Wind farms and their impact on the local community

Resource information and internet links for further information.

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I live at Ashhurst in the Manawatu, where we are surrounded by the first large wind farms established in New Zealand. TrustPower, operates the existing Tararua Wind Farm of over 100 of 650kW turbines. This will shortly be added to with 46 3 MW turbines of 90 metre diameter. Meridian Energy operate the Te Apiti wind farm above Ashhurst on the Ruahine Ranges which consists of 55 of 1.6 MW turbines of 70 metre diameter. In addition consent has been granted for another 100 two bladed New Zealand sourced windmills at Te Rere Hau next along the Tararua Ranges from the existing Tararua wind farm. The Palmerston North City Council are working with Mighty River Power for another wind farm proposal on reserve water catchment land at Turitea. Evergreen have just recently announced a project for yet another wind farm above Linton and Tokomaru.

A group called Aokautere Guardians was formed in a campaign to fight the establishment of the Te Rere Hau wind farm. After a little success in that battle, attention shifted to Tararua III proposed by TrustPower. These are 90 metre turbines sitting on 65 m towers. Aokautere Guardians, together with others, fought a great campaign and managed to convince the Commissioners to remove some turbines which would be intrusive and impose various noise restrictions. By agreement, prior to Environment Court hearings, additional conditions and extensions were made to the original consent decision. Since that time, the experience gained of the consent processes and arguments used in hearings to grant consents have been shared with others in Auckland, Wellington and Hawke's Bay.

Issues with Windmills

There are a number of identified issues with wind farms and their operation. I have listed some of the common ones below with a brief description of the identified problems.

Visual effect on the landscape

Windmills generally need to be situated on a ridgeline to be productive. The best wind generating sites also tend to be the mountain ridges where many residents will be able to see them. From a distance they are usually rated as a positive aspect from their 'green' power generating capacity and gentle movement. In the closer vicinity of 3 kms, they dominate the landscape and there is little escape from the constant movement of the blades on the mountain tops above and around you. Local residents of these areas are used to living in a remote natural environment and would be most affected by this type of change in their living environment.

Generally the local district plans identify regions of interest or significance. Skylines are often in so-called protected status, but there has been little effort to date by these district councils to make submissions opposing consent in any meaningful way. 'National good' is often raised as the rationale for little opposition.

Flicker

The blades can create flicker in two ways. Sunlight reflecting off the blades will occur at certain angles of the sun and windmill. This can create a strobe effect in affected areas which can be some distance away. With the sun behind them, the turning blades can cast moving shadows across nearby houses and landscape. Although generally affecting residences nearby, the strobe effect can be difficult to block out.

Noise

Noise occurs in two stages. The first is during the building and erection stage. There is a great deal of earthmoving and heavy machinery required for access roads to each turbine site. In addition there are significant foundation concreting required and then the tower and turbine erection. This would normally only seriously affect neighbouring properties, but truck movements on local roads will add additional noise to that normally encountered.

Restrictions of operating times may need to be set into the consent decision limiting night work which could disturb neighbours.

Once the wind farm is operative, there may be noise associated with the operation of the turbines. Rumbling sounds similar to a train can be observed up to 5 kms away with suitable wind conditions. Ashhurst is situated about 2½ to 3 kms from the nearest turbines. During easterly winds, some residents are seriously affected by the noise which ranges from the train rumbling sounds all night long, the sound of jet planes flying overhead or thumping sounds overlaid on the rumble. The gentle swishing sound which may be heard immediately under a windmill is not heard further away. Instead the turbine sounds begin to merge together and sometimes reinforce each other. The sound is generally worse at night, when the air is still, colder and more dense, seemingly transmitting the noise easier. Some of the low frequency noise tends to be transmitted through the ground and may be worse at various distances away from the source. Orientation, dimensions and structure of the dwelling alters the extent to which this noise can be heard. Sleep disturbance, irritability, tiredness and various medical conditions are associated with this noise by those in close proximity. Pierpont (2006) describes many of the typical problems encountered in the United States to date. Residents closer than 1 km would be expected to have significant noise problems. Double glazed windows and so on may help, but the vibration and other low frequency effects are likely to manifest themselves inside a nearby dwelling.

