



CHAMPIONS TROPHY
Case Competition

Case Study: New Zealand Wind Farms

Thursday 31 January



Case prepared by David Sorrenson under the supervision of Ashley Elder. This case has been prepared solely for the Champions Trophy Case Competition. All data in this case has been obtained from publically available sources. This case is not intended to serve as an endorsement, a source of primary data, or an illustration of effective or ineffective management.

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From: William Wind

Sent: Saturday 26 January 2019

To: Champions Strategy Team

Subject: New Zealand Wind Farms Presentation

Kia ora all,

Our client, New Zealand Wind Farms (NZWF), is the owner and operator of Te Rere Hau, a wind farm in New Zealand's Lower North Island region. With 97 turbines, Te Rere Hau creates enough clean electricity for 30,000 homes.

Since listing publicly over a decade ago, NZWF has struggled with profitability in the face of lower than expected electricity prices and issues with its turbines. The company also had a long running legal dispute with its neighbors and the local council over noise complaints. Despite its poor past performance however, the company has had a relatively successful couple of years with new management. They have consolidated control of Te Rere Hau, settled their disputes and implemented new cost discipline measures to return to profitability.

NZWF is now interested in what comes next for a small generator in the New Zealand electricity market. As a commodity producer, NZWF are exposed to price cycles and have little capacity to generate value. They are also at the mercy of the elements and rely on good wind conditions to generate revenue. In the past the company has considered investing in new generation to complement their turbines and have looked at selling electricity on the retail market, where prices are more stable. Both options carry their own risks and significant investment, which current shareholders may be wary of. The idea of selling the company has also been raised and should be considered as an option.

New Zealand is aiming for 100% renewable energy in the coming decades, and wind farms such as Te Rere Hau will play a crucial role in that future. The Board would like you to analyse NZWF and the industry's current situation and hear what you think is the best strategy for shareholders and the local community going forward.

You will have ten minutes to present, followed by a ten minute question and answer session. Attached are documents prepared by our research team to assist you.

Kind regards,

William Wind

Introduction

Catching the near-constant westerly winds that roll off the Tasman Sea, the rugged slopes of the Tararua Ranges carry some of the most productive wind generation in the world. Amongst them, nestled in the hills above Palmerston North, are the 97 turbines of Te Rere Hau Wind Farm, the sole asset of the publicly-listed New Zealand Wind Farms (NZWF).

Initially built to demonstrate an innovative new generation of wind turbine, Te Rere Hau and NZWF faced over a decade of difficulties, fighting off malfunctioning turbines, poor wind conditions, noise complaints and falling electricity prices. Yet in recent years NZWF have turned around the farm into a profitable enterprise. Now, as New Zealand targets full renewable status by 2035 and the wind power industry looks poised for growth, NZWF faces questions about how a wind farm operator can survive in the electricity landscape.



Company

Origins

NZWF began its life in 2002 as a subsidiary of Windflow Technologies, a New Zealand producer of unique two-bladed wind turbines.¹ In 2005 Windflow received consent for a 97-turbine farm near Palmerston North in New Zealand's lower North Island, which would showcase their NZ-made turbines and take advantage of emissions credits from the then recently-signed Kyoto Protocol.² That year, Windflow moved assets relating to the consented farm into NZWF and separated management of the two companies in preparation for a public listing.³

In 2006 NZWF raised \$4 million in an initial offering on the New Zealand Stock Exchange's small cap index (NZAX), reducing Windflow's stake to 44%. NZWF used the funds from the share offering to finance the first 5-turbine stage of the Te Rere Hau Wind Farm, which was opened by Prime Minister Helen Clark in September 2006.⁴

In 2007, the company shifted to the main board of the New Zealand Stock Exchange (NZX), raising \$75 million for the further development of Te Rere Hau and other future wind projects. The company marketed itself as a unique opportunity to invest directly in wind power in New Zealand and the funding round was oversubscribed. As part of the stock issue, New Zealand's largest electricity distributor Vector took a 20% stake in the company.⁵ After several years of negotiation, international wind farm developers Babcock and Brown and NP Power became 50% partners in the Te Rere Hau Wind Farm. However, within a few years they sold back their stake as they entered receivership.⁶

Over further stages opening in 2009 and 2011 the Te Rere Hau farm reached 97 turbines and a total capacity of 48.5 Megawatts (MW), enough to power 30,000 homes.⁷ By this stage Windflow had fully reduced its ownership in NZWF and handed over maintenance and operations of Te Rere Hau to the company.⁸ The company was now listed fully on the NZX (aside from the 20% Vector stake) and its only assets were those associated with Te Rere Hau and its 97 turbines.

A difficult decade

The 2010s would be rife with challenges for NZWF. Following hundreds of complaints about noise, the Palmerston North Council took NZWF to the Environment Court in 2011. While one local called the complaints a result of "hysterical turbophobia", others spoke of thumping and whining mechanical noises that would disrupt evening barbeques and days outside.

In a landmark decision, the Environment Court ruled that the noise from the farm was significantly louder than predicted in the initial resource consent application and the company would need to reapply in order to operate. NZWF spent the following five years in a high-profile legal battle with the Council and local residents. New Zealand's High Court overturned the Environment Court ruling in 2013, a decision upheld by the Court of Appeal in 2014. Despite the legal victories, the company was spending over \$500,000 a year on litigation.

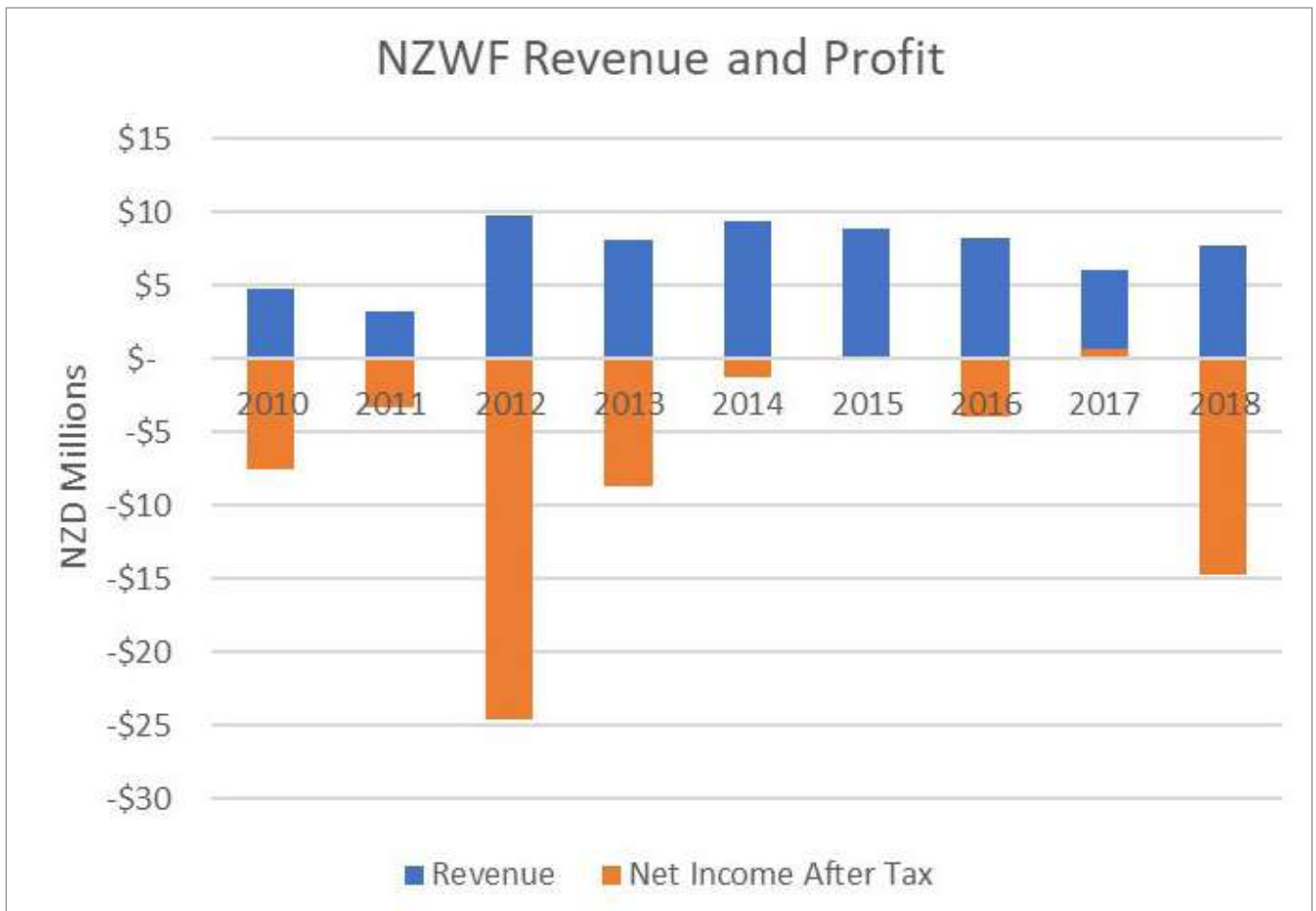
In December 2017 NZWF finally reached an agreement to reduce the hours some turbines operated, especially in low wind conditions and on weekends. Incoming CEO John Worth admitted that the company had been too focused on the technicalities of its consent, and not focused enough on being part of the community. Since 2005 there had been over 1700 noise complaints about the farm. "Putting compliance to one side," he said following the decision, "we thought, if it's pissing people off, then that's not good enough. We had been a terrible neighbour."

