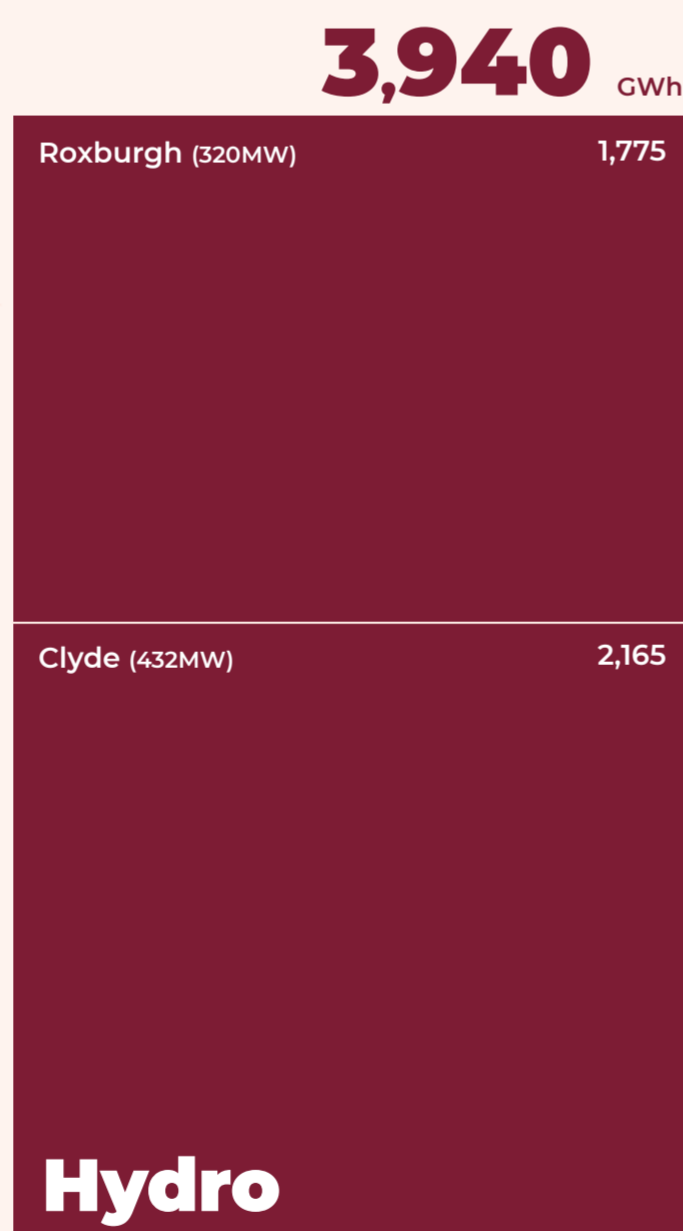
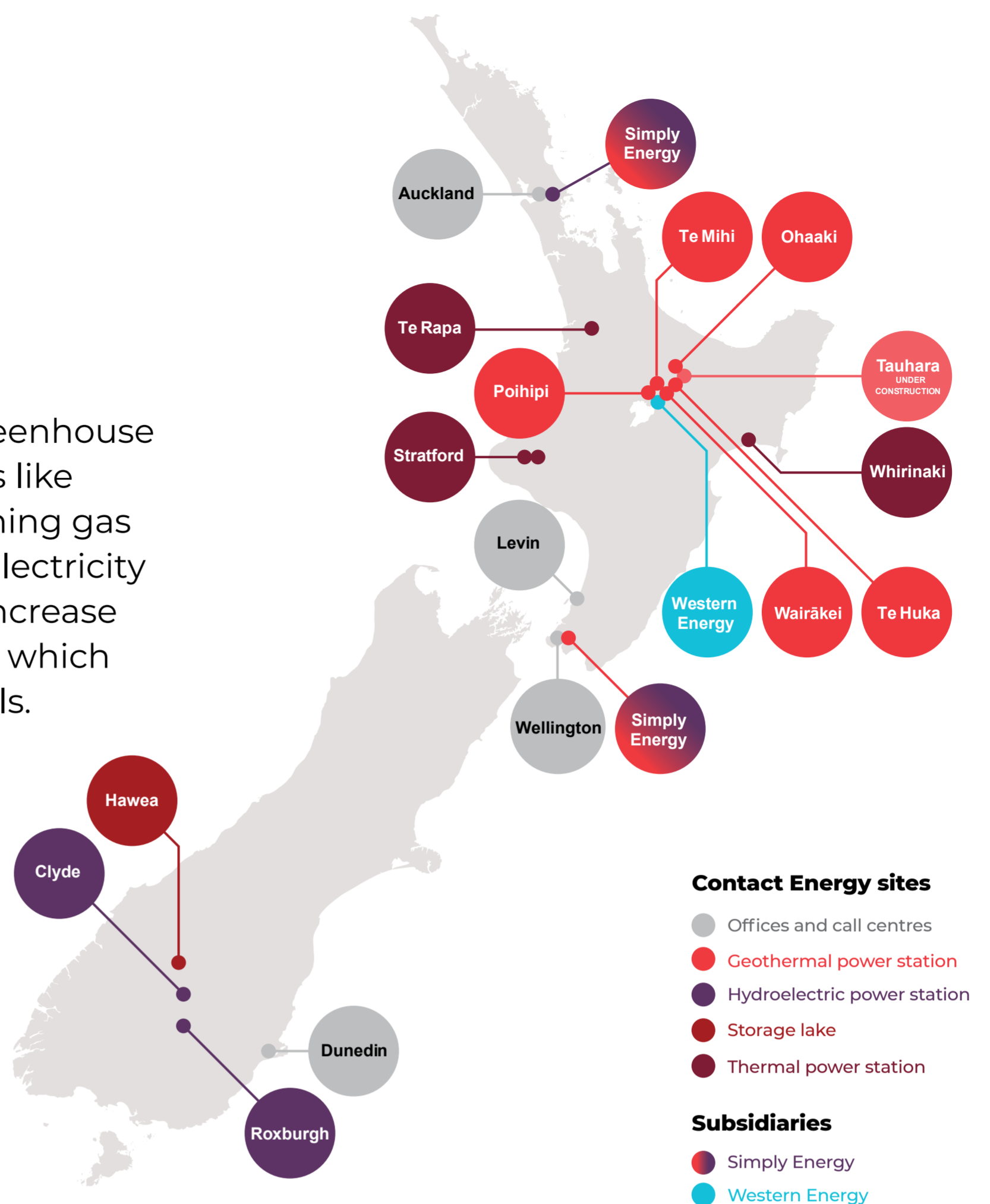