Noise restrictions need to be set into the consent process to protect local residents from problematic noise. Typical ambient noise will need to be measured before project construction begins. If possible, noise should be limited to agreed limits and if outside that level, turbines either automatically de-rated or shutdown. Typically complaints would be handled by the local governing body, but residents may be able have agreement to raise the problem directly with the operator. Low frequency and particular tonal noise has been identified and may be problematic at levels lower than prescribed noise limits.

Traffic

Most of the problems of traffic will occur during the building phase. Dozens of truck movements will be needed to supply heavy machinery, road metal, concrete and building materials. The blades and towers are of extreme length up to 45 m and take some time to navigate the roads. Traffic delays would be expected at some times and should be tailored to local traffic requirements. Damage to the roads can be expected and should be remedied by the operator. Dust and noise from the road traffic may also be a problem. Local roads are sometime improved by the operator by removing difficult curves, road widening and improving the road surface to enable heavy truck movements to use the roads without disruption.

During the operation phase when turbines are generating, there may be some sightseer traffic along with support technicians and security staff.

There have been some concerns that the windmills prove a distraction to motorists who may be sightseeing rather than paying attention to their driving. The Manawatu Gorge and the appearance of windmills does not appear to have created more traffic incidents. It is more likely that the introduction of no-passing lines in the Gorge has significantly contributed to this.

Soil erosion

Due to the earth excavation and road works there will be a range of erosion problems if the area experiences serious rainfall. Dust from exposed cuttings may also be problematic. This may result in a problem down hill with landslips or streams carrying additional silt and its resulting flooding consequences.

These problems will also affect water ways and their fisheries.

Ecology / Bird Strike

The consent conditions will generally require that any areas of significant flora and fauna are protected in some way. Bird strike by the blades and other disruptions to bird life need to be identified and reported upon during operation.

Physical breakages of turbines

The most prominent incident in New Zealand regarding a wind turbine would have to be the collapse of the Windflow turbine at Gebby's Pass, Christchurch. A sudden wind change is attributed to causing the complete nacelle, gearbox and blades to break from its mountings and fall to the ground in 2005. Other incidents elsewhere in the world have reported other failures of nacelle weighing 60 tons falling from towers or blades shearing off and flying ½ km.

The gearboxes in modern turbines are very large units capable of converting the slow turning revolution of the blades to a speed suitable for the generating of power. Many of these require 200 litres or more of oil, which could create a spill affecting farmers (particular organic) downstream or be a fire risk.

Energy Supply

The greater prevalence and generating capacity of windmills can contribute to instability in the electricity supply. The combined effect of the Tararua and Te Apiti wind farms is already significant with respect to generating capacity in the region. Electricity supply requires that the supply and demand is always balanced and that voltage and frequency levels stay within prescribed limits. There is no way to store electricity on this scale so wind variations can significantly alter generating capacity and disrupt local electricity supply. This may result in over or under-voltage (brownout) conditions if transmission line companies cannot balance the supply and loads. An Electricity Commission report has already identified this problem in Manawatu/Tararua with occasions where wind generating capacity has changed from zero to full power within 15 minutes.

Problems for local residents may include damage to electrical equipment in the home. Lightning strikes at wind farm level may also impact upon residents who live nearby electricity supply lines.

Technological improvements in generating equipment have resulted in differing systems being used. Early wind turbines (2005) required gearboxes delivering constant speed to the generator with associated problems in handling wind gusts and speed changes. Although feathering of the blades can alleviate slower changing wind speeds, there are continuing problems with gearboxes which have to deal with strong wind gusts as occur in New Zealand

conditions. Newer systems permit under/over speed conditions of up to 10% and use modern high current conversion equipment to rectify and then regenerate a stable voltage and frequency of power output.

