councils have an important role in New Zealand. Two important roles for local authorities, and particularly regional councils, are:

- developing strategic direction for renewable energy development and evaluating how renewable energy development can integrate with land use and land use values
- considering preferred locations and/or scales of wind farm developments for the region or district and developing specific policy that addresses regionally significant landscapes and other resources.

Local government, particularly at city and district council level, has an important role in involving communities in the direction for renewable energy (including wind power) by encouraging:

- community initiatives, education, and information
- effective consultation with communities in plan development.

Local government is an important link between central government policies that promote further renewable electricity generation, and the aspirations of local communities.

CHAPTER 8

Conclusions and recommendations

8.1 How does wind power contribute to a more sustainable electricity system?

Wind power can make a significant contribution to a more sustainable electricity system. Using wind power over thermal generation reduces greenhouse gas emissions and reliance on fossil fuels. Wind power uses a plentiful renewable resource. Wind farms present a low risk to our natural environment, and the physical effects of wind power are largely reversible.

These benefits can be fully realised only if wind power and other renewable energy sources increase their share of total generation. We also need significant improvements in energy efficiency and demand management. Greater commitment by the Government and the electricity industry is needed to achieve these improvements.

Wind turbines can be more than equipment for generating renewable energy. They can also generate knowledge, awareness, and acceptance of the need for a sustainable energy future. Wind power opens opportunities for communities to play a greater part in working towards this future through ownership of smaller developments.

8.2 Wind power, people, and place: Framing the issues

8.2.1 National impacts of wind power growth over the next 10 years

We have three main wind farms in New Zealand, and several smaller developments, totalling 181 wind turbines. Estimates of maximum development (see Chapter 3) show that an additional 2,000MW of installed capacity could be developed in New Zealand over the next 10 years. This equates to around 1,000 large turbines in about 36 wind farms.

Even using this high estimate, wind farms would occupy and be visible from a very small part of the country compared with many other land uses. Given New Zealand's land area, topography, and relatively low population density, we conclude that overall the expansion of wind farms does not pose a threat for most of New Zealand's landscapes. Denmark, by contrast, has greater land use pressures and a larger number of widely distributed turbines.

8.2.2 Localised impacts to valued landscapes and communities

Wind farm development will not alter most parts of the country. However, in

particular localities with good wind resources, wind farms may become a prominent feature as is already the case on the Tararua Ranges in the Manawatu. The functional, sculptural form of wind turbines can be a positive symbol of sustainable electricity supported by the community.

However, not *all* wind farm development has positive impacts. Careful attention to the location, scale, and design of wind farms is needed:

- sites with good wind resources are often valued for their lack of obvious human influence, and for their existing character and features. A wind farm comprises very large modern structures (and associated infrastructure) that are conspicuous and can be incongruous with the values attached to the site.
- the trend towards bigger turbines, larger numbers of turbines in each wind farm, and clustering of wind farms concentrates landscape and visual impact.
- wind farms are often located close to residences and their large turbines (sometimes over 80 metres high) can have significant effects on visual amenity.

Locations where large-scale wind farms would be unlikely to be appropriate include national parks; areas of high natural character and ecological value; nationally significant historic sites; and areas with high conservation value.

Any type of activity or structure would face significant hurdles to locate in these areas. Completely avoiding large-scale wind farms in them may be justified. However, many developments will be proposed in landscapes significant or outstanding to a region or district. These landscapes often have multiple values such as amenity, productive use, and natural character. Determining the appropriateness of a wind farm in these locations is more difficult.

Wind farms are one of the more environmentally sustainable forms of electricity generation and therefore call into question the values we place on some of New Zealand's landscapes. At the same time, values towards these landscapes are often strongly held and shared, and are important to the well-being of people and local communities.

8.2.3 What the public and communities think about wind farms

Similar to other countries, surveys in New Zealand show wide public support for wind power. Many people recognise it as one of the least environmentally harmful forms of electricity generation. Some people also like the appearance of wind farms and see them as adding interest to, rather than detracting from, landscapes.

Not all share this view, as shown when communities express their attitudes towards actual wind farm proposals in their district or region. Different opinions on any development proposal are an expected part of any democratic decision making process. However, evidence of increasing opposition by parts of local communities to

recent wind farm proposals *is* a concern. We must acknowledge and understand the full range of community perspectives, and maintain local community support for wind power.

8.2.4 The *way* wind farms are developed matters

Community acceptance and successful wind farm development depend not only on the extent, appearance, and location of wind farms, but also on the process by which they are developed, and who develops them.

In New Zealand wind farms are developed and owned by only a handful of large generators. Future development appears to be continuing this trend, with proposals for larger wind farms, and continued corporate ownership in most cases. This can increase the potential for tensions between developers and local communities. Few examples exist of community-based initiatives and smaller-scale wind farms.

Local communities are contributing little to decisions on location, scale, and design of wind farm developments. International research stresses the importance of engaging local communities early and often as a key success factor.

8.3 The effectiveness of government mechanisms and actions

Legislation and policy to encourage renewable energy is giving some support to wind power, and decision making under the RMA is recognising the benefits of wind power as a renewable resource. These positive trends are creating a platform for wind power to grow. However, central and local government have given little specific attention to addressing the implications of the distribution, location, scale, or ownership of wind farm development in New Zealand, particularly the impacts on valued landscapes and local communities.

We have found that decision making on individual wind farm applications is generally robust. However, we doubt that the case-by-case approach can deal effectively with cumulative effects of multiple applications and significant adverse effects of proposals in a way that will deliver the best environmental and social outcomes.

8.4 Learning from international experience

The following examples are key features of policy and planning adopted in other countries that are also promoting and experiencing significant growth in wind power. While priorities and approaches differ, these features are common to many countries and New Zealand can learn from them:

8.4.1 Strategic planning

In countries such as Denmark, where wind farm development has been very successful, a strategic approach has been taken to planning the location and scale of turbines. This includes national directives, with regional strategies for wind farm location. Other countries such as the United Kingdom and Ireland, while not taking

such a rigid approach to location, have developed a structured and specific planning system.

8.4.2 Support mechanisms

Many countries support wind projects through economic and institutional assistance. They recognise wind power as a renewable source of electricity that helps to address climate change. The feed-in tariff in particular has been successful in Denmark and Germany.

8.4.3 Community wind

Many governments recognise the value of encouraging community ownership of smaller commercial wind developments. They have set up programmes, institutional arrangements, and specific financial support to facilitate community wind development.

8.4.4 Guidance and studies

Many government authorities recognise the unique aspects of wind farm development and the need for guidance for decision makers and developers, and for studies, particularly landscape impacts and heritage. Guidance and information is particularly important when wind power is growing quickly.

8.5 Looking forward: Generating sustainable outcomes and opportunities

Wind farm development *could* be framed as a 'trade-off' between different economic, social, and environmental factors at different scales as follows:

- national needs versus local impacts – the benefits to the national electricity system versus the impacts on the local community and environment
- competing environmental goals – detrimental effects on highly valued landscapes to provide renewable electricity and address climate change
- economic and social priorities – the drive to maximise economic returns through large-scale projects weighed against opportunities for broader social benefits.