# Contact Energy

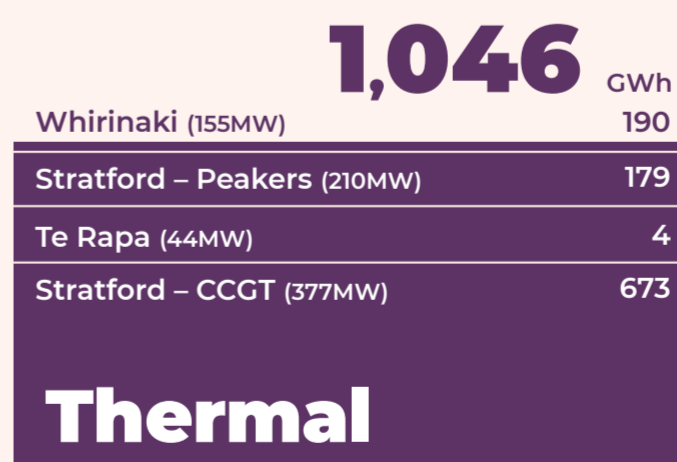
About 40% of Aotearoa New Zealand's greenhouse gas emissions comes from energy. Things like driving a petrol car or diesel truck, or burning gas for manufacturing. Less than 6% is from electricity generation. We have the opportunity to increase energy supply from renewable electricity, which will enable switching away from fossil fuels.

**At Contact, we are leading the decarbonisation of Aotearoa New Zealand by investing in more renewable electricity options to enable the transition to a low carbon economy.**

**In 10 years, we have increased our renewable energy portfolio from 60% to almost 90%.**



This graph shows the relative size of generation output from each station during the FY22 year.