Growing pains

Aside from noise complaints, the company struggled with profitability after opening Te Rere Hau. The farm was designed to produce 160 Gigawatt hours (GWH) of electricity a year but this target was scaled down three separate times, eventually reaching 120 GWH, an output which the company still did not meet in 2018. This poor production, on top of falling projections for long term electricity prices, meant the company had to re-evaluate the book value of Te Rere Hau several times in the 2010s. The board approved a \$6m impairment expense in 2010, followed by \$25m in 2012, \$10m in 2013 and \$5m in 2016. In 2018 they took a further \$22m impairment due to Vector unexpectedly unwinding their ownership stake, which caused a deferred tax asset to be repriced. Since opening Te Rere Hau in 2011, the company has only had one profitable year, although it has remained mostly operationally profitable.

NZWF was listed in 2006 with the vision to build Te Rere Hau and then expand to new developments. Yet as early as 2011 the company had curbed its ambitions. Difficulties with Windflow's turbines (Te Rere Hau was the only large user in the world) and depressed wholesale electricity prices meant the firm remained wholly focused on profitably running Te Rere Hau. Its original parent Windflow Technologies never succeeded in commercialising its two-bladed turbines and in 2017 was near bankruptcy, down to 5 employees and a 1 cent share price. Te Rere Hau and a handful of turbines in the United Kingdom remain the only commercial examples of Windflow's product.

1. <https://www.powerco.co.nz/divisions/transmission-services/press-release/nz-windfarms-to-enter-alliance-with-powerco/>
2. <https://www.renewableenergyworld.com/articles/2003/12/new-zealand-green-power-reaps-carbon-credits-10227.html>
3. 2005 Annual Report
4. 2006 Annual Report
5. <https://www.windflow.co.nz/news/windflow-welcomes-vector-as-fellow-nz-windfarms-shareholder>
6. <http://i.stuff.co.nz/business/755546/Babcock-Brown-plan-queried>
7. <https://www.windflow.co.nz/projects/te-rere-hau>
8. 2012 Annual Report
9. <http://i.stuff.co.nz/environment/7233811/Wind-farm-too-noisy-court>
10. <https://i.stuff.co.nz/manawatu-standard/news/96632194/the-roar-that-never-arrives-faces-volume-controls?rm=m>
11. <http://i.stuff.co.nz/environment/7233811/Wind-farm-too-noisy-court>
12. <http://www.scoop.co.nz/stories/AK1412/S00334/te-rere-hau-windfarm-commitment-to-resolving-issues.htm>
13. <https://i.stuff.co.nz/manawatu-standard/news/99881957/Palmerston-North-wind-farm-puts-a-decade-of-complaints-behind-it?rm=m>
14. <https://i.stuff.co.nz/manawatu-standard/news/99881957/Palmerston-North-wind-farm-puts-a-decade-of-complaints-behind-it>
15. <https://i.stuff.co.nz/manawatu-standard/news/99881957/Palmerston-North-wind-farm-puts-a-decade-of-complaints-behind-it?rm=m>
16. <https://i.stuff.co.nz/business/107389651/the-promise-of-nz-windfarms-dissipates-as-it-announces-a-major-review>
17. <https://i.stuff.co.nz/business/90673423/windflow-to-look-for-more-capital-new-prospects?rm=m>



Company

A Turnaround

2017 appeared to be a turning point for NZWF. On top of settling its lawsuits over noise complaints, the company began to consolidate its operations. They bought back power lines and electrical assets on the farm for \$17.3m, a step that put the company in complete control of the farm for the first time. They also reduced headcount from 16 to 11 and eliminated one General Manager role, saving \$200,000 a year. The company began hedging its prices 12 months in advance to give revenue stability. And in late 2017 they paid their maiden dividend, over 11 years after first listing.

According to Worth, the company now has two broad areas of focus for the coming year:¹⁸

1. Operating separation

A wind farm makes profit when the electricity revenue of its turbines exceeds the short run marginal cost of running them, which is mostly comprised of maintenance expense. The average short run cost for Te Rere Hau is about \$15 to \$20 per Megawatt hour (1 MWh being a 1 MW turbine producing for one hour, a 2 MW producing for half an hour, etc.) However, this varies significantly: in smooth wind conditions the cost can be as low as \$1 per MWh; in high and gusting winds that damage the turbines the cost can be several hundred dollars per MWh. Traditionally the company ran turbines at full capacity to maximise revenue, but if electricity spot prices are low during turbulent conditions, then the turbines may be running at a loss. This issue is accentuated by the fact that New Zealand's wind farms are clustered, so windy conditions increase all output and drive down spot prices right as the turbines cost the most to run.

NZWF and other providers lobbied for several years for 'elective curtailment' where they can stop turbines during loss making periods, arguing that such a change was needed to allow profitable operations of

wind energy. In 2018, New Zealand's electricity regulator granted NZWF an interim dispensation to do so, while long term changes are worked on. NZWF have now begun a "three axis" curtailment process, where each individual turbine assesses current wind speed and turbulence, works out what it is costing to run, and decides whether to turn on or off depending on current market price. As part of this process several turbines have been decommissioned and new components (which are expensive due to Windflow's one-of-a-kind turbines) are only being bought for profitable turbines, at least until electricity prices recover.

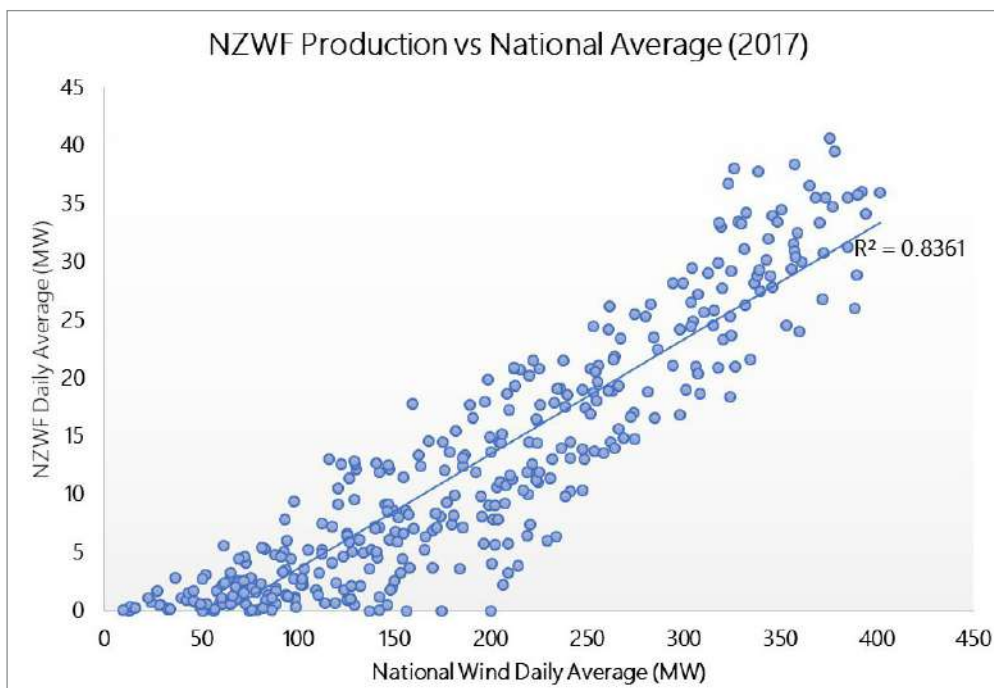
The curtailment process has not been running long enough to fully assess, but component failure rates have dropped, and the company has reported favourable EBITDA growth since the measure was started. A major focus for 2019 will be creating a more complex curtailment model with additional variables.