Wind power decisions are largely dictated by those with an existing stake in the electricity sector (mostly government-owned generators). The operation of the electricity market limits opportunities for a wider cross section of the community to participate in the development of renewable resources in their locality, and for smaller-scale developments to proceed.

Large-scale wind farms do have a place in New Zealand's energy future. However, the 'bigger is better' model may not always be optimising the integration of wind power into New Zealand's landscapes and communities. The balancing exercise under Part 2 of the RMA will always be difficult in relation to a large-scale wind farm.

We argue that a sharp distinction between benefits and costs is not inevitable.

Economic, social, and environmental benefits and costs can be combined at the appropriate scale. Examples of win–win approaches that could encourage this include:

- planning to encourage wind farms at locations and scales that will minimise tensions and impacts
- encouraging smaller-scale wind farms and turbines owned by members of local urban and rural communities
- fostering the growth of local community identity through wind farm development
- developing innovative ways of involving local communities in larger wind farm developments
- integrating wind farm development into sustainable communities.

To expand these opportunities, central, regional, and local government leadership and support will be needed to:

- increase institutional capacity
- address market barriers
- build knowledge
- improve strategy setting.

8.5.1 Smaller-scale wind farms and community-owned wind power

Opportunities exist to develop smaller-scale, distributed wind farms in New Zealand, and some of these could potentially be community owned. Smaller-scale wind farms:

- have less concentrated impacts on localities and communities
- may not create the same tensions as larger-scale wind farms
- can be sited in locations that would be inappropriate for large-scale wind farms.
- add to local energy security by strengthening local electricity networks.

Smaller, community-owned wind farms can:

- increase public acceptance of wind farms
- retain economic benefits within the district or region.

MED has done some work to encourage distributed generation. However, this work has not resulted in small wind farm proposals (such as those around 10MW or less). Central government needs to address the particular conditions that inhibit smaller wind power proposals and participants.

Recommendations

1 **We recommend that the Minister of Energy directs the Ministry for Economic Development (MED) to investigate measures to encourage investment in smaller-scale, distributed wind farms and turbines, and that a programme to implement these measures be undertaken.**

2 **We recommend that the Minister of Energy directs MED and the Energy Efficiency and Conservation Authority (EECA) to investigate the potential for community-owned wind power in New Zealand identifying:**

- **benefits and opportunities**
- **potential ownership structures**
- **regulatory, institutional, and market barriers, and measures to overcome those barriers**
- **market and policy support tools**
- **ways that local authorities can include community-owned wind power in local plans and strategies.**

8.5.2 Strengthening policy and guidance on wind farm management

This investigation has highlighted the need for clearer direction to address the impacts of wind farm development on valued landscapes and local communities while encouraging wind power to grow.

We need to have proactive and holistic planning for the impacts and opportunities of wind farm development over the long term. A key part of this planning will be considering alternative locations, scales, and designs of wind farms at an early stage. The process needs to be transparent and to fully involve stakeholders and the public.

Central government guidance and policy

Central government has a key role in providing leadership, guidance and information to support a clear framework for decision making on energy and electricity issues. Developing a New Zealand Energy Strategy (NZES) and reviewing the NEECS will help to establish stronger direction for New Zealand's energy future including the role of wind power. The PCE's recent report on the environmental performance of the Electricity Commission recommends actions needed in the development of the NZES.

Further specific guidance and policy on wind power at a national level would support the developing legislative and policy framework. Local authorities would then have resources to help them plan for wind farm development in a consistent way.

Local authorities would benefit from guidance to address particular issues such as cumulative effects of clustering, impacts on outstanding landscapes, and effects on residences. Guidelines could expand on EECA's current guidelines to focus on strategy

and plan making. Guidance is also needed on sensitive areas that are important at a national level, such as the coast, conservation areas, and heritage sites.

Recommendations

3 We recommend that the Minister of Energy and the Minister for the Environment direct EECA and the Ministry For the Environment (MFE) to provide local authorities with guidance on planning for wind farm development and managing tensions related to landscapes and visual amenity. This guidance should include:

- **guidelines to assist councils to develop specific objectives, policies, assessment criteria, and implementation measures to include in plans and policy statements**
- **further work by EECA to assist regional councils to use renewable resource inventories (for wind in particular) to develop regional strategies.**

4 We recommend that the Minister of Conservation directs the Department of Conservation (DOC) to take into account the impacts of large-scale wind turbines and farms in the coastal environment when reviewing the New Zealand Coastal Policy Statement.

5 We recommend that the Minister of Conservation directs DOC and the New Zealand Historic Places Trust to prepare guidelines on assessing and managing the effects of wind farms in or near the coastal environment, conservation land, and historic and heritage sites.

Regional councils should take a leadership role

Regional councils have an important leadership and integration role to play in supporting, planning for, and managing wind farm development. In particular, regional councils should take a strategic approach to:

- identifying and encouraging the appropriate use of renewable energy resources
- protecting regionally significant landscapes and other land use.

Regional councils need to develop strong policy in regional policy statements and plans, strategies, and guidance, and establish strong communication and partnerships with TLAs in the region.

Regional councils should:

- apply s 30(1)(gb) of the RMA to strategically integrate wind farm development with land use
- undertake a regional overview of regionally significant landscapes and coastal

areas with good wind resource, and establish specific plan provisions for wind farms in these locations

- assess the potential cumulative impacts of wind farm development in the region
- identify preferable locations, scales, and extent of wind farm development taking account of economic, social, and environmental criteria
- incorporate wind farm development into wider regional strategies for sustainable development and energy
- work with territorial local authorities to ensure a coordinated and consistent approach to wind farm development, identifying cross-boundary issues, and links between regional and district planning documents.

Recommendation

6 We recommend that regional councils take a leadership role in developing a proactive, strategic approach to wind power development.

8.5.3 Developing best practice for wind farm proposals

Best practice for minimising adverse effects on landscape, visual amenity, and local residences will contribute to positive wind farm development. Efforts to minimise adverse effects must be pursued – by the developer when designing the proposal, and by the council when assessing the resource consent application. The resource consent process has been providing a reasonably robust means of addressing effects. However, ways of avoiding or mitigating effects should be further explored.

Wind farm developers when developing their proposals, and local councils, when considering resource consent applications and determining consent conditions, need to consider:

- ways to mitigate or avoid significant adverse effects, in particular visual dominance of residences, coastal natural character, and values of significant landscapes and features
- including ecological enhancement and/or bush covenanting as part of the development
- enhancing access for recreational use
- establishing community liaison groups and community funds
- monitoring and recording community attitudes following development of the wind farm.

We understand that the New Zealand Wind Energy Association plans to develop best practice guidelines for the wind industry. This is a positive move. The above aspects should be considered when developing these guidelines.

