# Submission Electricity Authority / Te Mana Hiko:
# Working together to meet the needs of New Zealanders.

**Introduction**

This submission focusses on low cost and ultra-high reliability as the two prime targets for electricity for all New Zealanders, both domestic and industrial.

**Reliability is key for several reasons:**

**Critical to life and health**: medical equipment both domestic and in medical / retirement / nursing facilities require ultra reliable electricity, as lives are at risk. Communications are another area where lives can be at risk, if they fail and therefore ultra reliable electricity is key to the safety of all of us.

**Significant cost and risk**: industry requires reliable power to keep working, in particular critical processes that would be disrupted if power fails, usually resulting in high cost to the business and subsequently the consumers but also the risk of damage to people and equipment.

**Cost to business**: hospitality and retail generally have a lower risk profile than industry however they do also require reliable power to keep the lights on, payment systems/heating/cooling/freezing/cooking etc. going. Disruption can range from a minor inconvenience to quite costly.

**Households**: apart from critical medical equipment in some people's homes, reliability of electricity still needs to be high, to limit disruption of people's lives, even if blackouts generally only result in inconvenience and disruption of daily lives.

**Cost, more than just money:**

Wealth of a country is always directly linked to abundant and cheap energy. New Zealand has long enjoyed this incredibly valuable economic driver and benefited massively from it. Unfortunately, this is no longer the case and unless we rapidly develop cheap new renewable electricity generation, we will see a serious economic impact with significant knock-on effects continuing for the longer term economic development.

Firmed renewable electricity is the cheapest form of electricity in virtually every country in the world and in particular in New Zealand, as decades of hydropower and geothermal have proven. In the past decades solar PV and wind, with appropriate firming have joined this low cost electricity generation.

Hydrocarbon based thermal generation is currently significantly more expensive than renewables and has been for a long time and there is no credible path to cheaper hydrocarbon thermal generation anymore. And this doesn't factor in the significant cost to the health of the population (cost of health care and reduced productivity) and climate change impact.

Nuclear energy done right may not have the health and environmental impact of hydrocarbon generation, but it will still be an expensive form of electricity generation.

With renewable electricity generation we have the opportunity to access electricity at zero marginal cost, in fact it is one of the features of an ultra-reliable firmed generation system, which requires a built-in

additional capacity that, at times, can generate significantly more electricity than what's needed and use that to increase economic productivity, for example in greenhouses, keeping the grow lights on for longer.

Aotearoa / New Zealand still maintains an aura of green, environmentally friendly, country that attracts tourism. Unfortunately, we're quite far behind the rest of the world when it comes to decarbonisation, and that is going to become more obvious to visiting tourists when they see very few EVs on the road, and very few solar panels on roofs and very few wind farms around the country. Eventually this could damage our green clean image and reduce (eco-) tourism as a result but also affect international trade.

**Renewable electricity cost and reliability advantages**

Fortunately, low cost and high reliability is where renewable electricity generation can excel far more than hydrocarbon or nuclear thermal generation.

By its nature wind and in particular solar PV can generate their electricity at or very close to the sites where it is needed, reducing the reliance on grid connections significantly. And where this localised generation is supported by home and EV batteries, it becomes the resilient supply that we need.

Imagine a hospital car park where all EVs of employees and visitors are plugged in when the grid goes down, within milliseconds the EVs will be powering the hospital without even an observable light flicker. And when the grid is operational, all those EVs are being charged with the "excess" daytime solar generation.

**What is the best path forward**

In renewable electricity generation there is not one single champion as all forms of renewable energy generation have a place in the new system. Each location has a unique mix of resources and the most cost effective way to generate electricity will be a mix of the most applicable one to utilise this unique mix of resources.

Enabling all forms of renewable energy generation is critical to allow for the fastest and most efficient / cost effective transition to a fully renewable system.

Part of enabling renewable energy is creating a system that pays even the smallest generators (like a homeowner with rooftop solar or renter with their V2G EV for example) a fair price for the electricity they sell to the grid, something the current system most certainly does not allow for.

Enabling small local generation and distribution without the heavy hand of regulation that is currently preventing such cost effective and resilient cooperative approach that allows communities to access low cost and high reliability electricity.

Enabling small remote businesses to develop their own small scale renewable generation for their business unlocking significant economic potential.

Key to a resilient, reliable and cheap new electricity system is utilizing its strengths, which is distributed generation and local firming where possible and utilize our existing grid and large renewable generation assets for the larger users, while the hydro lakes become our main firming asset.

Planning for what such a grid looks like is incredibly complex and requires dedicated modelling software and expertise to develop the most cost-effective path forward.

It is important to make the clear distinction between the grid and the system. The grid is just another part of a much bigger system, where generation and usage will increase without using the grid. It is the system that we need to change to enable low cost and highly reliable electricity generation, the grid will be a significant part of it, but the grid may not have to change too much, if we tap into the key feature of renewable electricity generation, its distributed nature.

The transition to a fully renewable energy system is inevitable as it is a much better value proposition. The sooner we transition, the sooner we have the wide array of benefits from this system. Delaying the transition has already cost us a lot and will cost us a lot more.

**Explanations related to this document:**

EV: Electric Vehicle, in the context of this document a Battery Electric Vehicle (BEV) or a Plug-In Hybrid Electric Vehicle (PHEV) capable of V2L, V2G, V2H or V2X power supply (through a suitable charger).

V2L: Vehicle to Load, the electric vehicle can power small appliances, generally up to 2 or 3 kW, sometimes more.

V2G: Vehicle to Grid, the electric vehicle can provide power to the grid if called upon by grid communication and allowed by the vehicle owner/operator.

V2H: Vehicle to Home, the electric vehicle can power a home/house/small building but not power the grid, similar to the way a home battery can power a home.

V2X: Covers all from of “vehicle to ….” power supply. This also includes vehicle to vehicle charging.

PV: Photovoltaic, as solar panels that turn light directly into electricity.