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Thank you for the opportunity to submit on MBIE's Energy Transition Strategy.

About GoEco

GoEco (Waikato Environment Centre Trust) aims to be a voice for the environment, a centre for learning and a catalyst for change. We provide community education, collaborate with and support environmental groups and projects, provide inspiration for living lighter and advocate on behalf of the environment.

Why we are submitting on this Strategy

Energy generation and use has an impact on New Zealand's Greenhouse Gas (GHG) emissions. Generating energy from fossil fuel and using fossil fuelled transport produces C02 and other gases which affect planetary temperature regulation and climatic systems. Research indicates that the annual rate of increase of GHG emissions globally is still accelerating (1). The consequence of rising emissions is an increase in global temperatures. Given our historical and current emissions globally, according to Dr Rod Carr from the Climate Commission it is understood that globally we are on a pathway of warming in the vicinity of 2.4-2.8 degrees above pre-industrial levels (2). As well as significant effects of increased temperature on human wellbeing, potentially severe stress on biological ecosystems, there is accelerated ocean warming with subsequent ice loss, resulting in sea level rise. Recent events are indicating that we are already temporarily breaching the 1.5 degree limit (3).

As well as in the Arctic, but also increasingly in the Antarctic, melting is happening much faster than anticipated, especially with regard to recent discoveries on the West Antarctic Ice Sheet where "results suggest that mitigation of greenhouse gases now has limited power to prevent ocean warming that could lead to the collapse of the West Antarctic Ice Sheet." (4). The effects of melt water from the West Antarctic Ice Sheet (WAIS) glaciers is such that it is possible to have up to 5.3m of sea level rise affecting coastal and low lying cities and communities (5).

The challenges we are facing are unprecedented. All human systems are contributing in some way to the climate crisis. Given the complexity and connectedness of the systems we have created, achieving all of the desired outcomes is challenging. We need to accelerate our response and ensure that we are focusing on specific wellbeing outcomes.

Accordingly GoEco advocates and supports increased effort to:

a)Reduce fossil fuel consumption to lower GHG emissions

b) Place increased emphasis on increasing energy efficiency and lowering energy demand

c) Transition to alternate forms of energy and the development of offshore renewable energy for Aotearoa New Zealand.

d) Place increased emphasis on an <u>affordable, equitable and just transition</u>.

We would like to point out that New Zealand has already endured a 35% increase in the cost of electricity in the last 20 years (6)

It is uncertain that moving to alternate energy is going to be cheaper or more equitable for New Zealand consumers. If anything judging by new interest by foreign companies in large scale infrastructure (Eg offshore wind) a lot of money would likely be transferred offshore in profits from such projects possibly at higher costs to the consumer.

This submission focuses on the following three consultation documents:

1)The Gas Plan Issues Paper.

2) Measures for Transition to An Expanded and Highly Renewable Electricity System.

3) The Interim Hydrogen Roadmap.

The Gas Plan paper

We need an accelerated plan to move away from gas given the current events being observed in natural systems Eg Arctic and Antarctic ice melting. Industry has to be supported for such a shift. We do have alternatives available but we need to be very careful as some proposed alternatives come with disadvantages.

Similarly to those points mentioned above we believe the primary tools for reducing gas demand emissions are:

a) a larger shift to using electricity
b) larger focus on increasing efficiency
c) Only using hydrogen as a backstop in a limited range of applications

Lowering demand and increasing efficiency must be the primary focus. Although the government supports programmes like Warmer Kiwi Homes and the work underway as part of the Government's Building for Climate Change Programme, more can be done to address energy efficiency across the board. Reducing the need for energy needs to be our highest priority.

Increased energy efficiency is cheaper than growing future demand for more green hydrogen and trying to match the expected demand with infrastructure investment year on year.