8.5.4 Increasing understanding of public attitudes

EECA has commissioned research into public attitudes to wind farm development. These surveys should be continued and expanded to improve our understanding of public attitudes. We need to know about preferences for different types and locations of wind farms, and how local communities are responding to wind farm development in particular locations.

Recommendation

7 We recommend that the Minister of Energy directs EECA to continue regular reporting on public attitudes to wind farm development and to expand these surveys to include information on:

- **attitudes to different types of wind farms (for example, size and number of turbines)**
- **locations considered most and least appropriate to wind farm development**
- **attitudes of communities to existing wind farm developments.**

8.5.5 Involving the community in decision making

This investigation revealed that the *process* by which wind farms are developed is a key factor influencing positive outcomes. An effective process incorporates the principles of equity, participation, and democracy. Local communities need to be well informed so they can participate meaningfully in the development process.

The local community should be fully involved before designs are finalised – a key aspect of success internationally. It shows the community that they can have input into the design of the development. Early consultation can benefit both communities and developers. Best practice for community consultation could be a facet of the wind industry guidelines.

District and city councils should make use of the extended pre-hearing provisions in s 99 of the RMA. Pre-hearings provide a relatively informal forum for providing information, addressing concerns, and facilitating discussion following lodgement of a consent application.

Councils have the ability to involve communities at the policy and strategy level rather than through individual applications. This can involve initiatives to encourage more direct community involvement in wind energy. The LTCCP process under the LGA is an ideal means of doing this.

Recommendations

8 We recommend that territorial local authorities (TLA's), where appropriate, use the extended pre-hearing provisions of the Resource Management Act (s 99) to clarify or resolve matters between parties before formal hearings.

9 We recommend that regional councils and territorial local authorities use the Long Term Council Community Plan process for gaining community input on the location, scale, and extent of wind farm development considered appropriate for the district or region.

8.5.6 Developing clear and robust landscape assessment and policy

This investigation has highlighted wider issues associated with how landscapes are managed in New Zealand. Sustaining and protecting landscape and amenity values has been a challenging aspect of resource management to date. Decision making relies on good information about the characteristics and values of important landscapes, and this information is not always available.

There has been little input from a national level about how to define, evaluate, and manage landscapes. National guidance requiring a consistent approach to landscape assessment would help local authorities to manage change in valued landscapes; in particular how to address wind farm impacts, particularly in outstanding landscapes.

The RMA requires resources to be managed in an integrated way. Landscapes are often at a scale relevant to a region, and sustaining important values and attributes of these landscapes requires a broad, integrated approach. This means regional councils should take a leadership role in landscape management. Some regions are already doing this. Those that haven't should develop policy and plan provisions, and work with TLAs to incorporate these policies into their plans.

Recommendations

10 We recommend that the Minister for the Environment directs MFE to develop a nationally consistent approach to landscape assessment for use by local authorities in plan development and resource consent processes.

11 We recommend that regional councils take a leadership role in landscape management that includes:

- **identifying and describing outstanding and regionally significant landscapes and features**
- **developing policy and suggested methods for managing regionally significant landscapes in regional policy statements**
- **working with TLAs to incorporate these policies into their plans.**

Glossary and acronyms

AEE	Assessment of Environmental Effects (required under the RMA for resource consent applications)
ANR	Vermont Agency of Natural Resources
ARC	Auckland Regional Council
Carbon sequestration	Processes that remove carbon from the atmosphere. Carbon sequestration occurs naturally but efforts are being made to develop methods beyond naturally occurring sequestration.
C-BED	Community Based Energy Development. Legislation and mechanisms adopted by the Minnesota State government to assist community owned energy (Minnesota residents, nonprofits, LLCs, non-electric co-ops, local governments and school systems, and tribal councils) to develop energy resources.
Community wind	Commercial-scale wind projects where one or more members of the local community have a significant direct financial stake in the project other than through land lease payments. Community wind ownership can take a variety of forms, but the most common ownership structure is when cooperatives form to purchase a turbine/s, sell the electricity to power retailers, and share the revenue among their members.
Covenant	In relation to land of conservation value, a covenant places formal legal protection on land of special value (such as with ecological or heritage value).
Demand-side participation	The process whereby electricity retailers or users can sell into the market reductions in their demand for electricity at times of high price.
Designation	Allows requiring authorities to plan for network utilities and large public works by setting aside an area of land outside the provisions of the district plan.
Distributed generation	Any electricity generation facility, usually small scale, that produces electricity for use at the point of location, or supplies electricity to other consumers through a local lines distribution network.
DOC	Department of Conservation

DTI	Department of Trade and Industry (United Kingdom)
EECA	Energy Efficiency and Conservation Authority
EIA	Environmental Impact Assessment
Electricity efficiency	Any change in electricity use that results in an increase in net benefits for each unit of electricity. A narrower concept than energy efficiency.
Energy efficiency	Any change in energy use that results in an increase in net benefits for each energy use.
FDC	Franklin District Council
Feed-in tariff	The price per unit of electricity that a utility or supplier has to pay for renewable electricity from private generators. This is set by the Government.
FRST	Foundation for Research Science and Technology
Gentailers	The major generators who also own the energy retailer companies. These include Meridian Energy, TrustPower, Mighty River Power, Genesis Energy, and Contact Energy.
Geomorphological	The structural effects to the land of folding and faulting of the earth's surface.
GWh	Gigawatt hour. A measure of energy equal to 1 million kilowatts. New Zealand's installed capacity in 2005 was around 8.7GWh.
GWRC	Greater Wellington Regional Council
KW	Kilowatt. A measure of electricity, or unit of electricity as they appear on electricity bills.
LGA	Local Government Act 2002
Lines companies	The companies that manage the local networks. There are 33 lines companies; many are owned, or co-owned by community trusts.
Local network	The electricity network excluding the transmission grid operated by Transpower.
LTCCP	Long Term Council Community Plan
MED	Ministry of Economic Development
MFE	Ministry for the Environment
MORST	Ministry of Research, Science and Technology.

MRET	Mandatory Renewable Energy Target. A mandatory target that requires industries and electricity retailers to buy a percentage of their energy needs from renewable sources.
MW	Megawatt. One thousand kilowatts.
MWh	Megawatt hour. 1,000,000 watt hours. A watt hour is a unit of energy. Megawatt hours are used for metering large amounts of electricity.
National Environmental Standard	A standard prescribed by regulations made under s 43 of the Resource Management Act 1991.
National grid	The high-voltage electricity transmission network that transmits electricity throughout New Zealand. It is owned by Transpower, a state-owned enterprise.
NEECS	National Energy Efficiency and Conservation Strategy
NFFO	Non-Fossil Fuel Obligation. An instrument used by the UK government for encouraging the growth of the renewable energy sector. It provided premium payments for renewables-generated electricity over a fixed period, with contracts being awarded to individual generators.
NIWA	National Institute of Water and Atmospheric Research
OECD	Organisation for Economic Co-operation and Development
PCE	Parliamentary Commissioner for the Environment
PJ	Petajoule. A unit of energy equal to 10 joules or 277.778GWh.
PTC	Production Tax Credit. Production tax credits support the introduction of renewables by allowing companies that invest in renewables to write off this investment against other investments they make. A PTC can be used as the central mechanism for the support of renewables as part of a national or regional mechanism, or it can be used in support of another mechanisms, such as a quota mechanism.