**7,223 GWh**  
Total renewable generation

**1,046 GWh**  
Total non-renewable generation

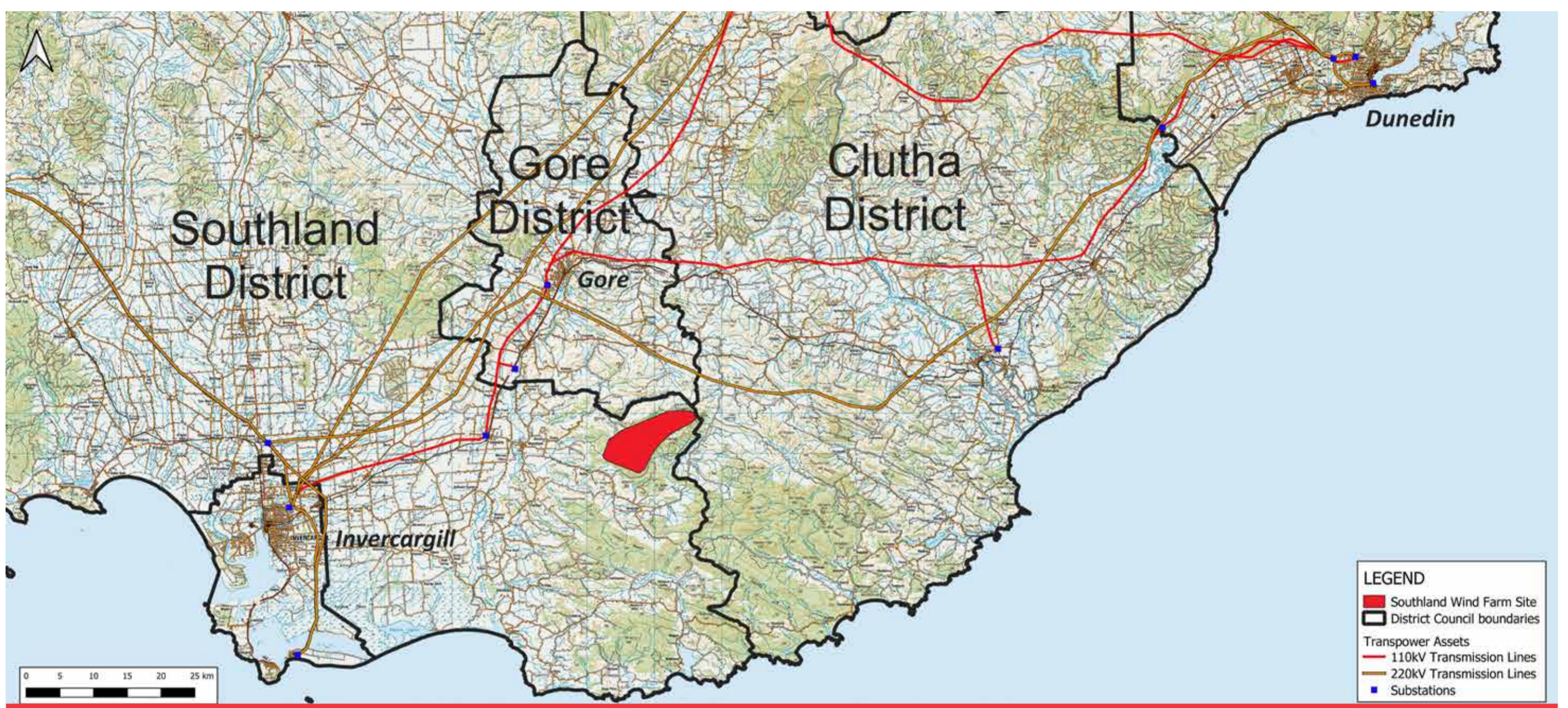
**8.3 TWh**  
Total generated

Contact delivers **20%** of electricity generation for Aotearoa New Zealand



# Introduction to the Southland Wind Farm Project

Contact Energy is developing a pipeline of wind farm opportunities to meet Aotearoa New Zealand's growing demand for renewable electricity.



## Southland Wind Farm

We're looking to develop a wind farm on the elevated land east of Wyndham.

A wind farm was previously proposed for this location over a decade ago and was known as the 'Slopedown wind farm'.

Our initial work suggests the wind farm could consist of about 50 wind turbines and generate as much as 300MW, providing a significant contribution to the energy supply in Southland.

This wind farm project is currently being called 'Southland Wind Farm' although this will change as we get further along in the process.