2. Social license

As noted above, incoming management in 2017 sought to end the adversarial relationship NZWF had with its neighbours. The company contends that the changes they have made to appease noise complaints have not affected profitability, as they are for very specific and non-prevailing wind conditions when neighbours are downwind. They made several changes to this regime over 2017 and 2018 to make it even more effective for their neighbours.

Worth talks of a 'social license' that major infrastructure owners must work hard to earn from the local community. NZWF have recently launched a community engagement programme, with school visits and multisport events planned. "We're not entirely done in getting this right," Worth told shareholders in 2018, "but we have come a very long way."

¹⁸ 2018 CEO Report



Looking forward

At NZWF's 2016 AGM then-Chairman Rodger Kerr Newell called on the company to move away from being a price-taker to "an entity that actively manages its revenue."¹⁹ The two solutions mooted were to create an alternative form of generation to produce when wind is low, and to get involved in retailing electricity, which sells at a fixed rate, unlike the fluctuating wholesale market NZWF currently sells onto. Larger producers like Meridian, who own the nearby Te Apiti Windfarm, run other forms of generation and operate retail brands so are better insulated against wind patterns and price drops.

Yet with the turnaround process now nearing completion, management is treading carefully about future plans. In September 2018, Chairman Stuart Bauld said that expanding generation in the electricity sector is expensive and "shareholders are unlikely to fondly view a request for more money when the company has so far failed to consistently produce a profit..."²⁰ About entering retail, he noted that new entrants into the market struggle and only pick up the most price sensitive and disloyal customers. On top of this, Te Rere Hau's inconsistent supply means NZWF would often have to buy electricity on the wholesale market and expose itself to price risk.

Bauld added:

"We have reached the point where it is clear that the company can consistently produce a modest profit and a modest cash flow, but is never going to be a major player in the industry. We do however have some major and attractive assets. We are now profitable. We have a good location. We have good resource consents. Since improving our behaviour towards our neighbours we generally have a good relationship with them. In order to fully utilise these assets, we are of the view that a significant capital infusion would be necessary. In my opinion trying to implement a major project by share placement creates excessive risk for existing shareholders."

He finished by announcing that the company was undertaking a financial review to figure out the best next steps for shareholders. "We intend to consider the full range of options available to us to maximise shareholder value..." he concluded.

Conclusion

Like the southerly winds that brew in the Southern Ocean and rip across the hills of Te Rere Hau, New Zealand Wind Farms' first decade as a listed company has been turbulent. The vision of a public company dedicated purely to wind energy evaporated in the face of low prices, turbine troubles and harsh economic reality.

A new board and management have worked hard since 2016 to turn around the company, but questions linger about what comes next. Fundamentally the central problem remains: NZWF is at the mercy of the elements and the wholesale market. Yet to step beyond a pure generation role brings its own challenges and risks, not to mention the issue of funding such endeavours.

"There is nothing that is off the table, but you've got to be realistic," Bauld said in late 2018.²¹ Results from the financial review are not yet out, but market observers noted that Vector's stake was a large obstacle now removed from a possible takeover, which had been considered by several competitors in the past. The actual turbines of Te Rere Hau are unfavourable due to the trend towards larger and more powerful designs, but its possibility to expand into some of the world's best wind territory may prove tempting to an outside buyer.

While the wind power industry has proved to be anything but a breeze for NZWF, dreams of a thriving sector have not yet died on the rugged terrain of the Tararua Ranges. The future of energy is renewable, and NZWF will surely play a part in that future. For now, the turbines of Te Rere Hau stand, still spinning, in the hills above Palmerston North, looking over the Tasman Sea and an uncertain story to come.

19. 2016 Chairman's Report

20. 2018 Chairman's Report

21. <http://www.sharechat.co.nz/article/a113ca46/te-rere-hau-sale-among-options-in-nz-windfarms-strategic-review.html>

Industry

Overview

New Zealand is notable for its high renewable generation: around 80% of electricity is from renewable sources, the third highest rate in the OECD.²² The current Government has set a target of 100% renewable generation by 2035.

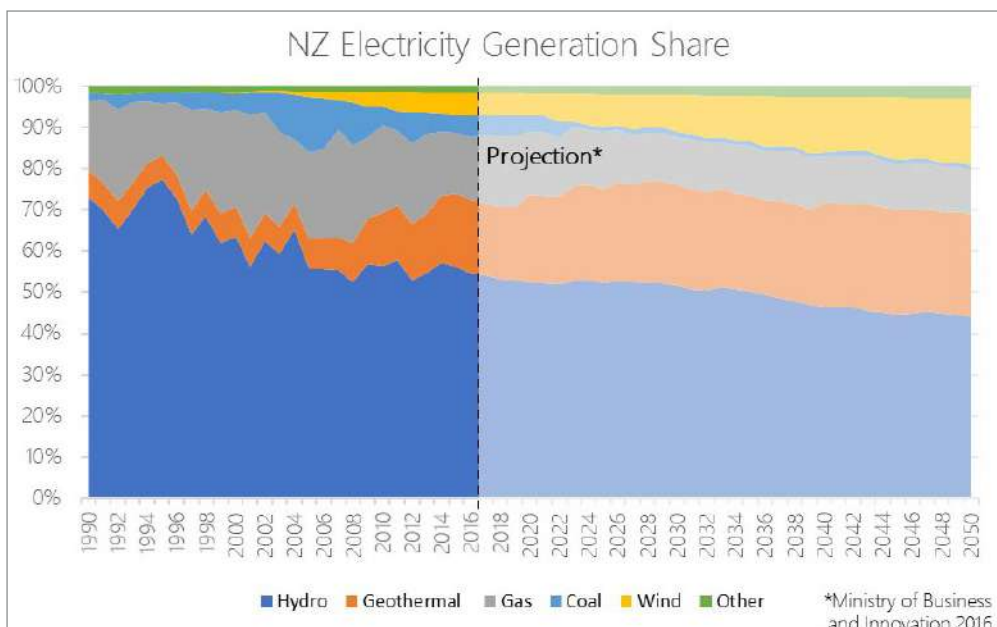
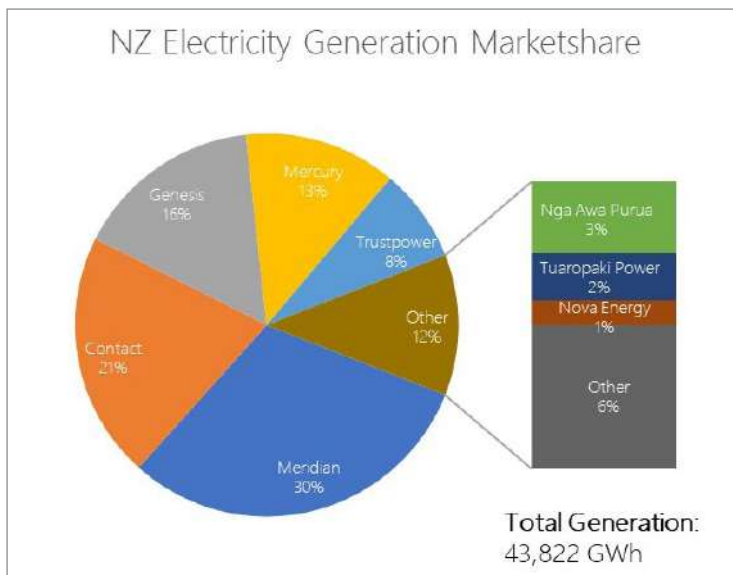
Hydro-electric dams, mostly situated in the lower South Island, provide 59% of total generation, followed by geothermal production at 17%. A further 15% of supply comes from gas and coal-powered plants. Non-renewable generation is dominated by gas from local gas fields, which provide a crucial role in producing when renewable generation is low.