Hydrogen production is a very inefficient use of electricity Eg with transport you use electricity to make hydrogen, only then to convert hydrogen back into electricity to be used in a fuel cell in a vehicle. The storage of hydrogen is very energy intensive and technically complex as you have to compress the gas to a liquid, maintaining it in storage at minus 253 degrees with 'boil off' losses daily. The costs of all this new hydrogen infrastructure will place a greater debt and expense loading on business and consumers. Using and expanding our existing electrical infrastructure is a more efficient process. Green hydrogen has a very low energy return on energy investment Eg Green hydrogen from solar has an EROI of 0.97 meaning it is

unsustainable (7). Green hydrogen from wind is likely to have a lower EROI owing to the larger energy uses in turbine construction and maintenance requirements and the intermittent nature of wind.

Efficiency gains have lots of potential over the longer term but require upfront investment Eg Warmer Kiwi homes program.

Solar hot water and solar PV have much larger roles to play in our economy and are far more efficient in providing energy directly for onsite applications.

Biogas has opportunities Eg waste water plants can generate electricity. Biogas can be used as a transition fuel as it still generates GHG emissions when burnt.

Innovative Solar arrays Eg deployment of floating solar arrays water bodies where appropriate

The majority of household gas used is to heat water. Solar hot water systems and electric hot water heat pump systems are already in use in New Zealand and are an excellent solution that will reduce the long-term cost for the consumer, and reduce peak energy demands on the grid. This solution can help reduce energy hardship for our communities.

Measures for transition to an expanded and highly renewable electricity system

Offshore wind development does need regulation. There will be unique problems that this development creates that will need to be mitigated Eg Installation of single pole piles for wind turbines involves hammering the piles into the seabed creating significant noise for marine organisms.

Boost solar water and PV installations - there is significant roof resource available to expand solar deployment. Similarly there are opportunities with floating solar on water bodies where appropriate.

Provide support for the development of the solar industry. There needs to be investment in the training industry to assist the development of the sector Eg Solar installer training at Polytech and solar engineering at University.

Subsidies for the installation of solar PV on homes should be offered to lower the payback time Eg Australia has a 3-4 year payback time versus New Zealand at approximately 8 years.

Investment in community energy projects Eg solar is a potential gamechanger here. Community energy has the advantages as energy is produced locally fostering community spirit and engagement, and creating community resilience and can assist in emergencies where other energy sources could be cut off. Communities can also choose to focus on supporting those in energy poverty with lower margins for their energy costs.

However there are significant barriers - these community projects require significant engineering and project management expertise which may not be available locally - possible Governemt support here would be a good idea.

Central government must put more emphasis than the current Emission Reduction Plan on how New Zealand moves away from car dependence and supports other more efficient modes of transport such as public transport and walking and cycling. Although the plan promises a reduction in Vehicle Kilometers Travelled, once population growth is accounted for there is no real reduction at all. We need much more aspirational targets and assertive action to reduce car travel in New Zealand.

Invest in public education regarding the benefits of public transport in improving fuel efficiency and lowering emissions. The NZ Government has begun a process to assist regional councils with the purchase of electric buses - however more investment is required to get the public to realise the benefits of using the electric buses once we have them in use. Various efforts by diverse regional councils in terms of advertising to encourage public transport patronage has failed to achieve the desired outcome.

EV's will not completely help with issues of congestion and equality, maintaining and expanding incentives for choosing zero emissions vehicles will still help with their adoption. Retain the Clean Car discount will help continued adoption. The real challenge comes when you get to the group of people that would not be normally able to afford to buy a new car - they are relegated to the second hand market. This also means that those on lower incomes are going to be left with a relatively greater cost in owning an EV as they are at risk of experiencing faster degradation of the battery and have a shorter benefit in terms of EV battery life. Also those on lower incomes will have to manage the recycling of a dead EV.

We need incentives for EV manufacturers to standardise their EV battery design - each brand/model is currently unique and not interchangeable. Imagine if it were possible to swap batteries for your EV to get a fully charged one in approximately 10 minutes. There is currently no incentive for manufacturers to do this.

Invest in the battery refurbishment and recycling industry. There is currently only a volunteer group with individual members who are needing help with battery refurbishment. A voluntary group is not enough for this critical part of the EV and RE economy.