## Key project statistics



East of Wyndham in the Southland District



About 50 wind turbines



Tower height up to 135m  
Rotor diameter up to 170m



Up to 300MW



900-1200GWh – equivalent energy needs of up to 150,000 households

# Wind turbines

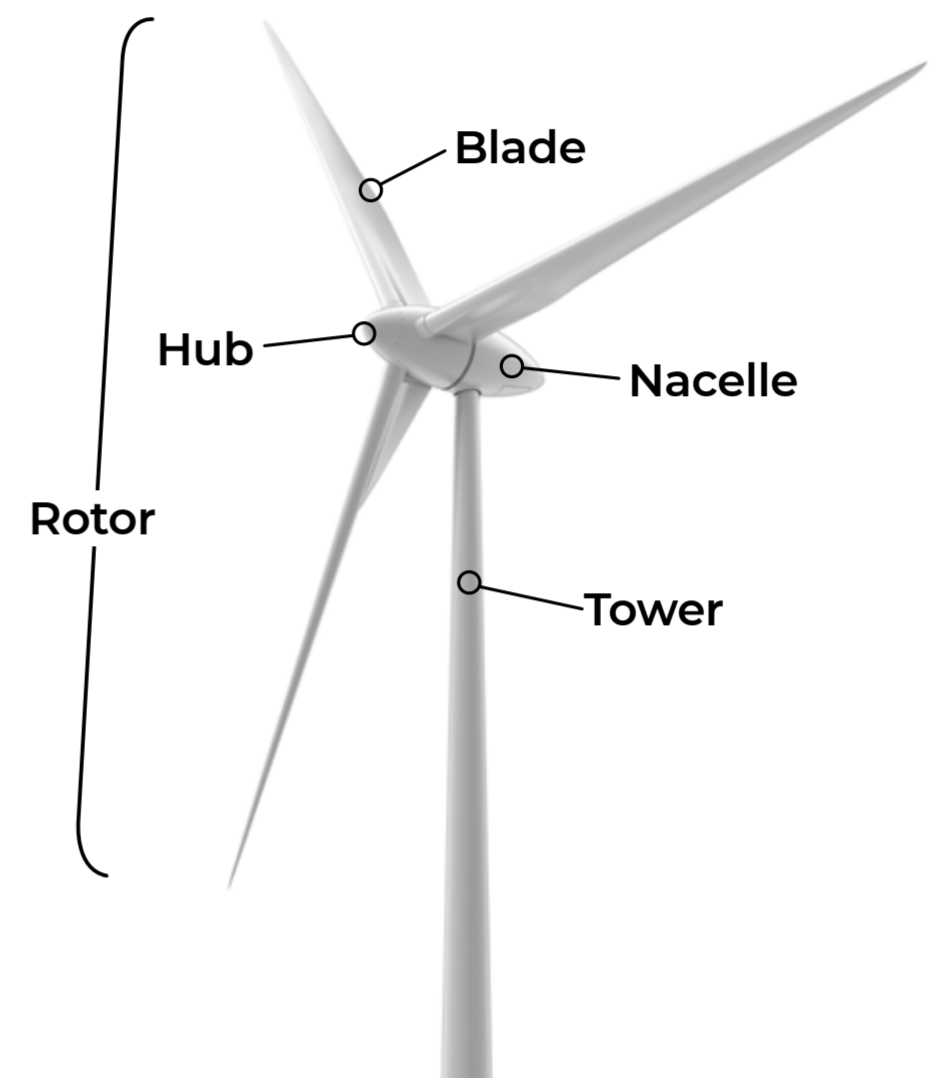
Aotearoa New Zealand is blessed with a significant wind resource which is ideal for wind energy generation. The use of that resource for the generation of electricity is expected to increase significantly over the next few decades. Currently about 6% of Aotearoa New Zealand's electricity is generated by wind.

## How does a wind turbine generate electricity?

A wind turbine is made up of a number of major components, as shown on the right.

When the wind blows it passes over the wind turbine's blades which generate lift – in much the same way as an aeroplane wing or the America's cup yacht. That lift force causes the wind turbine rotor to rotate which is translated into rotation of the electrical generator, creating electricity.

As the wind speed increases the lift forces on the blades increase, and consequently more power and electricity are generated. Once the turbine reaches maximum power the blades rotate on their axis (pitch) to reduce lift, and maintain a constant power output in increasing wind speeds. The wind turbine will continue to produce this output until the wind is too strong (about 90 km/h) at which point the turbine will shut down.