Renewable energy	Energy from sources such as the sun, wind, waves, tides, ocean currents, the hydrological cycle, and biomass that are sustainable and naturally replaced within a short period of time.
Renewable Portfolio Standard	A standard adopted by some states in the United States that obliges power companies to purchase an increasing percentage of their power from renewable sources.
RMA	Resource Management Act 1991
RO	Renewables Obligation. The RO places an obligation on all licensed electricity suppliers to produce evidence that they have sourced a specified proportion of their electricity supplies from renewable energy sources.
RPS	Regional policy statement
SNH	Scottish Natural Heritage
SOE	State owned enterprise
Taonga	Valued resources, assets, prized possessions both material and non-material
TLA	Territorial local authority
Waahi tapu	A particular category of ancestral land or water which is held in the highest regard by tangata whenua. They can include places, sites, areas or objects that are tapu, sacred and special to an iwi.
WCC	Wellington City Council
Whakapapa	Genealogy, ancestry, identity with place, hapu and iwi
Wind energy	Wind energy is the energy present in the flow of air around the earth. The wind is driven by the temperature and pressure differences in the atmosphere arising from heating of the earth by the sun, and it is further guided by topography. The term wind energy is most often used to refer to the generation of useful energy from wind. This can be electrical, as in wind turbines, or mechanical, as used in wind pumps, used often in simple agriculture.

Wind farm	A collection of wind turbines and their associated infrastructure (roads, buildings, land etc) that convert wind energy into electrical power or energy. Most wind farms are commercial and owned by large generating companies. Their primary purpose is sale, resale, or offsite use of electricity. Wind farms can also be called wind energy facilities. However, see definition of wind farms – small scale.
Wind farm – small scale	No clear-cut distinction exists between a large-scale wind farm and a small-scale wind farm. However, for the purposes of this report, small-scale wind farms include single or small clusters of utility-scale wind turbines, with an installed capacity of up to around 10MW. Small-scale wind farms do not include domestic-scale wind turbines.
Wind turbine	A turbine that is driven by the wind. Wind turbines come in different sizes and produce different amounts of energy.

Endnotes

[1] UMR Research Limited, 2004.

[2] PCE, 2000.

[3] PCE, 2005a.

[4] PCE, 2006.

[5] PCE, 2001; PCE, 2003a.

[6] The environment is defined in the Environment Act 1986 as: "Environment includes – (a) Ecosystems and their constituent parts [including people and their communities]; and (b) All natural and physical resources; and (c) Those physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes; and (d) The social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) of this definition or which are affected by those matters. (Section 2: Interpretation)".

[7] Ministry for Economic Development (MED), the Electricity Commission, Transpower, and the Energy Efficiency and Conservation Authority (EECA), have been investigating technical and economic aspects of wind power. See EECA, 2001; Transpower, 2005.

[8] Local energy can be described as methods for providing energy services without reliance on remote large-scale electricity generation. A report by PCE, due out this year will have more information about local energy, including its potential in New Zealand.

[9] For more discussion on the criteria for defining environmental sustainability see PCE, 2003b.

[10] PCE, 2003b.

[11] *ibid*, 2003b.

[12] MED, 2006.

[13] A 3-year moving average has been used to smooth out some of the variation caused by annual differences in rainfall.

[14] PCE, 2006.

[15] For this analysis, the installed capacity for wind is the total for the installation (i.e. the wind farm).

[16] For more information about New Zealand's electricity system, see PCE, 2005a.

[17] PCE, 2005a.

[18] Under the *Fuelling the future* scenario, total wind generation installed is 1780MW by 2050. Under the *Sparking new designs* scenario, total installed wind generation capacity is 1877MW. See PCE, 2005b.

[19] EECA assessed the total long-term potential of wind generation in the order of 100,000 Gigawatt hours a year (nearly three times our present annual generation). This is based on the assumption that 1 percent of the land area in New Zealand is suitable for wind farming. See EECA, 2001.

[20] EECA, 2001. These included: the far north, the west coast of Auckland, Coromandel/Kaimai Ranges, Cape Egmont/Taranaki Coast, North Island east coast hills and coast, Wairarapa hills and coast, Manwatu Gorge, Wellington hills and coast, Malborough Sounds hills, Banks Peninsula, Canterbury river gorges, inland Otago, and Foveaux Strait and hills.

[21] The first MW-scale turbine was installed in 1941 at Grandpa's Knob in Vermont, USA.

[22] Although the price of turbines has been reducing over time, there has been a recent increase in the price of turbines internationally due to high demand. This is being stated as a constraint to some wind farm developments. For example, see http://www.nzherald.co.nz/section/story.cfm?c_id=3&ObjectID=10399783

[23] Lines companies can undertake some limited generation. The lines company cannot sell any power produced to the end-use customer and must sell it to an energy retailer (who is also a competitor).

[24] Natural monopolies occur when, due to the economies of scale of a particular industry, one firm can supply the entire market at a lower price than two or more firms. Network industries (rail, land-based telephone, electricity lines companies) are typical of this type of monopoly.

[25] Commerce Commission, 2006.

[26] See http://www.meridianenergy.co.nz/WindProjects/news/meridian+consulting+on+central+otago+wind+farm.htm [Accessed 1 June 2006].

[27] The Energy Efficiency and Conservation Act 2000 provides for the Minister to replace the strategy at any time.

[28] See www.electricitycommission.govt.nz/opdev/comqual/windgen/wgip [Accessed 14 August 2006].

[29] New Zealand has around 6 weeks storage as compared with months or years in other countries.

[30] Energy Link and MWH NZ, 2005.

[31] This includes the second stage to Te Rere Hau wind farm in the Manawatu totalling 45.5MW.

[32] Please note that because of rapid changes in wind farm proposals, some of the wind farms shown on

the map may no longer be being investigated, and new wind farm proposals may not be shown.

[33] EECA also indicated potential growth in wind power in their 2001 report *Review of New Zealand's wind potential to 2015.* This report found that wind power could provide all of New Zealand's growth in electricity demand for the foreseeable future, and provide 23 percent of New Zealand's electricity. The report estimated that between 610MW and 3,070MW could be installed in New Zealand, depending on the level of uptake, and issues such as cost. See EECA, 2001.

[34] Electricity Commission, 2005.

[35] This scenario was based on several assumptions, including that some thermal generation would be displaced with wind, and that demand growth is not constrained. It also assumed that sufficient investment was made in transmission.

[36] PCE, 2005b.

[37] The main constraint on maximum size of turbines is the size of the prop, which must be manufactured in one piece and transported over narrow and twisty New Zealand roads.

[38] This calculation assumes 1.5MW turbines are used.

[39] WWEA, 2006.