Increasing home energy efficiency incentives by implementing higher building code standards to prevent heat loss Eg Increase the minimum building and home wall insulation 'R' value to maxmise thermal mass and energy retention. Just increasing the 'R' value for ceiling and floor insulation means heat will increasingly want to escape out of the sides of a building at the weakest insulation point Eg windows

Requiring energy efficient curtains to reduce home heat loss in tenanted properties. There is currently no legal requirement for curtains in a tenanted property. Make subsidies for energy efficient curtains available.

Make hot water cylinder design achieve a new higher insulation standard. All older hot water cylinders need to be wrapped and insulated.

How do we ensure sufficient investment in new renewable generation to expand our electricity system for electrification and to replace retiring fossil fuel generation?

Encourage New Zealanders to invest in their own country's renewable energy development via personal savings and investments. Government can issue financial tools for people to invest in.

This sector would be worthy of more investment from the NZ Superannuation Fund - Kiwi's investing in their own future wellbeing here in New Zealand.

Channel royalties from fuel, oil and gas companies specifically into renewables and renewable energy projects, not a general Government money pool.

How do we ensure adequate dispatchable generation capacity, storage or demand side response as fossil fuel plants retire and intermittent capacity grows including ensuring sufficient capacity for peaking, calm, cloudy periods, and managing the 'dry year' challenge (ahead of any NZ battery project solution)?

The best investment is a larger national campaign or drive to raise awareness about energy efficiency and lower peak demand in both residential and commercial sectors. During the heights of covid-19 lockdown there was on average an 8% reduction in emissions globally from lower levels of consumption. Whilst commendable during Covid-19, this rate of emissions reduction needs to be sustained and accumulated year after year, after year…after year, to reach our 1.5 degree climate goals.

Increasing use of geothermal energy is another option with lower emissions.

Local thermal storage projects have huge potential for heating homes Eg large scale sand batteries or brick thermal mass batteries to heat hot water and use it for distributed use

Smart technology has a lot of potential in energy savings at both the residential and commercial cleveland in the grid itself.

How do I ensure competitive markets during transition to a more highly renewable electricity system?

How can someone find out what the cheapest electricity is from the most renewable resources? One option is to assist in modifying the PowerSwitch website to include a renewable energy component in its calculations ie currently most calculations are done on price.

Allowing those with renewable energy generation eg solar on their roof, community energy projects to be able to sell the electricity on an online platform app to anyone.

Are there barriers for smaller power companies to being able to be listed on the PowerSwitch website? Why is Nau Mai Ra not listed on the PowerSwitch website?

Government can subsidise energy companies that also offer community outcomes as part of their operations Eg Nau Mai Ra.

With increasing energy poverty in New Zealand, investment in community energy solutions has more win-win outcomes for a wide range of customers. Profit is not always about price - wellbeing is 'profit' too.

Careful consideration is required as to whether the existing market model is in the best interests of New Zealand and the transition to a low carbon future. There is clear evidence of electricity pricing that is far above the cost of long-term generation suggesting that the current model does not allow participants to adequately manage risk.

The current market mechanisms need review to ensure that resilience and continuity of supply has a centralised function with this cost being shared across all.

How do we grow and enhance transmission and distribution networks at a sufficient pace to meet our needs for demand growth and new renewable generation in a timely way?

We need to pivot more into community energy projects - pumping electrons from one end of the country to the other results in large energy losses over distance and requires huge capital investment. Community Energy projects have great advantages in that energy can be used locally, offsetting the need for large distribution networks,

Some of the mechanisms in the current proposed transition are driving, rather than negating increased energy demand to the benefit of the current energy industry and supporting industry to continue practices that degrade our soil, water, and human health, whilst putting the cost of this on the consumer. For example, a significant expansion of green hydrogen will allow the continued production of synthetic fertilisers which supports the unsustainable side of the dairy industry.

Although the current energy transition plan is a step in the right direction, it is not transformational enough, with little consideration of the need to reduce our energy demands. It is not firmly prioritising the levers and technology we already have that would see the most reductions in the shortest possible timeframe.

Do you agree that hydrogen has the most potential for New Zealand in decarbonising hard to-abate applications such as chemicals, fertiliser and heavy transport (including aviation and marine)?