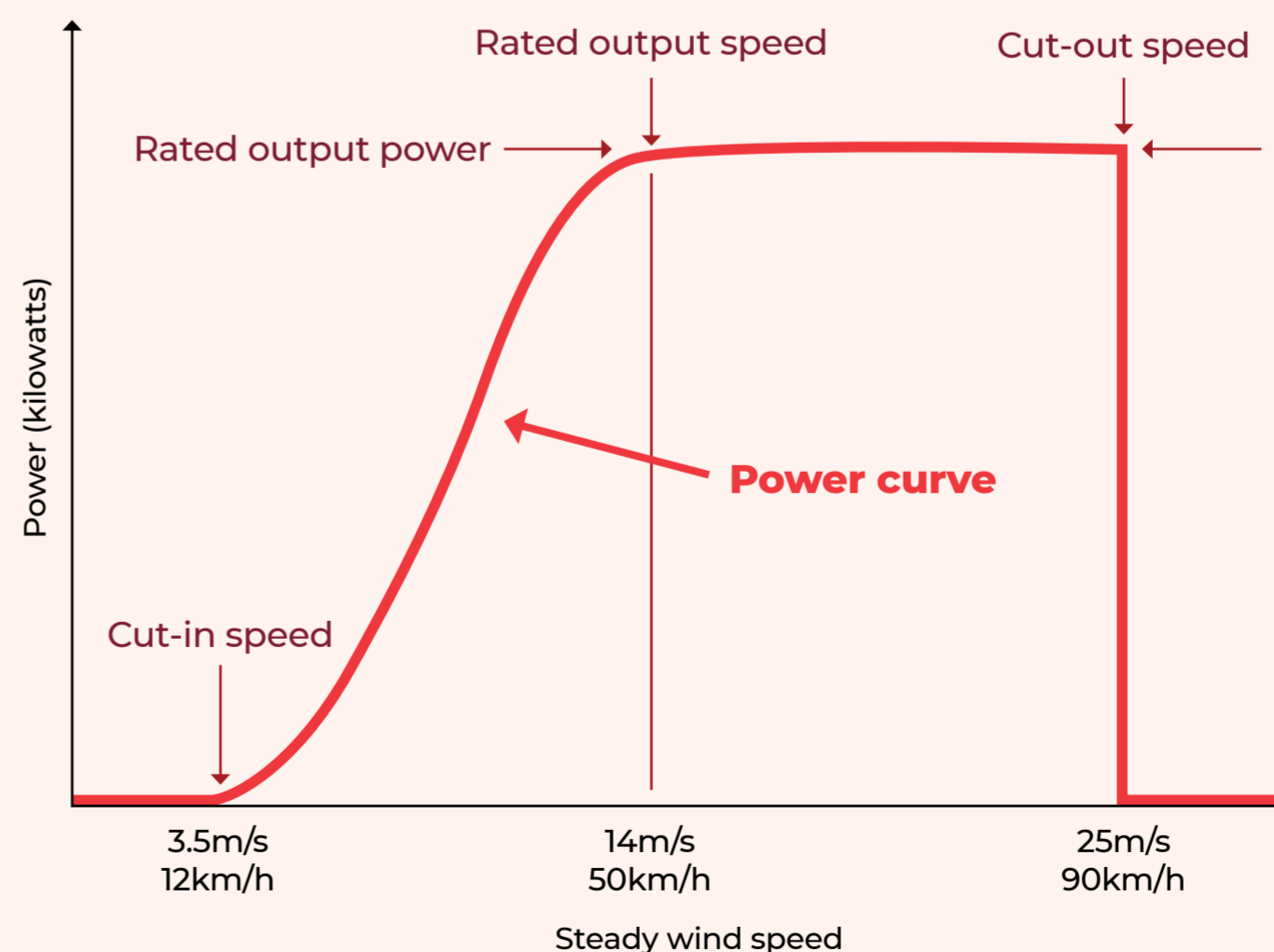
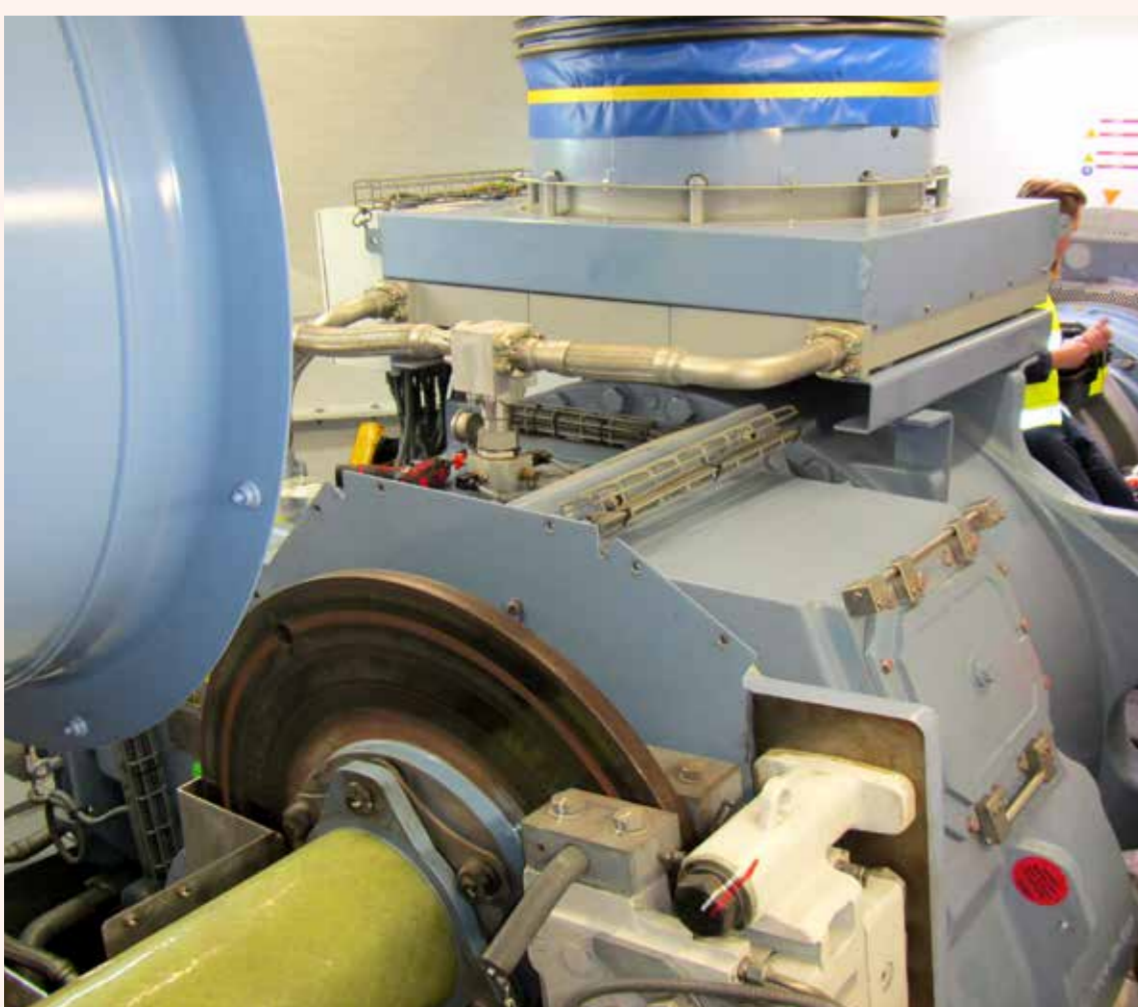