[40] MED, 2006.

[41] Danish Energy Authority, 2005.

[42] European Commission (Directorate-General for Energy and Transport), 2003.

[43] Gipe, 2004.

[44] Gipe, 2005a.

[45] Gipe, 2006.

[46] This included the creation of the Risø National Laboratory in 1978, used for testing and national certification of turbines.

[47] A 2005 Commission of the European Communities report comments that European countries using a feed-in tariff for supporting wind power have been the most effective in stimulating growth. (Commission of the European Communities, 2005).

[48] Bolinger, 2001.

[49] German Wind Energy Association, 2006.

[50] Gipe, 2004.

[51] Bolinger, 2005.

[52] Khan, 2003; Devine-Wright, 2005.

[53] Stenzel *et al.*, 2003.

[54] Gipe, 2006.

[55] Gipe, 2005a.

[56] Centre for Sustainable Energy and Garrad Hassan, 2005.

[57] Bolinger, 2001.

[58] Gipe, 2005a.

[59] Such agreements typically pay US $2,000 to $5,000 annually.

[60] Bolinger, 2001.

[61] See http://www.windustry.org/community/policy.htm [Accessed 15 June 2006] and Dorman, 2005.

[62] BWEA, 2006

[63] Centre for Sustainable Energy and Garrad Hassan, 2005.

[64] Edge, 2002.

[65] BWEA, 2005.

[66] BWEA, 2006.

[67] The average size of commercial projects has grown from 10–20 turbines in 2000, to 30–50 wind turbines in 2005. Department of the Environment and Heritage and Australian Greenhouse Office, 2006.

[68] See http://www.theage.com.au/articles/2003/08/31/1062268472512.html?from=storyrhs [Accessed 25 September] regarding requests to Parliament for a moratorium of wind farms on Victoria's coast in 2003.

[69] Department of the Environment and Heritage and Australian Greenhouse Office, 2006.

[70] Ashby, 2004.

[71] Centre for Sustainable Energy and Garrad Hassan, 2005.

[72] *ibid*, 2005.

[73] MORI Scotland, 2003.

[74] Devine-Wright, 2005: 126.

[75] Centre for Sustainable Energy and Garrad Hassan, 2005; Warren *et al.*, 2005.

[76] For example, Centre for Sustainable Energy and Garrad Hassan, 2005.

[77] For example, Devine-Wright, 2005.

[78] For example, in the UK: Country Guardians, www.countryguardian.net; Views of Scotland http: //www.viewsofscotland.org.uk/; Campaign for the Protection of Rural Wales
http://www.cprw.org.uk/; in the US: www.misplacedwindpower.com.

[79] EREC, 2004: 24.

[80] Gipe, 2002; Khan, 2003; Lambert, L. and Elix, J., 2006.

[81] Devine-Wright, 2005: 134.

[82] Schwann, 2002: 139.

[83] See http://www.countryside.gov.uk/NewEnterprise/Economies/CRI.asp [Accessed 14 August 2006].

[84] South West Renewable Energy Agency, 2004.

[85] See www.windustry.org. [Accessed 1 March 2006].

[86] Auken, 2006.

[87] Ashby, 2004.

[88] DTI, 2003.

[89] Office of the Deputy Prime Minister, 2004a and b.

[90] See http://www.snh.org.uk/pdfs/strategy/cumulativeeffectsonwindfarms.pdf [Accessed 14 August 2006].

[91] See http://www.helm.org.uk/server.php?show=nav.9257 [Accessed 14 August 2006].

[92] AusWEA and Australian Council of National Trusts, 2005. The aim of this report was "…to ensure that valued Australian landscapes are protected while enabling wind farming development to occur within an agreed national framework, and to find creative solutions to landscape assessment issues and sustainable energy development, in the context of society's evolving understanding of landscape values and concern about long-term climate protection".

[93] The project was made possible by a grant from the US Department of Energy and administered by the Vermont Department of Public Service. Partners in the project included Vermont Environmental Research Associates, Renewable Energy Vermont, and the Woodbury Dispute Resolution Center.

[94] Vissering, 2002.

[95] Vermont Department of Public Service, 2002.

[96] Vermont Agency of Natural Resources, 2004.

[97] Ashby, 2004.

[98] See *Campbell JA and Ors v Southland District Council* (Environment Court W114/94, 1994).

[99] Judge Jackson in *Wakatipu Preservation Society v Queenstown Lakes District Council* (Environment Court C180/99, 2 November 1999, Judge Jackson) stated: "We consider it useful to consider 'landscape' as a large subset of the 'environment' … we also regard 'landscape' as a link between individual (natural and physical) resources and the environment as a whole. It is a link in two ways: first in that it considers a group of natural and physical resources together, perhaps in an arbitrary cultural lumping as a 'landscape' rather than in any ecologically significant way; and secondly it emphasises that our attitudes to those resources are affected by social, economic, aesthetic and cultural conditions".

[100] RMA, Section 2.

[101] PCE, 1997: 14-15.

[102] See PCE, 1997, for a more detailed discussion of amenity values, particularly in the context of suburban amenity.

[103] *Harrison v Tasman District Council* (Environment Court W42/93, 1993).

[104] *ibid.*, 1993.

[105] Goodwin *et al.*, 2000: 64.

[106] Goodwin *et al.*, 2000.

[107] MFE, 2001.

[108] Edgar, 2003: 5.

[109] Adapted from criteria developed for outstanding natural landscapes in *Wakatipu Environmental Society Inc v Queenstown Lakes District Council* (Environment Court C180/99, 2 November 1999, Judge Jackson).

[110] Newton *et al.*, 2002.

[111] *ibid.*, 2002.

[112] Goodwin *et al.*, 2000.

[113] Historic Places Trust, 2004. The New Zealand Historic Places Trust (NZHPT) held a Heritage Landscapes Think Tank in 2003, and a Draft Heritage Landscapes Policy has been formulated to promote the identification, protection, preservation, and conservation of New Zealand's heritage landscapes.

[114] Wihongi and Tukua, 2005.

[115] Peart, 2005: 10-12.

[116] Goodwin *et al.*, 2000: 8.

[117] Section 6(b) and Fourth Schedule of the RMA.

[118] Woods, 2003.

[119] In Warren *et al.*, 2005: 855.

[120] Palmer, 2005.

[121] Brown, S. 2004. Statement of Evidence of Stephen Kenneth Brown on behalf of Auckland Regional Council. *Genesis Power Limited v Franklin District Council* (Environment Court, Auckland A148/2005, 7 September 2005, Judge Whiting).

[122] SDC, 2005: 53.

[123] Gipe, 2002.

[124] Brittan, 2002.

[125] Thayer, 1994: 309.

[126] Vissering, 2002.

[127] Landscape Design Associates, 2000.

[128] AusWEA and Australian Council of National Trusts, 2005: 48.

[129] Gipe, 2002.

[130] Landscape Design Associates, 2000.