Wind currently only comprises 5% of supply but is predicted to grow significantly. While hydro and geothermal provide consistent and cheap renewable energy supply, there is little capacity left for growth. As such, if New Zealand is to reach its full-renewable goals it is estimated that wind energy will grow to 20% of supply by 2035.²³

New Zealand is not a favourable climate for commercial solar power generation, although domestic rooftop generation is growing rapidly. 9% of households now have some form of solar generation, with 45% reporting they had thought about installing a system.²⁴ Tidal power has also been discussed as a viable option, especially in Cook Strait between the North and South Islands, which has some of the strongest tidal flows in the world. However, such plans have a long route to commercialisation.

Generation is dominated by five large providers, who are each listed on the New Zealand Stock Exchange (NZX). Together they make up close to 90% of all generation.

- 22. https://www.nzherald.co.nz/opus/news/article.cfm?c_id=1504443&objectid=12135637
- 23. https://www.nzherald.co.nz/opus/news/article.cfm?c_id=1504443&objectid=12135637
- 24. <https://i.stuff.co.nz/business/money/100484649/solar-power-not-yet-financially-worthwhile-for-many-people-eeca>
- 25. <http://www.windenergy.org.nz/wind-energy/nz-windfarms>



Wind power

There are currently 17 wind farms in New Zealand carrying a total of 490 turbines with an installed capacity of 690 MW, enough to power 300,000 homes.²⁵ The country is situated in the middle of an unimpeded westerly flow of wind known as the 'Roaring Forties', and so is considered an excellent location for generation. A 2008 study concluded that using just 1% of available land could produce 100,000 GWh of generation per year, twice current demand.²⁶

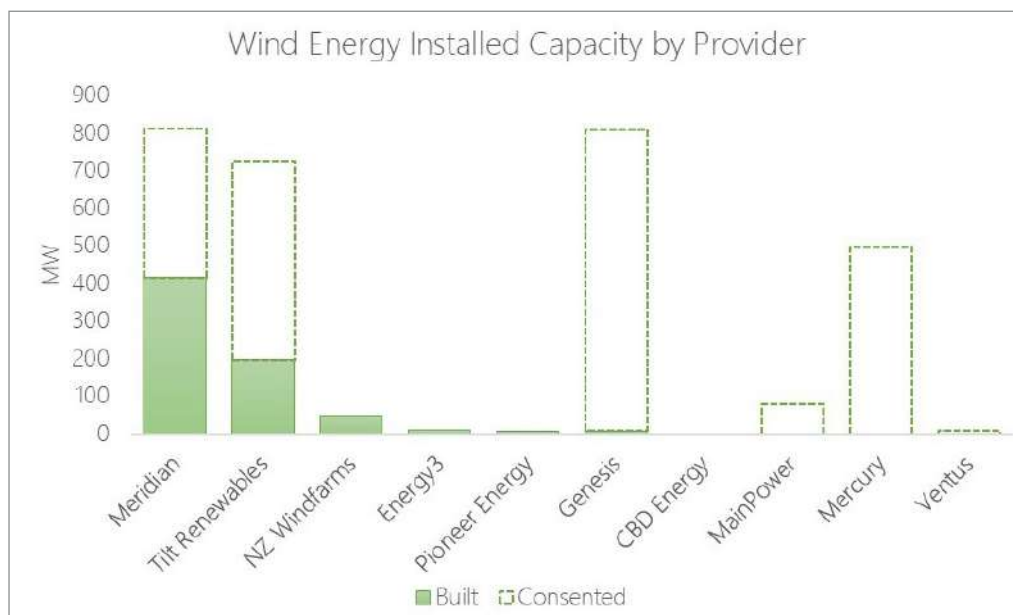
Most development has been held back by a lack of commercial viability. A large number of farms consented in the 2000s were never built due to uncertainty about electricity prices, some of the same issues that dogged NZWF's efforts. Notably, there were fears that Tiwai Point aluminium smelter, which consumes 13% of New Zealand electricity, would close and collapse wholesale prices.²⁷

Some large providers are now starting to look at wind farms. For example, Contact Energy is considering a 100MW wind farm in Taranaki in the Central North Island. The company had consents for 900MW of farms but had either abandoned or let them lapse due to low electricity prices or requirements for larger turbines than consented. In 2018 Contact CEO Dennis Barnes said that wind farms may 'come back on the radar' as geothermal opportunities dry up. Barnes added that his company viewed wind farms as largely a 'consenting issue' and that they

may pursue them after researching wind patterns and new technology.²⁸ Throughout the country about 2500 MW of farms are consented but not yet built.²⁹

Tilt Renewables, which was created with Trustpower's wind assets in 2016, is looking to build several new projects in New Zealand. They already control Tararua Wind Farm, which neighbours Te Rere Hau and is New Zealand's largest wind farm. They are now moving ahead with a \$300m farm in Taranaki, which faced some local complaints but is consented for turbines 160m tall with 130m rotor diameter (by comparison, the Windflow turbines NZWF uses have a 33m rotor diameter).³⁰ With only 48 turbines the project will have capacity of 130MW, about three times that of Te Rere Hau's 97 turbines. For the project they have partnered with Genesis, who will buy the electricity long term as part of their plan to close all coal powered plants by 2030. Meridian has sought to update many of its consents to accommodate larger and more efficient turbines too.

26. https://web.archive.org/web/20070320102430/http://www.windenergy.org.nz/FAQ/wind_resrc.htm
27. <https://www.odt.co.nz/regions/southland/extra-power-smelter-tiwai-deal>
28. <http://www.sharechat.co.nz/article/dd4d7aa3/contact-looking-again-at-wind.html>
29. <http://www.windenergy.org.nz/wind-energy/nz-windfarms>
30. <http://www.scoop.co.nz/stories/BU1810/S00507/genesis-partners-with-tilt-in-taranaki-wind-farm.htm>
31. <https://i.stuff.co.nz/business/industries/92920513/infographic-what-is->



Market Mechanism

In the New Zealand electricity market generators sell electricity onto the wholesale market, with retailers bidding every 30 minutes for supply. Prices are set in MWh. For context, the average home in New Zealand consumes about 7 MWh of electricity in a year.³¹

Once bought on the wholesale market, the electricity makes its way through a state-owned national transmission grid to regional distribution networks, which run powerlines to houses and businesses. Retail customers typically pay a set price per kilowatt hour, although plans that track the market spot price are growing in popularity. Most areas have access to at least 25 different retail providers, a mix of generators like Meridian and retail-only outfits that buy off the wholesale

market but don't generate.³² In the end, the cost of generation only comprises about 30% of a customer's final bill, with the majority of expense coming through transmission and distribution.³³

Only 32% of electricity goes to households, with 24% being consumed by commercial customers (office blocks, shops, etc.) and 44% by industrial users (forestry, manufacturing, agriculture, etc).³⁴

31. [the-average-new-zealand-power-bill](https://i.stuff.co.nz/environment/108816028/kiwi-engineers-name-10-the-average-new-zealand-power-bill)
32. EECA Report
33. EECA Report
34. EECA Report
35. <https://i.stuff.co.nz/environment/108816028/kiwi-engineers-name-10->