**Rotation speed: The wind turbines rotate at 5rpm to 9rpm**

## Typical wind turbine power curve

The graph below shows how the power output from a wind turbine (and electricity) varies with increasing wind speed. The turbine will commence generation in wind speeds of about 12 km/h and increases to about 50 km/h. Between 50 km/h and 90 km/h the turbine maintains constant power output by pitching its blades.

The power output of the turbine is also dependent on the diameter of the turbine rotor (blade length) and the density of the air.



# Turbine noise

Wind turbines generate noise while operating. The two primary sources of noise are the mechanical noise from the nacelle (generator, gearbox, fans etc) and the aerodynamic noise from the turbine blades.

The image to the right shows the relative level of the noise from the turbine blades and nacelle, with the dark red colours indicating higher noise levels. From that image it is clear that the majority of the wind turbine noise comes from the downward moving blade and the aerodynamic noise is significantly greater than the mechanical noise.

**In Aotearoa New Zealand we have a standard for the control of noise levels from wind farms, titled NZS6808:2010 "Acoustics – Wind farm noise". This sets out a methodology for predicting, measuring and assessing the sound from wind turbines.**

The standard recommends that in most cases the wind farm noise limit be 40 dB  $L_{A90}$  or the background plus 5dB, whichever is the greater. The decibel scale is a logarithmic scale which converts sound pressure levels into a more manageable scale.

A whisper is about 30dB while conversational speech is about 60dB. The level inside a living room is also approximately 40dB. The frequency of the sound also has a bearing on how the noise level is perceived.

The noise from a wind turbine reduces at a rate of 6dB for each doubling of the distance, so for instance the noise level at 400m will be 6dB lower than that at 200m.

Additionally adding two sound sources together at the same point increases the noise level by 3dB. A change in noise level of 3dB is only just perceptible while a change of 10dB is perceived as a doubling or halving of the noise.