[131] Gipe, 1995, Gipe, 2005b

[132] Spacing to minimise turbulence is around 3 rotor diameters across the predominant wind direction and 5 rotor diameters in non-predominant direction.

[133] Rough, P. 2005. *Statement of evidence of Peter Rough.* Landscape architect for Meridian Energy. WCC SRN: 131428 GWRC Ref: WGN060001.

[134] Lothian, 2002.

[135] Vissering, 2002.

[136] We do not consider the research turbine located in Brooklyn, Wellington to constitute a wind farm.

[137] *Genesis Power Limited v Franklin District Council* (Environment Court, Auckland A148/2005, 7 September 2005, Judge Whiting).

[138] Scottish Natural Heritage, 2005.

[139] *ibid.*, 2005: 9-10.

[140] *ibid.*, 2005: 13.

[141] *ibid.*, 2005: 14.

[142] For example PCE, 2001.

[143] Hudson, J. 2005. *Evidence of John Robert Hudson on behalf of Genesis Energy*. 4 March 2005. *Genesis Power Limited v Franklin District Council* (Environment Court, Auckland A148/2005, 7 September 2005, Judge Whiting): 16-17.

[144] *ibid.*, 2005: 13.

[145] In the West Wind council hearing, the landscape architects discussed the impact of the turbines from various viewing points. These included the approaches from Johnsonville, Karori, Makara Valley, Makara Beach, Makara Walkway, Outer Green Belt, Wellington City, and Hutt City Suburbs, at sea and in the air.

[146] This table is adapted from the Sinclair-Knight matrix that indicated effects at greater distances.

[147] AusWEA and Australian Council of National Trusts, 2005: 47.

[148] SDC, 2005: 57.

[149] SDC, 2005: 82.

[150] Report and Decision of the Joint Hearings Panel in the matter of the applications for resource consent by TrustPower Limited for the construction and operation of 40 wind turbines and associated services, being an extension to the existing Tararua Wind Farm on the slopes of the Tararua Ranges. 4 July 2005. Evidence of James Baines.

[151] Devine-Wright, 2005: 132.

[152] Devine-Wright, 2005.

[153] See Palmerston North City Council emblem on www.pncc.govt.nz; see http://www.manawatunz.co.nz/Pages/ThingsToDo/FamilyAttractions.php with wind farms listed as a tourist attraction [Accessed 1 August 2006].

[154] Shepherd, 2003.

[155] New Zealand Wind Energy Association, 2005. See http://www.windenergy.org.nz/documents/2005/050825-NZWEA-FactSheet7Landowners.pdf [Accessed 1 March, 2006].

[156] See New Zealand Herald, 13 May 2005; New Zealand Herald, 15 August 2005; Hawke's Bay Today, 16 August 2005; Ansley, 2006.

[157] Noise was the third highest perceived disadvantage of wind power stated in the UMR survey (2004): 14.7 percent of respondents thought noise was a disadvantage.

[158] Standards New Zealand, 1998.

[159] For example: Makara Guardians, Aokautere Guardians, Outstanding Natural Landscapes Protection Society, Upland Landscape Protection Society.

[160] This was a telephone survey of a nationally representative sample of 750 New Zealanders 18 years of age and over. This research was undertaken from 20–24 May 2004 at UMR Research's national interview facility in Auckland. The margin of error for a 50 percent figure at the 95 percent confidence level is ±3.6 percent (UMR Research Limited, 2004).

[161] It has been noted by those opposing wind farm development that these surveys do not portray an accurate picture of public sentiment towards wind farm development. This is because a) the surveys do not provide full information on other alternatives to large-scale generation (e.g. solar water heating, energy efficiency measures) and b) they have been undertaken by agencies strongly in support of wind energy so are not impartial.

[162] UMR Research Limited, 2004.

[163] SDC, 2005: 52.

[164] Barton, 2005a.

[165] The Resource Management (Energy and Climate Change) Amendment Act 2004.

[166] Designations allow requiring authorities to plan for network utilities and large public works by setting aside an area of land outside the provisions of the district plan.

[167] Section 5(1) RMA.

[168] Additional regulatory instruments can be created under the RMA such as water conservation orders and heritage orders, but these are unlikely to play a significant role in the regulation of wind farm location.

[169] *Genesis Power Limited v Franklin District Council* (Environment Court, Auckland A148/2005, 7 September 2005, Judge Whiting); *Unison Networks Limited and Hawkes Bay Wind Farm Limited v Hastings District Council* (Environment Court, Wellington W 058/2006, 17 July 2006, Judge Thompson). A summary of these cases is provided at 6.2.9.

[170] Barton, 2005b.

[171] Peart, 2004.

[172] See s 56 of the RMA.

[173] At the time when the NZCPS was being developed the developers were content to rely upon the case law definitions of coastal environment developed under pre-RMA planning laws. They referred to the following 'definitions' drawn from case law: "an environment in which the coast is a significant element or part", and "What constitutes the coastal environment will vary from place to place and according to the position from which a place is viewed. Where there are hills behind the coast, it will generally extend up to the dominant ridge behind the coast." (*Northland Regional Planning Authority v Whangarei County* (1977) D A 4828 at 4831); and "The environment is one's surroundings; what one perceives at a particular time and place. Coastal environment means an environment in which the coast is a significant part or element" (*Physical Environment Association v Thames-Coromandel District Council* (1982) 8 NZPTA 404, at 408).

[174] See ministerial press release from the Hon Chris Carter: *Board of Inquiry to examine coastal development*, 8 March 2006. http://www.doc.govt.nz/Whats-New/presult.asp?prID=2142 [Accessed 15 August 2006].

[175] Section 59 RMA.

[176] See ss 67 and 74 of the RMA, respectively. Every regional policy statement is different, but they frequently contain sections dealing with matters such as energy, heritage, coastal development, and landscape. All of these will be relevant to the potential development of wind farms.

[177] MWH New Zealand, 2003.

[178] The Resource Management Amendment Act 2005 inserted a new section 36A into the RMA. The section states explicitly that neither the applicant for a resource consent, nor the requiring authority for a designation, nor the consent authority responsible for dealing with either the consent application or notice of requirement, has a duty under the RMA to consult with any person. This amendment was made to clarify the case law that had developed on consultation by applicants and consent authorities under the RMA.

[179] Section 99 now enables the consent authority to require parties to an application (including the applicant and some or all persons who have made submissions on the application) to attend a pre-hearing meeting for the purpose of clarifying a matter or issue, or facilitating resolution of a matter or issue. Before the 2005 amendment, a consent authority could only invite the parties to such a pre-hearing meeting. Any person who fails to attend such a meeting can face sanctions under the Act, which have the effect of preventing the application going ahead, or preventing a submitter taking further part in the process.

[180] Section 99A separates out the mediation process from the pre-hearing meeting process. Under the pre-amendment s 99 the two processes were conflated in the one section. Unlike pre-hearing meetings, mediation can only occur through the agreement of all potential participants.

[181] Section 99 does not prescribe any process for pre-hearing meetings and the potential exists for consent authorities to develop such meetings along the lines of workshops or any other type of format that is seen as constructive.