Heritage

Building on some areas may have historical or archaeological significance. Maori (indigenous residents) historical sites should be investigated to ensure there is no problem.

Media Articles

Academic Articles

Pierpont, Nina. 2005. Health, hazard, and quality of life near wind power installations. How close is too close? *Malone Telegram*, (New York,USA). March 2, 2005, p5.

Pierpont, Nina. 2006. Health effects of wind turbine noise. February 4, 2006.

van den Berg, GP, 2004. Effects of the wind profile at night on wind turbine sound. Journal of Sound and Vibration 277:955-970. For a pre-publication copy of this article, go to http:/www.nowap.co.uk/docs/windnoise.pdf

News Articles

And the beat goes on . . .and on and on

They call it the train that never arrives. It's a low, rumbling sound that goes on and on ... and on. Sometimes, in a stiff easterly, the rumbling develops into a roar, like a stormy ocean. But worst of all is the beat. An insidious, low-frequency vibration that's more a sensation than a noise. It defeats double-glazing and ear plugs, coming up through the ground, or through the floors of houses, and manifesting itself as a ripple up the spine, a thump on the chest or a throbbing in the ears. Those who feel it say it's particularly bad at night. It wakes them up or stops them getting to sleep.

February 18, 2006 by Kathy Webb in Hawke's Bay Today

Copy to be found at http://www.windwatch.org/news/1693

TV1 reports and videos

Te Apiti, Meridian Wind Farm

Flurry of complaints after wind change: 25 Jul 2005

http://www.tvnz.co.nz/view/page/411319/599657

Houses Condemned at te Apiti

Compensation deal irks wind opponents: July 31, 2005

http://www.tvnz.co.nz/view/page/411319/600897

New Zealand Windmill Noise Standard – NZS6808

In addition, in November last year EECA arranged and paid for a meeting to consider NZS 6808 (measurement of noise from wind turbines) to see if it needed review as we had said it did. Clearly this meeting was engineered to give the "green light" for NZS Standard 6808, just in time for the Wellington City Council hearings on plan changes that included reference to the Standard; changes that appeared to us clearly written at Meridian's behest. The supposed results of that meeting have been published on the NZWEA web site. What actually happened at that meeting was that the parties acknowledged that the Standard was not "best practice", but until another standard was written it was the only document that could be used. Makara Guardians is making a formal application to seek urgent review of the Standard, and also asking for removal of the incorrect statements on the NZWEA web site plus seek an apology to Makara Guardians to be published. Makara Guardians has never approved of the minutes of the Standards November 2004 meeting, the minutes did not refer to the fact that participants had agreed that the Standard did not reflect best practice and this was to be included in the statement about "adequacy", and that the Standard was only a "holding measure", and was not to be relied upon in isolation. All these conditional aspects of "approval" have not been included. Unfortunately we have been too busy to do this earlier. The Standard must be reviewed or there will be significant problems with noise for many people and communities around New Zealand.

Web Links

Makara Guardians http://www.makaraguardians.orcon.net.nz/
New Zealand information site of group set up to oppose Meridian wind farm project called WestWind at Makara, Wellington.

Industrial Wind Action Group http://www.windaction.org/
Industrial Wind Action stands ready to assist communities faced with unwanted industrialization by providing residents as well as government officials with information to make informed decisions.
A great resource to locate up to date news on World and NZ wind farm stories. Check out the News link by location to access Aust/NZ media stories.

NZ Electricity Commission http://www.electricitycommission.govt.nz/
Search on "Wind Power"
The Electricity Commission is a Crown entity set up under the Electricity Act to oversee New Zealand's electricity industry and markets. The Commission regulates the operation of the electricity industry and markets, to ensure electricity is produced and delivered to all consumers in an efficient, fair, reliable and environmentally sustainable manner.
The Commission also promotes and facilitates the efficient use of electricity.