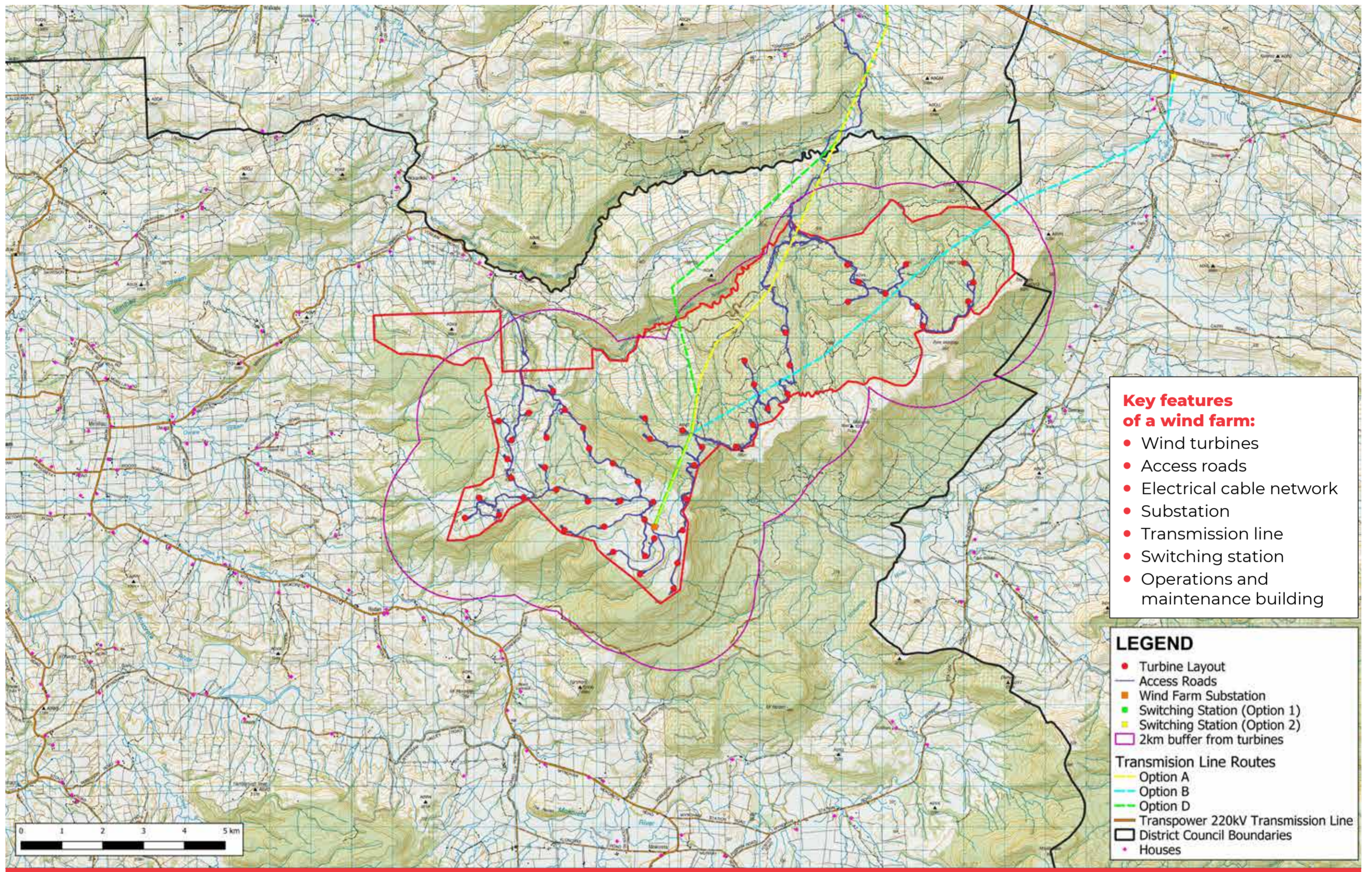
Graphic used with permission: Stefan Oerlemans (NLR)



## Will I be able to hear the turbines?

**In most cases it is possible to carry on a conversation at the base of a wind turbine without having to raise your voice. Detailed noise studies will be undertaken during project development to ensure that the wind farm will meet the noise standard and will not negatively impact on local residents.**

# Indicative site layout



## Construction

### Construction of roads, hardstands and foundations

Construction of the access roads and turbine hard stands are the initial works undertaken on the site, they enable access to each of the turbine locations. Concrete foundations with a steel reinforcing mesh are formed to provide the base to support each turbine. An on-site concrete batching plant will be established within the site during construction to produce the concrete for all the on-site works.