[182] See comments of Whiting J. at paras [68]–[75] of *Land Air Water Assn v Waikato Regional Council* Environment Court A110/01.

[183] *ibid.,* para [72].

[184] *ibid.,* para [74].

[185] Also insertion of new ss 70A and 70B and insertion of new ss 104E and 104F.

[186] *Genesis Power Limited v Franklin District Council* (Environment Court, Auckland A148/2005, 7 September 2005, Judge Whiting).

[187] See the Explanatory Note to the Resource Management (Energy and Climate Change) Amendment Bill, 2003, No 48-2.

[188] See http://www.mfe.govt.nz/publications/rma/rmaa2005-factsheets-aug05/overview/overview.pdf [Accessed 8 August, 2006].

[189] See ss 24A and 25A of the RMA, as inserted by the RMA Amendment Act 2005.

[190] See new paragraph 30(1)(gb) of the RMA and the newly inserted definition of infrastructure in section 2(1) of the RMA).

[191] See amendment to s 43A and new ss 43B to 43G of the RMA.

[192] See new ss 46A and 46B, amendments to ss 55 and 57, and new s 58A, of the RMA.

[193] See new ss 140 to 141C and 142 to 150AA of the RMA.

[194] See ss 67 and 74 of the RMA, respectively.

[195] *Genesis Power Limited v Franklin District Council* (Environment Court, Auckland A148/2005, 7 September 2005, Judge Whiting) and joint hearing *Unison Networks Limited and Hawkes Bay Wind Farm Limited v Hastings District Council* (Environment Court, Wellington W 058/2006, 17 July 2006, Judge Thompson).

[196] *Genesis Power Limited v Franklin District Council* (Environment Court, Auckland A148/2005, 7 September 2005, Judge Whiting).

[197] *ibid.,* para [17].

[198] *ibid.,* para [62].

[199] *ibid.,* paras [65] and [66].

[200] *ibid.,* para [67].

[201] *ibid.,* para [108].

[202] *ibid.,* para [128].

[203] *ibid.,* paras [201] and [202].

[204] *ibid.,* para [48].

[205] *ibid.,* para [230].

[206] *ibid.,* evidence of Rackham quoted at para [219].

[207] *ibid.,* para [230].

[208] *Unison Networks Limited and Hawkes Bay Wind Farm Limited v Hastings District Council* (Environment Court, Wellington W 058/2006, 17 July 2006, Judge Thompson)

[209] i.e. *Wakatipu Environmental Society v Queenstown Lakes DC* [2000] NZRMA 59.

[210] *ibid.,* para [52].

[211] *ibid.*, para [39].

[212] *ibid.*, para [44].

[213] *ibid.*, para [44].

[214] *ibid.*, para [68].

[215] *ibid.*, paras [81] and [82].

[216] See s 10 of the LGA 2002.

[217] See s 14 of the LGA 2002.

[218] Section 93 (1) LGA 2002.

[219] Anderton, 2005.

[220] Energy Link and MWH NZ, 2005.

[221] In Strachan and Lal, 2004: 567.

[222] Toke, 1999; Gipe, 2004.

[223] OSEA, 2005, Galluzo, 2005.

[224] Bolinger, 2001. Standard interconnection agreements are usually implemented as part of the feed-in tariff laws. These require distribution utilities to interconnect small wind projects that meet certain technical conditions. Usually the turbine owner/s pays the cost of connection (at a capped fee), while the lines company must pay the costs of any necessary grid upgrades.

[225] Campbell, 2006.

[226] Ruapehu, Wanganui, Rangitikei, Manawatu, Tararua, and Horowhenua District Councils, and the Palmerston North City Council.

[227] Palmerston North City District Plan, Section 9, rural zone. R 9.9.2.

[228] Regional Policy Statement for Manawatu-Wanganui, Part 5, Policy 8.3.

[229] LTCCP made under s 93 of the LGA 2002.

[230] Palmerston North City Council Long Term Council Community Plan, Part One, page 111.

[231] Report and Decision of the Joint Hearings Panel in the matter of the applications for resource consent by TrustPower Limited for the construction and operation of 40 wind turbines and associated services, being an extension to the existing Tararua Wind Farm on the slopes of the Tararua Ranges. 4 July 2005, para [377].

[232] For example, Palmerston North City Council's landscape expert considered turbines proposed to extend along the ridgeline compromised the Ranges to an unacceptable level as they lay outside the fabric of the existing wind farm. The hearings panel did not support this.

[233] Report and Decision of the Joint Hearings Panel in the matter of the applications for resource consent by TrustPower Limited for the construction and operation of 40 wind turbines and associated services, being an extension to the existing Tararua Wind Farm on the slopes of the Tararua Ranges. 4 July 2005. Evidence of Boyden Evans, para [105].

[234] *ibid.*, 2005. evidence of James Baines: para [134].

[235] For example see Meridian's website: http://www.meridianenergy.co.nz/aboutus/news/new+funding+model+to+benefit+communities.htm [Accessed 30 July, 2006].

[236] A QEII open space covenant is a legally binding protection agreement, which is registered on the title of the land. It is voluntary but once in place binds the current and all subsequent landowners. See http://www.nationaltrust.org.nz/master.html?http://www.nationaltrust.org.nz/about_covenants.htm for more information [Accessed 1 August 2006].

[237] Franklin District Plan: Part 15 Activities throughout the District, 15.1.2.9 – Assessment criteria for network and other utilities and other essential services, which are discretionary activities. Some criteria have not been included in the list.

[238] Franklin District Plan: Part 16 Rural Issues, 16.2 – Conflicts between activities.

[239] See http://www.franklindistrict.co.nz/fdc/displaypage.cfm?view=847&selectcat=249 [Accessed 15 August 2006].

[240] Genesis Energy. Awhitu Wind Farm Resource Consent Applications and Assessment of Environmental Effects. April 2004.

[241] *Genesis Power Limited v Franklin District Council* (Environment Court, Auckland A148/2005, 7 September 2005, Judge Whiting): para [110].

[242] Brown, 2004. Statement of Evidence of Stephen Kenneth Brown on behalf of Auckland Regional Council. *Genesis Power Limited v Franklin District Council* (Environment Court, Auckland A148/2005, 7 September 2005, Judge Whiting): 20-21.

[243] Fisher, 2005.

[244] East Harbour Management Services, 2005a: 29.

[245] Greater Wellington Regional Council, 2006.

[246] EECA, 2001.

[247] Chairman of the Panel of Commissioners, Euan McQueen noted that the hearing was dominated by: "The concentration on renewable energy issues and the perceived effects of wind turbines upon Makara and other settled areas…"

[248] Policy 14.2.1.3 of Plan Change 32 states: "Encourage energy efficiency and the development and use of renewable energy within the Rural Area". The explanation states: "Wellington has some of the country's best wind resource. Much of the potential for commercial development lies in the Rural Area".