Industry

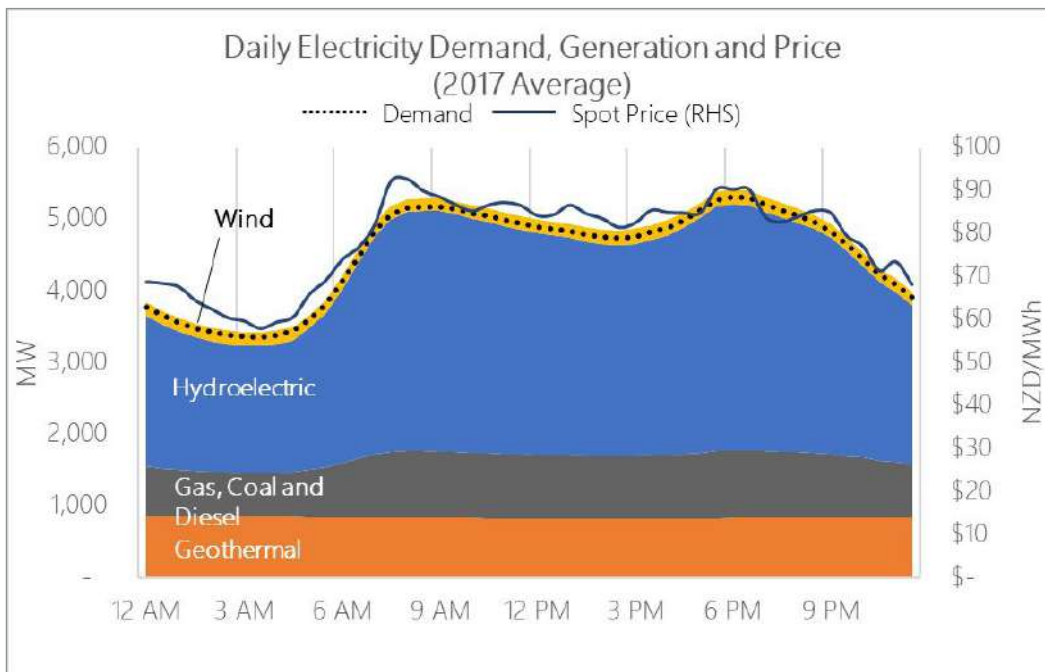
Price cycles

To avoid blackouts or system overloads supply and demand must equal constantly in the electricity market. Hydro and gas are used as swing generation, ramping up rapidly in the mornings to match demand and tapering off in the evenings. These two sources also increase or decrease production based off of supply from unpredictable and non-adjustable sources such as solar and wind power.

Due to the importance of hydro power, prices tend to follow an annual cycle based off rainfall and lake levels. In winter, electricity demand is high, but rainfall around hydro lakes is captured as snow, dropping lake levels. In order to ensure consistent supply in months to come, genera-

tors must limit their outflows, which drives up spot prices. As the snow melts in spring and summer and lake levels rise, demand falls due to the warmer weather, pushing down prices.

Since electricity supply and demand have to equal constantly, the market is prone to large price swings. Generally, the forward price stays constant throughout predictable cycles. While periods of low prices - for example when hydro lakes are full - are not felt hugely by retail customers, generators can struggle to make money.



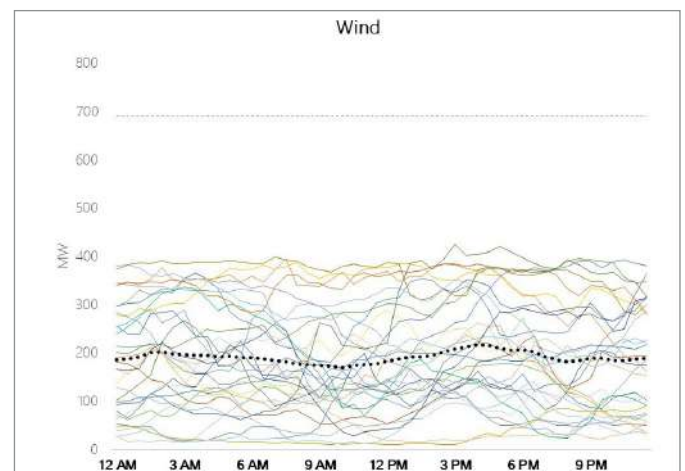
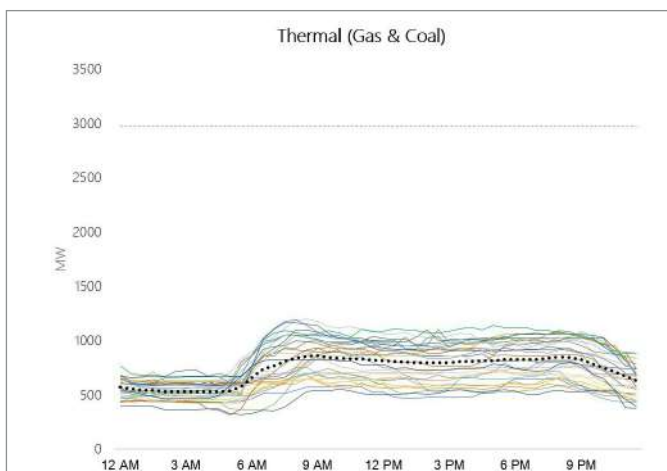
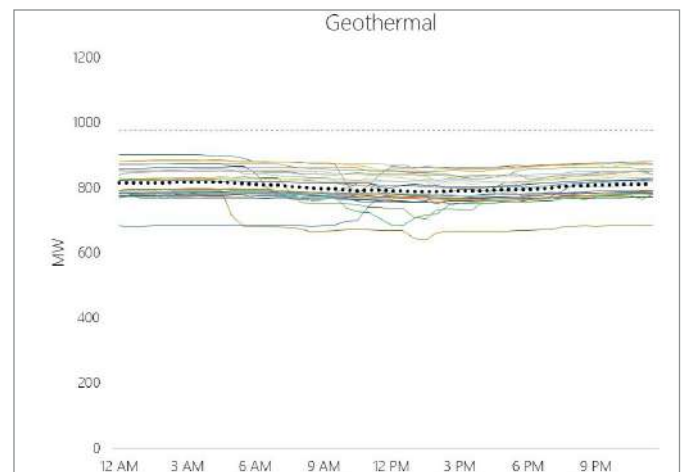
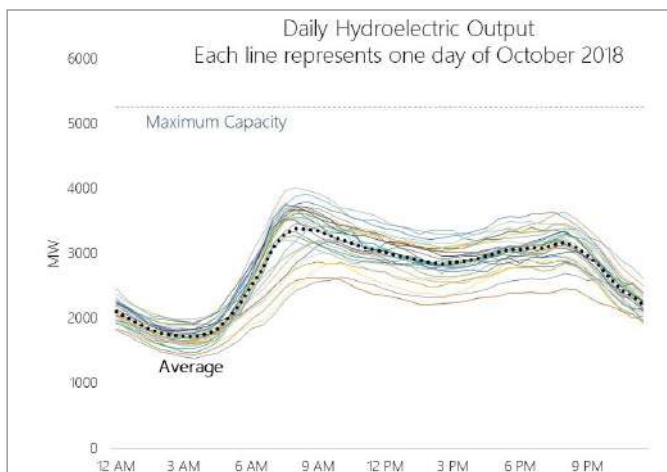
Wind power challenges

Wind power has a major advantage in that it produces the most during cold, windy winter days, when demand is highest. It is also able to produce outside the middle of the day, unlike solar. However, output relies on wind conditions. Large weather patterns can lull winds for several days at a time. In contrast, windy weather can cause a significant drop in the spot price of electricity as producers are forced to sell their increased output onto the wholesale market. Wind farm operators therefore face a challenging proposition: right as they can produce the most electricity, the price they can sell it for drops.³⁵

Hydro dams may provide a valuable counterweight to this problem across the whole network. Hydro can produce on call, and so could generate electricity in excess of river flows during non-windy times, with the assurance that during windy periods less outflow will be needed, and lake levels can increase. In future, batteries, both within homes and at the site of generation, could charge up during windy periods and let out electricity during calm times.

climate-priorities

36. <http://i.stuff.co.nz/business/8567284/Labour-promises-to-cut-power>



Industry

Regulatory changes

While in Opposition the left-leaning Labour Party was critical of the New Zealand electricity market and in 2013 proposed a sweeping single-buyer model. “I’m not prepared to sit back while power companies cream super-profits at the expense of households and the economy,” then-leader David Shearer said.³⁶ Labour also opposed the Government’s plan to partly privatise the large power generators, which ultimately went ahead. After losing the 2014 election the party tempered their plans for the industry but remained critical of the growing unaffordability of electricity.

Upon winning the next election in 2017 Labour leader Jacinda Ardern announced a widespread review of the electricity sector, mostly to address high prices. In late 2018 the interim report of the review was released. The report was not overly critical of the industry, but still highlighted confusing pricing and lack of competition in the retail sector. The ‘generator-retailers’ (Meridian, Contact, Genesis, Mercury and Trustpower) controlled 90% of the retail market alongside their dominance in generation. Many small retailers complained about the large players’ tendency to ‘buy back’ departing customers with cash incentives. The report noted that while consumer prices had risen in real terms by 79 percent since 1990, commercial prices have fallen 18 percent.³⁷

A rise in the goods and services tax (GST) as well as previous underinvestment in transmission were highlighted as factors in the rise in prices. Most of the increase in the generation and retail component came through higher retail margins.³⁸

The report concluded that the generation market was generally efficient and wholesale electricity prices have mapped changes in the price of building new generation assets. There are now 34 companies generating and the market share of the 5 largest producers has fallen from 98% in 1990 to 90% today.