We do not support the option of green hydrogen for the roading sector or aviation - we already have two existing sustainable solutions for moving heavy goods, rail and coastal shipping which are much more energy efficient. Potentially using green hydrogen for powering coastal shipping and reducing international shipping is preferable as floating on water is more efficient to move goods than via aviation. Using electricity for rail is much more energy efficient than green hydrogen. We need to develop a more diversified circular economy here in New Zealand and reduce our reliance on overseas imported goods with a higher energy and resource footprint.

Hydrogen needs an entirely new infrastructure system to be set up and has large energy losses firstly in the supply chain, but also in the vehicles themselves as fuel cells lose 77% of the energy as heat. Hydrogen vehicles also lose 1% of their fuel daily

owing to boil off from the tank. This compares with 69% of the energy from electricity in an EV being available at the wheel (8).

Capital costs for hydrogen vehicles are higher than electric vehicles.

In order to lower emissions we recommend more investment focus on electrified rail. The modal shift from road to rail afforded by the Ruakura Inland Port will remove an estimated 65,000 long-haul truck journeys per year when the port is at operating capacity, by 2050. Carbon emissions are estimated to reduce by 600 tonnes per year. Many European countries have made significant investment in to their rail systems to reduce emissions. Electrification of the rail network will assist in lowering emissions further.

Green hydrogen is reliant on renewable energy and will potentially increase our renewable electricity demand in excess of the Climate Change Commission's Demonstration Path forecasts by 22 percent in 2035 and 48 percent in 2050.

Green hydrogen demand is also likely to put pressure on electricity prices. There is a risk that green hydrogen is viewed as being the 'convenient' fix to our problems, yet it will be competing with electricity production and fresh water (see below) for other uses.

Transporting energy as a liquid has historically resulted in the highest energy costs and charges in New Zealand. Currently liquid LPG in bottles is one of the most expensive forms of energy. You have to compress a gas to a liquid, purchase a certified and tested bottle to put it in, load the bottle on a truck, drive the truck to its destination and then unload the bottle with all of the wages, depreciation and maintenance that goes with the process. Using hydrogen is the same process with much more demanding bottle or tank requirements and systems as you have to maintain the liquid at 700 bar and minus 253 degrees and a whole new distribution system to handle it.

Green hydrogen production also needs to use purified water - for every one litre of hydrogen, you need 9 litres of purified water with additional processes for water purification raising this to some 20-30 litres per kg which is on a par with other hydrogen generation processes (9).

In terms of fertiliser production we do not support using green hydrogen for chemical fertiliser production, rather more emphasis needs to be placed on regenerative agricultural practices and reduced nutrient loading on our waterways.

Developing a regulatory framework for offshore renewable energy

We support development of offshore wind energy - it has potential to be a larger part of New Zealand's energy generation mix. We have large offshore wind resources.

We support the design of a complementary permitting system alongside the consenting process for construction, operation and generating energy, and also deconstruction from offshore energy systems.

Environmental effects of building wind turbines in marine ecosystems must be given high regard, including but not limited to the effects of sound and noise generation from establishment Eg pile driving metal cylinders into the sea bed for turbine supports will result in significant noise

generation underwater affecting all marine organisms. Floating support structures generally have smaller footprints and relatively little sound impact for marine life.

We also need a national framework for guidelines for decisions with offshore wind resource development and use. Central government must work closely to protect and identify the rights and interests of iwi or hapuu. Any regulatory regime must also enable Maaori participation and give effect to the principles of Te Tiriti o Waitangi and ensure early engagement at the pre-feasibility stage.

Similarly Maaori should be offered training options for future employment opportunities in the sector as well as potential opportunities for investment Eg shareholder or social enterprise opportunities.

References:

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(4) Naughten, K.A., Holland, P.R. & De Rydt, J. Unavoidable future increase in West Antarctic ice-shelf melting over the twenty-first century. *Nat. Clim. Chang.* (2023). https://doi.org/10.1038/s41558-023-01818-x

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(9) (https://rmi.org/hydrogen-reality-check-distilling-green-hydrogens-water-consumption)