[249] The Hearings Panel for Plan Changes 32 and 33 stated: "The Panel believes that the 2001 study that identified the intrinsic natural values and the amenity values of Wellington's ridgelines and hilltops should be fully implemented in order to enable landscape features to be appropriately protected, maintained and enhanced".

[250] Decision of Joint Hearings Commissioners, in relation to applications to construct, use, and maintain a wind farm on a 55.8 square kilometre site to the west of Wellington City, 21 December 2005: 7.

[251] Wellington City Council Strategy and Planning Group Hearing Report to Commissioners, September 2005, para [15].

[252] Decision of Joint Hearings Commissioners, in relation to applications to construct, use, and maintain a wind farm on a 55.8 square kilometre site to the west of Wellington City, 21 December 2005: 4.

[253] Anstey, C. Review of Landscape Evidence on behalf of Wellington City Council. Council hearing for Project West Wind. 15 August 2005: 21, and pers. comm. Clive Anstey, 27 November, 2006.

[254] These were: Ohariu Bay, Pa Site/Gun Emplacement Escarpment, Opau Bay, Te Ikaamaru Bay/Ohau Bay, Terawhiti Hill, Oteranga Bay, Outlook Hill, and Tongue Point.

[255] Decision of Joint Hearings Commissioners, in relation to applications to construct, use, and maintain a wind farm on a 55.8 square kilometre site to the west of Wellington City, 21 December 2005: ii.

[256] Karori Golf Club, G. Bruce, A. J. Hudgson-Booth-Windsor, Makara Guardians Inc., R. Paul and C. Moore, Quartz Hill Reserve Charitable Trust, West Wellington Environmental Protection Society, Action for Environment Inc., Southern Environmental Association (Wellington) Inc, Meridian Energy.

[257] Andrea Marshall, Genesis Energy, pers. comm., December 5, 2005.

[258] Fisher, 2005.

[259] See http://www.meridianenergy.co.nz/aboutus/news/new+funding+model+to+benefit+communities.htm for more information [Accessed 1 August 2006].

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Appendix A: Investigation questions

1 What are the challenges, risks, and opportunities facing wind power development in New Zealand?

2 What are the strengths and weaknesses of wind farms in the context of environmental sustainability?

3 What do key stakeholders think about the growth in wind farming in New Zealand? What are their expectations about its evolution over the longer term? What will wind farm development look like in 20–30 years time?

4 How do we balance local community and landscape concerns with wind power's contribution to environmentally sustainable electricity generation?

5 How effectively do the current consultation and decision making processes include community values and views? How could communities contribute more effectively to wind farm development in the future?

6 How effective are current mechanisms for managing the impacts of wind farms in New Zealand, particularly landscape impacts? What are the options for pursuing proactive management of wind farm impacts in the future?

7 What are the roles of key stakeholders for ensuring wind farm growth in New Zealand is environmentally sustainable at all scales?

8 What can be learned from overseas experience about the growth and management of wind farms? What should New Zealand emulate or avoid?

Appendix B: People interviewed

John Hudson	Landscape architect
Clive Anstey	Landscape and resource planner
Mark Ashby	Planning Manager, Connell Wagner
Raewyn Peart	Environmental Defence Society Incorporated
Alastair Morrison	Department of Conservation
Alan Ross	Department of Conservation
John Holmes	Greater Wellington Regional Council
Rachel Boisen	Greater Wellington Regional Council
Jo Noble	Greater Wellington Regional Council
Chris Pepper	Palmerston North City Council
Virginia Watson	Palmerston North City Council
Rochelle Viles	Palmerston North City Council
Mike Brown	Tararua District Council
James Glennie	New Zealand Wind Energy Association
Sharleen Hannon	Energy Efficiency and Conservation Authority
Selwyn Blackmore	Energy Efficiency and Conservation Authority
Steve Torrens	Energy Efficiency and Conservation Authority
Adam Muldoon	Meridian Energy
Richard Little	Meridian Energy
Quentin Poole	Aokautere Guardians and Ashhurst resident
Geoff Keall	Aokautere Guardians and Ashhurst resident
Richard Munneke	Horizons Regional Council
Robin Brasell	Ministry for the Environment
Phil Gurnsey	Ministry for the Environment
Glenn May	Ministry for the Environment
Kathy Perreau	Ministry for the Environment

Angela Rego	Ministry for the Environment
Sharon Corbett	Ministry for Economic Development
Roger Fairclough	Ministry for Economic Development
Miranda Jenkin	Ministry for Economic Development
Richard Gordon	Genesis Energy
Andrea Marshall	Genesis Energy
Reece McVinnie	Genesis Energy
Murray Kennedy	Greater Wellington Regional Council
Robert McClean	New Zealand Historic Places Trust
Brett McKay	Wellington City Council
Warren Ulesele	Wellington City Council
Sharlene Pardy	Auckland Regional Council
Alison Stillwell	Auckland Regional Council
Hugh Jarvis	Auckland Regional Council
Sherallee McDonald	Windflow Technology
Chris Freear	Windflow Technology
Geoff Henderson	Windflow Technology
Richard Mackie	Roaring Forties
Steve Abel	Greenpeace New Zealand
David Forrest	Planning Consultant
Stephen Ward	East Harbour Management Services Ltd
John Rutherford	East Harbour Management Services Ltd
Murray Cameron	Franklin District Council
Christopher Oliphant	Franklin District Council
Jenny Jorgenson	Makara Guardians
John Mills	Makara Guardians
Rachel Penfold	Makara Guardians
David Bennett	Makara Guardians

Appendix C: OECD criteria for environmental sustainability

Regeneration	Using renewable resources efficiently and not permitting their use to exceed their long-term rates of natural regeneration.
Substitutability	Using non-renewable resources efficiently and limiting their use to levels that can be offset by substitution of renewable resources or other forms of capital.
Assimilation	Not allowing releases of hazardous or polluting substances to the environment to exceed the environment's assimilative capacity.
Avoiding irreversibility	Avoiding irreversible impacts of human activities on ecosystems.

About the Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

Independent scrutiny, advocacy and advice for a better environment

The Parliamentary Commissioner for the Environment (PCE) is an independent officer of Parliament with wide-ranging powers to investigate environmental concerns. The office was set up under the Environment Act 1986, and the Commissioner is appointed for a five-year term. In 2002, Commissioner Dr Morgan Williams was appointed to a second five-year term. The primary objective of the office is to contribute to maintaining and improving the quality of the environment in New Zealand.

The PCE has five key roles:

- **Environmental systems guardian** – checking on the ability of management regimes to ensure that the quality of the environment is maintained or improved
- **Environmental watchdog** – responding to the general public's enquiries and concerns, and encouraging preventative measures and remedial actions to protect the environment.
- **Information provider, facilitator and catalyst** - providing information about the environment to a wide range of groups and individuals
- **Environmental management auditor** – evaluating the performance of public agencies to ensure they are meeting their environmental responsibilities
- **Advisor to Parliamentary Select Committees** – responding to requests from Select Committees to provide assistance and advice.