One large barrier to independent generators remains the contract market. The big five generator-retailers have little need to buy and

sell on the wholesale market as they can simply funnel most of their generation to their retail customers. Given these companies account for 90% of generation and retailing, the wholesale market can have very little depth and poor price signals. In recent years the Electricity Authority has encouraged companies to maintain minimum volumes of publicly-listed contracts and required minimum buy-sell spreads. The changes have generally been well received, but at times buy-sell spreads have gone over minimums and in some periods during winter of 2017 there were no sell contracts at all. The report argued that “improving the depth and resilience of the contract market should be given high priority”.³⁹

The report concluded by noting that the electricity sector is set to face many technological changes in years to come:

- Consumers and/or networks will be able to store electricity, and consumers will actively determine what metered electricity they take rather than be passive consumers.⁴⁰
- Solar panels and batteries may dominate many distributors’ networks, potentially reversing normal electricity flow patterns at some times of the day.
- Widespread use of electric vehicles and their connection to household generation will create shifting, unpredictable patterns of demand.
- Distributors will need new technology, and may need to invest in more infrastructure, to handle demand fluctuations.
- New companies may emerge to compete with distributors in managing the two-way power flows.
- New software systems will be needed so consumers can track and sell power to other consumers.

prices

37. <https://www.mbie.govt.nz/have-your-say/first-report-into-the-state-of-the-electricity-sector/>

38. MBIE Report, p.24.

39. MBIE Report, p. 47.

40. MBIE Report, p. 64.

41. <http://www.ren21.net/wp-content/uploads/2015/07/REN12->

Figure 6: Changes in composition of residential prices

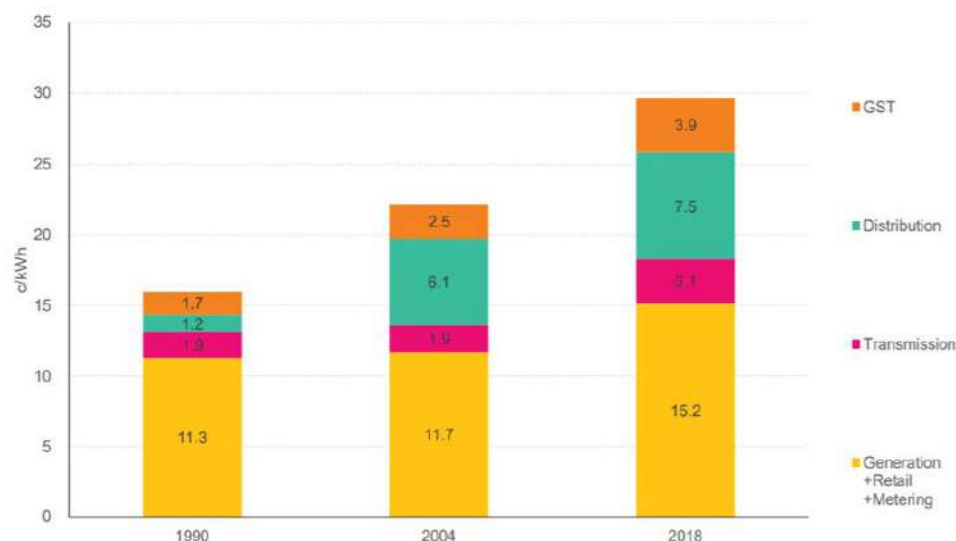


Figure 14: Wholesale contract prices versus cost of building new power stations

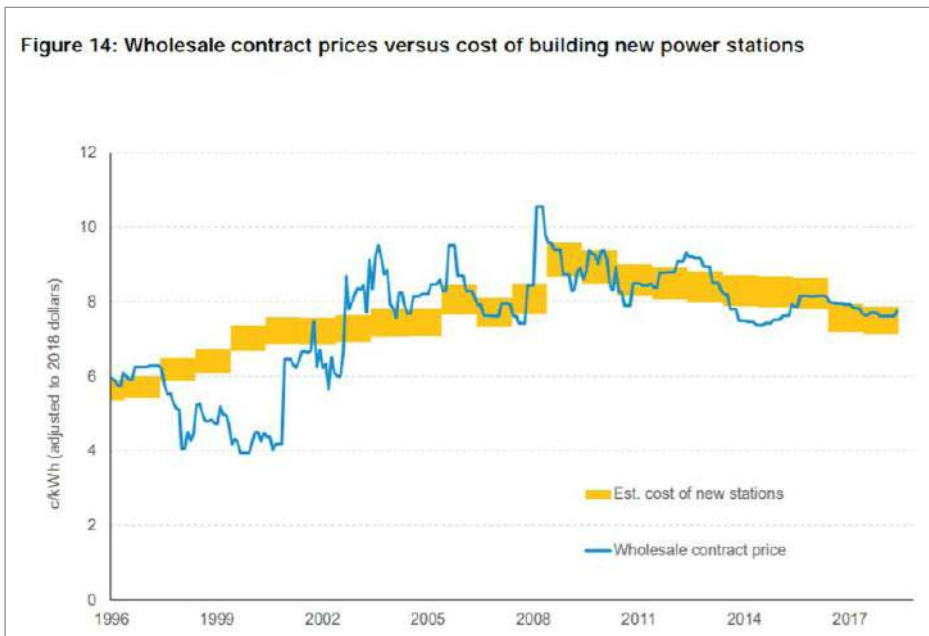
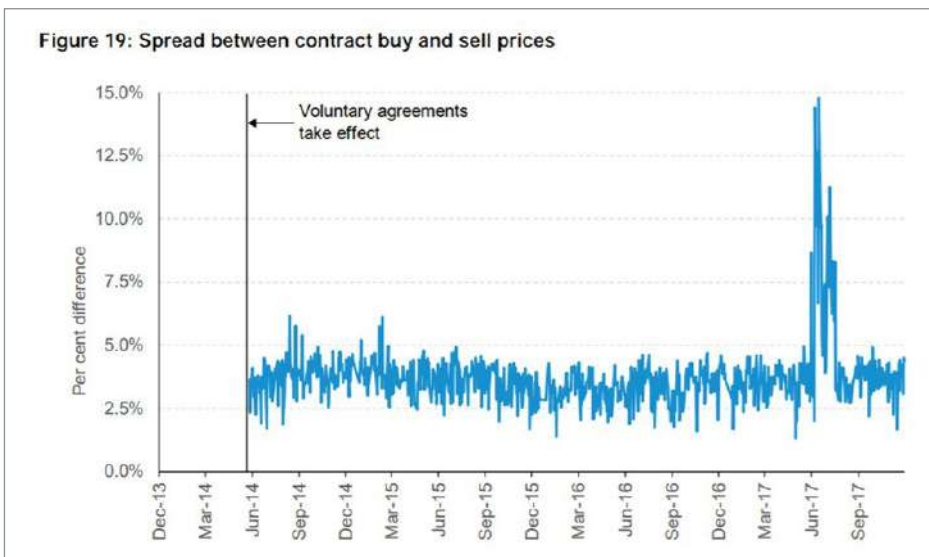


Figure 19: Spread between contract buy and sell prices



Global Trends

Globally wind power is growing in prominence, driven by ambitious sustainability goals. Wind power currently makes up only 3% of global generation but is as high as 40% in some individual countries.

Wind turbine output is driven by blade length and turbine height. As such, turbines are getting larger and taller. The latest generation of General Electric turbines will be almost as tall as the Eiffel Tower and have blades the length of football fields. These turbines are designed for offshore use, where size complaints are less of an issue. Nevertheless, onshore turbines have also grown significantly in size over the last decades and now reach almost 200m in some locations.

Mostly driven by scale, the price of wind generation has dropped by two-thirds in the last decade. One study projects prices will fall a further 50% by 2030. Larger and taller blades spin even in low wind conditions, meaning the average capacity factor of wind farms – or the amount of electricity produced as a percentage of maximum output – has risen from 25% in 2000 to 42% today. Some next generation turbines will reach 60% capacity, close to that of gas and coal plants. The Tararua Wind Farm next to Te Rere Hau was long considered one of the best producing in the world, with a capacity factor of 46%, compared to then-global averages of 30%.