### Construction of site cable network and substation

Power and communications cables between turbines and substation are typically installed in cable trenches dug along the access roads. The substation is the collection point all of the electricity generated by the turbines. Transformers at the substation 'step-up' the voltage to 220,000 volts to match that of the Transpower National Grid.

### Grid connection

An overhead transmission line and a 'switching station' are required to provide electrical connection between the wind farm and the Transpower National Grid. Only one transmission line and switching station will be required. We are currently investigating options for these. The transmission line will likely consist of steel lattice towers with power cables strung between the towers. The switching station will comprise mainly of circuit breakers, switchgear and protection equipment to enable a safe and robust connection between the wind farm and the National Grid.

### Erection of turbines

Following completion of each foundation the turbine components are erected using a cranes to install the tower sections, then the nacelle and then the blades. Once erected, the turbines are connected to the wind farm cable network, tested and commissioned. When all turbines have been commissioned, the wind farm is deemed to be 'fully commissioned' and has the ability to generate to its full potential. The construction period up to 'fully commissioned' is anticipated to take approximately two years.

# Turbine transportation



## Port delivery

For the project, the turbine components and the substation transformers will arrive by ship to South Port in Bluff. Components for transportation from South Port to the site include the turbine nacelles, tower sections, turbine blades, crane components, and the substation transformers.



## Road transport

After delivery at the port, the components will travel by specially-configured heavy transport via the state highway network towards the site and then utilising local roads for the last section before entering the site. The final transport route will be determined for each component type to minimise disruption and ensure the roads and bridges are suitable for the over-weight and over-dimension loads.



Photo credit: Creative Commons



## On-site transport

Once on-site, the components are transported on the access roads constructed for the wind farm, to temporary storage areas or directly to the turbine platforms ready for erection.



# Resource consents and technical assessments



We will need to apply for resource consents from the relevant District and Regional Council to construct, operate and maintain the wind farm.

As part of this, technical assessments are underway to help us understand the impacts that the wind farm could have on the environment. These include:

- **Landscape and visual**
- **Ecology**
- **Traffic and transportation**
- **Civil works and construction effects**
- **Acoustics**
- **Electro-magnetic interference**
- **Archaeology**
- **Economics**
- **Shadow Flicker**
- **Aviation**

We will also be working with rūnaka to understand cultural values and the impacts the proposal may have on these and wāhi tapū.



# Communities and environment support



## Environmental initiatives

We take a site-specific approach to biodiversity management, focusing on ecosystems which are affected by our operations, and those which are of particular importance to tangata whenua and communities:

**Vegetation:** planting natives, thermo-tolerant vegetation enhancement (geothermal), pest plant control.

**Waterways:** waterway restorations including sites of cultural significance, wetland enhancements.

**Native species:** native bird support, habitat protection and pest control.

Across our sites in 2022 we caught 4,832 pests, planted 55,206 trees, transferred 227 tuna (freshwater eels) downstream in the Clutha catchment, and transferred 198kg of elvers upstream of the Roxburgh Dam.

## Community initiatives

We work hard to be a good neighbour, and a positive part of the communities we operate in. As part of this project, we will be actively looking for opportunities where we can support the community.

**Ka Hiko training and employment programme** includes two weeks of pre-trade health and safety training, scholarship payments and PPE gear. On successful completion of Ka Hiko, ākonga (students) start full time work with a contractor on our Tauhara geothermal construction site.

**Taranaki Kiwi Trust, Kiwi Contact & Wingspan National Bird of Prey Centre sponsorships.**

**Women's Refuge sponsorship** initiatives includes donations of money and energy, support of the successful Safe-Night-a-thon campaign in 2021, and adding the Shielded functionality on our website.

**Swimwell Taupō programme** gives every school-aged child in the district access to free swimming and water safety lessons.

**Blossom Festival** and other Clyde community events and projects.

## Employment and economy

There are many direct opportunities for employment within the region during both the construction and ongoing operations of the wind farm.

**Employment:** Wind farms require a variety of jobs and skills. During the construction stage of the project, approximately 160-240 jobs will be required. When the wind farm is operational, there will be 10-14 full time jobs directly working on the wind farm, plus there will be flow on employments benefits as the project will bring demand for local businesses.

**Economic Growth:** The proposed wind farm will inject about \$220-\$280 million of investment into the New Zealand economy, with much of this going to local suppliers of materials, services and labour. This can include domestic scale electricians, transport operators, concrete suppliers, civil engineering and road construction contractors.