The Ministry of Business Innovation and Employment estimated in 2016 that the long run marginal cost of wind energy in New Zealand is between \$90 and \$105 per MWh, although the industry predicts prices could be as low as \$70 to \$80 per MWh. The current capacity factor for wind in New Zealand is around 40% (although it dropped to 35% in the most recent year) compared to 50% for hydro, 65% for gas and 90% for geothermal.

GSR2015_Onlinebook_low1.pdf

42. <https://www.vox.com/energy-and-environment/2018/3/8/17084158/wind-turbine-power-energy-blades>
43. <https://electrek.co/2017/11/02/worlds-tallest-wind-turbine-built-in-germany/>
44. <https://www.lazard.com/perspective/levelized-cost-of-energy-2017/>
45. <https://www.vox.com/energy-and-environment/2018/3/8/17084158/wind-turbine-power-energy-blades>
46. <https://www.vox.com/energy-and-environment/2018/3/8/17084158/wind-turbine-power-energy-blades>
47. <http://www.windenergy.org.nz/tararua-wind-farm>
48. <http://www.windenergy.org.nz/the-cost-of-wind-energy>
49. <http://www.windenergy.org.nz/generation>

Appendices



Appendix 1: Transmission Network Map

Figure 6: Transmission Network Map

As shown in the transmission network map below, the transmission lines aren't all the same type. High Voltage Alternating Current (HVAC) transmission lines operate at 66 kV, 110 kV or 220 kV (a kilovolt or kV is 1000 volts).

Source: Transpower, 2017

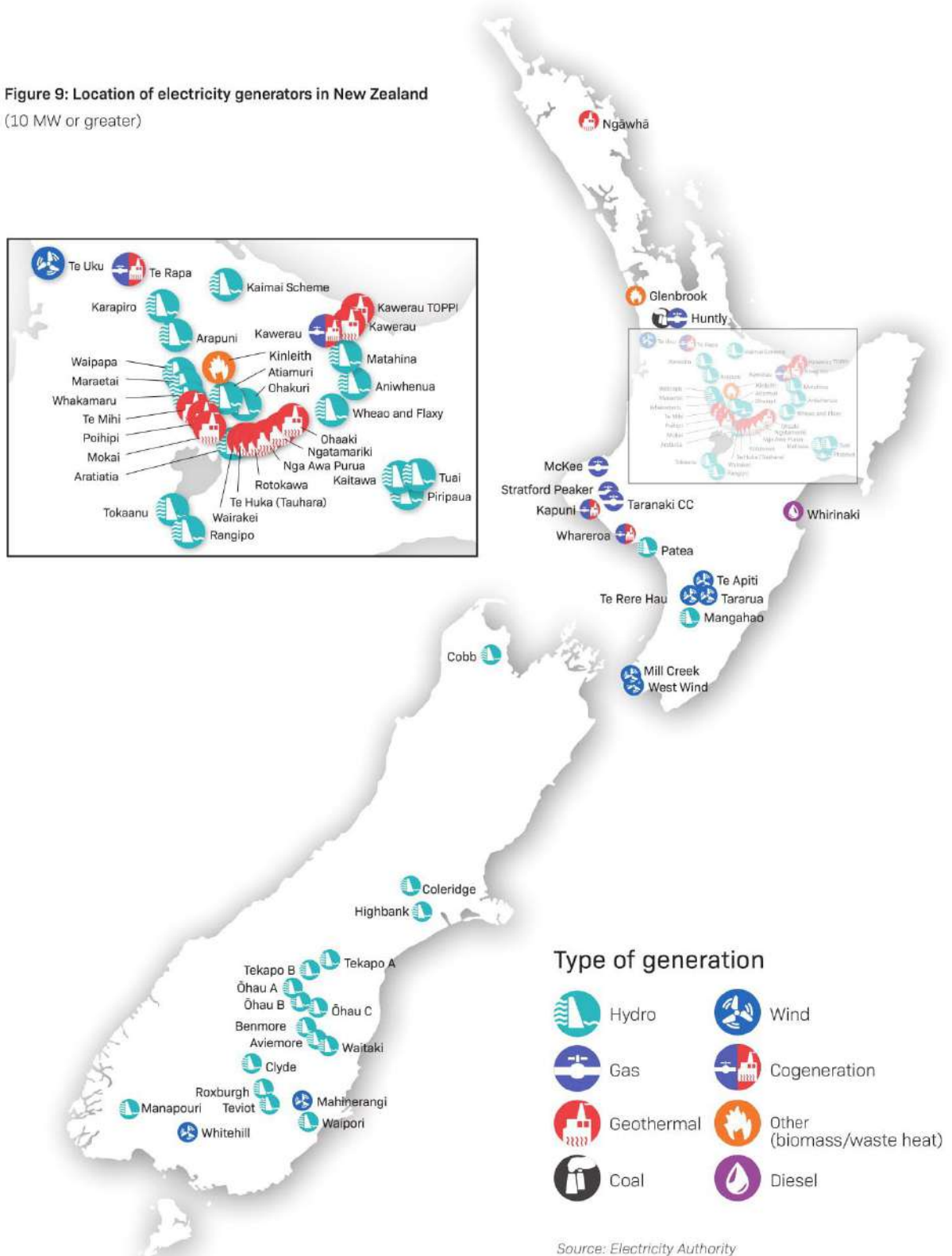
Key

●	Substation
—	400 kV AC
—	350 kV HVDC
—	220 kV AC
—	110 kV AC
—	50/66 kV AC



Appendix 2: Location of electricity generators in New Zealand

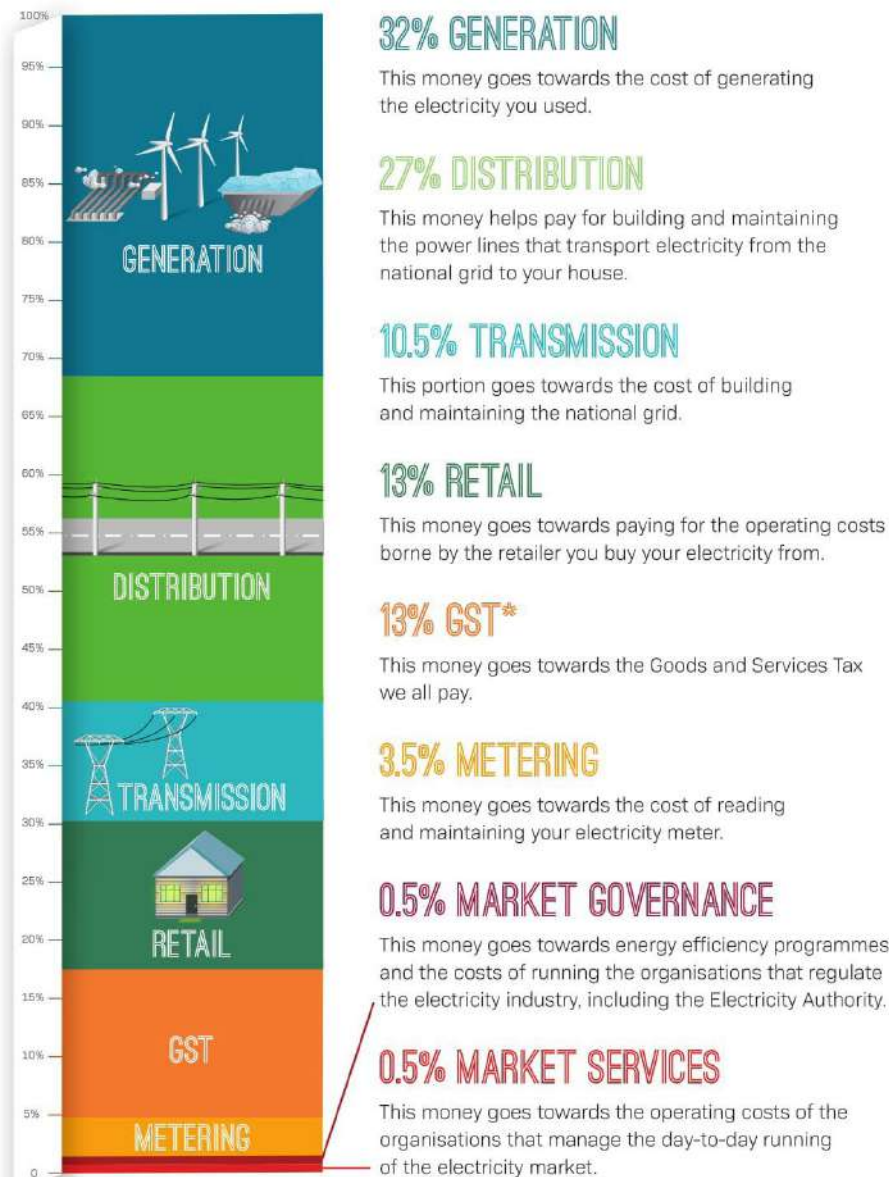
Figure 9: Location of electricity generators in New Zealand (10 MW or greater)



Source: Electricity Authority

Appendix 3: What does your power bill pay for?

WHAT DOES YOUR POWER BILL PAY FOR?



NB: This is based on an average bill. These proportions may vary from year to year.

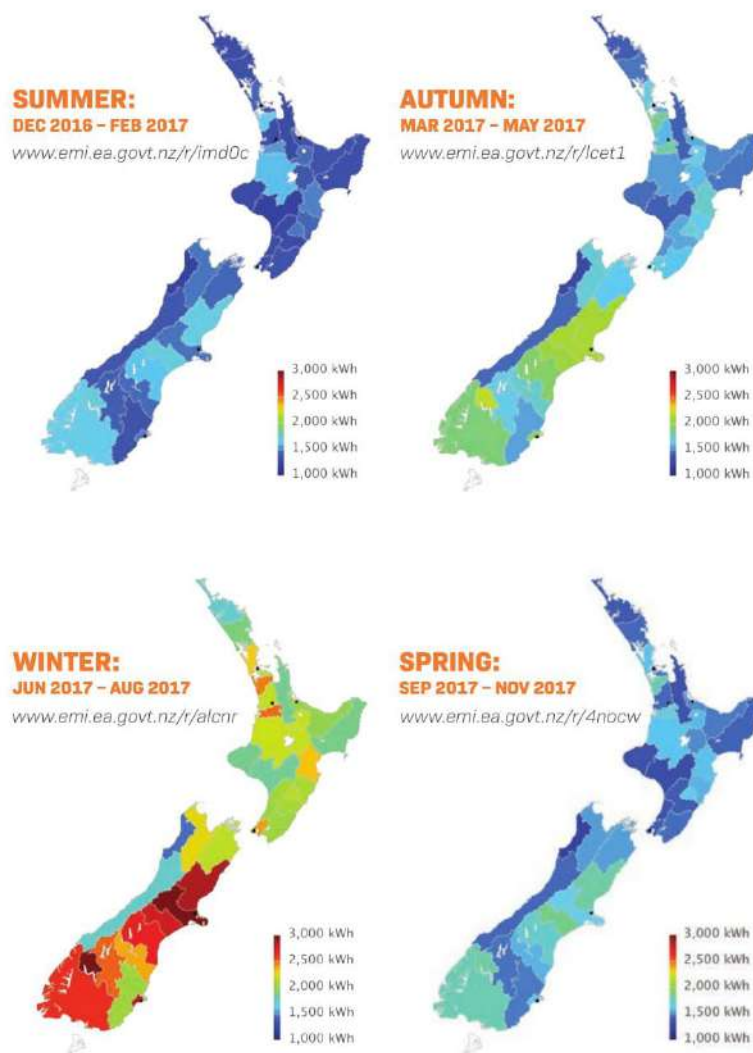
**GST is 15% of the pre-GST cost and therefore 13% of the GST-inclusive amount.*

www.ea.govt.nz/consumers/my-electricity-bill

Source: Electricity Authority

Appendix 4: Residential consumption by season

Figure 1: Residential consumption by season



Appendix 5: Consolidated statement of comprehensive income for the year ended 30 June 2018

NZ WINDFARMS LIMITED
 CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME
 FOR THE YEAR ENDED 30 JUNE 2018

	Notes	2018 \$000's	2017 \$000's
Income			
Electricity sales		7,165	5,981
Gain on realised energy futures derivatives	12	346	-
Gain on unrealised energy futures derivatives	12	104	-
Land lease		27	-
Other income		40	97
Total income (excluding interest income)		7,682	6,078
Operating expenses			
Administration		282	359
Audit fees	3	50	50
Directors' fees	16	179	146
Employment expenses		1,155	1,888
Payments to defined contribution plan		29	-
Share option expenses	9	139	-
Insurance		126	107
Lease and rental expenses	20	267	902
Legal and consulting expenses		228	387
Te Rere Hau wind farm operational expenses		1,088	1,758
Other operating expenses		186	201
Total operating expenses		3,729	5,798
Profit before interest, impairment, amortisation, depreciation and tax		3,953	280
Interest income		200	296
Interest expense		(795)	(944)
Profit (Loss) before impairment, amortisation, depreciation and tax		3,358	(368)
Impairment reversal of Te Rere Hau wind farm	15	-	(3,781)
Depreciation	4	2,226	2,016
Loss on disposal of property, plant and equipment		42	219
Amortisation	5	274	268
(Gain)/Loss on derecognition of finance lease		36	-
Profit (Loss) before tax		780	910
Income tax expense (benefit)	1	15,527	261
Total comprehensive (loss)/income		(14,747)	649
Basic and diluted earnings (loss) per share	10	(\$0.051)	\$0.002

Profit (Loss) after tax for the year is equal to the total comprehensive income (loss) for the year attributable to equity holders of the Parent.

Appendix 6: Consolidated balance sheet as at 30 June 2018

NZ WINDFARMS LIMITED
 CONSOLIDATED BALANCE SHEET
 AS AT 30 JUNE 2018

	Notes	2018 \$000's	2017 \$000's
Assets			
Current assets			
Cash and cash equivalents	14	2,337	1,291
Term deposit		-	6,500
Trade and other receivables	2	854	1,005
Derivative asset		104	-
Inventories		1,174	1,244
Total current assets		4,469	10,040
Non-current assets			
Property, plant and equipment	4	44,615	38,117
Intangible assets	5	3,966	3,535
Convertible notes	17	11	11
Deferred tax	7	3,661	19,188
Total non-current assets		52,253	60,851
Total assets		56,722	70,891
Liabilities			
Current liabilities			
Trade and other payables	8	872	813
Current portion of finance lease	19	-	514
Current portion of term loan	21	946	-
Total current liabilities		1,818	1,327
Non-current liabilities			
Finance lease	19	-	8,372
Term Loan	21	10,769	-
Total non-current liabilities		10,769	8,372
Equity			
Share capital	9	107,005	107,005
Share option reserve	9	139	-
Retained (loss)/earnings		(63,009)	(45,813)
Total equity		44,135	61,192
Total equity and liabilities		56,722	70,891
Net tangible assets per share	10	\$0.13	\$0.13

Appendix 7: Consolidated cash flow statement for the year ended 30 June 2018

NZ WINDFARMS LIMITED
CONSOLIDATED CASH FLOW STATEMENT
FOR THE YEAR ENDED 30 JUNE 2018

	Notes	2018 \$000's	2017 \$000's
Operating activities			
Cash was received from:			
Trading revenue		7,293	5,738
Derivative income		250	-
Other income		112	53
Interest received		307	282
		7,962	6,073
Cash was applied to:			
Interest paid		763	945
Payments to suppliers and employees		3,530	5,953
		4,293	6,898
Net cash inflow (outflow) from operating activities	11	3,669	(825)
Investing activities			
Cash was provided from:			
Sale of property, plant and equipment		-	11
Release of restricted short term deposit		6,500	-
Cash was applied to:			
Investment in Term Deposit		-	(1,500)
Purchase of intangible assets		705	-
Purchase of property, plant and equipment		8,758	1,530
		9,463	30
Net cash inflow (outflow) from investing activities		(2,963)	(19)
Financing activities			
Cash was provided from:			
Drawdown of BNZ borrowings		12,300	-
		12,300	-
Cash was applied to:			
Dividend paid		2,449	-
Repayment of finance lease		8,926	471
Repayment of BNZ borrowings		585	-
		11,960	471
Net cash inflow (outflow) from financing activities		340	(471)
Net increase/(decrease) in cash and cash equivalents		1,046	(1,315)
Cash and cash equivalents, beginning of year		1,291	2,606
Cash and cash equivalents, end of year		2,337	1,291
Cash and cash equivalents			
Bank account and on call deposits	14	2,337	1,291
Ending cash and cash equivalents		2,337	1,291



CHAMPIONS TROPHY
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