Submission on *Measures for Transition to an Expanded and Highly Renewable Electricity System*

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Responses to questions

Part 1: Growing Renewable Generation

1. Are any extra measures needed to support new renewable generation during the transition?

Please keep in mind existing investment incentives through the energy-only market and the ETS, and also available risk management products. Any new measures should add to (and not undermine or distort) investment that could occur without the measures.

The current structure of the electricity sector does not support the widespread adoption of rooftop solar. The gentailer oligopoly (5 generator-retailers generate around 88% of our supply) may invest in large-scale solar or wind farms once rising demand ensures that energy prices and their profits are stable or growing. Other countries have achieved significant contribution to the overall energy supply by incentivising rooftop solar and by simplifying the regulatory framework for implementing rooftop solar and/or for allowing for community controlled microgrids that are based on renewables.

2. If you think extra measures are needed to support renewable generation, which ones should the government prioritise developing and where and when should they be used? What are the issues and risks that should be considered in relation to such measures?

When Government speaks of new renewable generation it mainly refers to offshore wind farms or large scale PV solar facilities that feed into the grid. There seems to be lack of appreciation that other countries have achieved a significant contribution to their electricity generation from rooftop solar. Ideally electricity is consumed where it is generated to avoid costly transmission and the associated losses. PV solar is a disruptive technology because it scales down i.e. electricity generation becomes possible for individual households. As battery storage becomes more efficient and like PV panels and small scale inverters more affordable the combination of PV solar and battery storage may allow many households to reduce their grid dependency. To achieve the 2030 and 2050 targets (decarbonisation of current electricity generation and a min increase to 73Twh total generation) Government should incentivise rooftop solar. There are many examples from other countries where rooftop solar subsidies have worked exceptionally well in accelerating the energy transition.

The sector must prioritise building domestic and local industry renewable electricity supply ahead of developing a green hydrogen export industry, i.e. co-ordinating the building of renewables rather than leaving it up to individual gentailers to build wind and solar generation for green hydrogen exports for private companies, competing for materials and labour force for building domestic supply.

There are Government directives needed to ensure that roofs of houses, public and industrial buildings are used for renewable generation before any large-scale facilities are constructed on productive agricultural land (agrivoltaics excluded).

The future mix of renewables (up to 2050) may include additional generation based on geothermal, biomass and biogas, hydro, co-generation from landfills and from other more innovatory sources like wave action or tidal generation. The main contribution will come from solar and wind. Just because a source is deemed to be renewable should not distract from the fact that any additional generation will have an impact on the environment. Government's benchmark for evaluating projects for new sustainable generation should be the environmental footprint.

3. If you don't think further measures are needed now to support new renewable generation, are there any situations which might change your mind? When and why might this be?

Malcolm Johns (CEO of Genesis Energy) said recently during a panel discussion that everybody

	is talking about the supply side and nobody about the demand side. In his view the NZ electricity sector would react timely and appropriately to any demand increases (provides electricity prices and profit margins are stable or increase). This is not a surprising statement from a CEO of a private company, which purpose for being is to generate value for shareholders. Electricity is infrastructure and typical market mechanism don't work for infrastructure that delivers essential goods and services. Both industry and households are increasingly dependent on electricity. Heating, refrigeration/cooling, cooking, lighting, transport, communication all need electricity with no option of a substitute. In economic speak, the demand curve is inelastic - captive consumers. It would be absurd for a democratically elected Government that is obligated to ensure the wellbeing of its people to subsidies a profit oriented oligopoly. Any encouragement to transition the electricity generation to renewables either in form of subsidies or regulatory measures should go directly to consumer-generators.
4.	Do you think measures could be needed to support new firming/dispatchable capacity (resources reliably available when called on to generate)? If yes, which kind of measures? What needs do you think those measures could meet and why?
	Renewables are intermittent and we see projects for large-scale BESS here and overseas. Inverter technology reacts fundamentally different to turbines (inertia) and therefore more power conditioning is required with grid-scale capacitors and synchronous condensers when new renewables feed into the grid. This is still part of the 'old' technology which the current electricity sector is equipped to handle well. With the electrification of transport there is a huge potential to tap into the electricity store of vehicle batteries. Vehicle to grid (V2G) technology is fully developed, we would need regulatory or encouragement measures to allow for a nationwide standard for vehicle charging so that demand response via V2G becomes a reality.
5.	Are any measures needed to support storage (such as battery energy storage systems or BESS) during the transition? If yes, what types of measures do you think should be considered and why?
	BESS will be an important factor for community based energy generation. Microgrids operated by and for a community will often require BESS and the Government should support such facilities if operated by not-for-profit community organisations.
6.	If you answered yes to question 4 or 5 above, should the support be limited to renewable generation and renewable storage technologies only or made available across a range of other technologies? Keep in mind that fossil fuels are generally the cheapest option for firming, though this may change over time as renewable options (particularly batteries) become more efficient and affordable.
	Is this a trick question? Energy transition away from fossil fuels has nothing to do with the price of fossil fuels but with their associated GHG emissions. We have a GHG budget within which we have to operate irrespective the relative price between fossil fuels and renewables. What does carbon zero mean if we build new fossil fuel capacity (eg CCGTs) which in all likelihood will have a life span past 2050?
7.	If you answered yes to question 6 above, what are the issues and risks with this approach? How could these risks and issues be addressed?
	BESS and V2G may be insufficient without implementing demand management elements of the long touted smart grid. Smart load shedding may leave household and industry with

	essential circuits operating. Smart, staged power rationing makes a lot more sense than allowing unrestricted power consumption until the grid collapses. Again this should not be implemented via electricity pricing - for instance exposing consumers to tariffs linked to spot pricing. Equitable access to electricity requires regulatory measures.
8.	Are any measure(s) needed to support existing or new fossil gas fired peaking generation, so as to help keep consumer prices affordable and support new renewable investment?
	It is clear (see my answer under 6) that all fossil fuel generation has to be phased out asap and that no new fossil fuel generation - including CCGTs/OCGTs - should be built. The state sanctioned electricity oligopoly will use whatever justification it sees fit to increase electricity prices. To make electricity more affordable the Government needs to support rooftop solar and community owned/operated energy schemes.
9.	If you answered yes to question 8 above, what measures should be considered and why? What are the possible risks and issues with these measures?
	Given that is probably very difficult to re-nationalise the NZ electricity sector any Government measures that aim to expedite the transition to renewables should be targeted at consumer-generators. This will take market share away from the oligopoly and will - in tendency - lead to falling prices for grid electricity. Since the Government has significant shareholdings in the electricity sector falling revenue from dividends will be a risk.
10.	If you answered yes to question 8 above, what rules would be needed so that fossil gas generation remains in the electricity market only as long as needed for the transition, as part of phase down of fossil gas?
	Clearly a ban is needed to stop all new fossil fuel generation.
11.	Are there any issues or potential issues relating to gas supply availability during electricity system transition that you would like to comment on?
	No
12.	Do you agree that specific measures could be needed to support the managed phasedown of existing fossil fuel plants, for security of supply during the transition?
	A managed phasedown implies that security of supply must be a consideration otherwise it wouldn't be 'managed'. Has the Government lost trust that the privatised electricity sector would, without Government interference, give security of supply appropriate consideration? Apparently the gentailers 'sit' on consents for many GW of renewable generation - some for more than 10 years - without showing any inclination to build and commission these facilities. The threat of supply shortages when coal burning Huntly is decommissioned might be a ploy to keep Huntly going as long as possible as this is the most costly generation to which spot prices and profitability of gentailers are linked. I believe it is not a simple matter for the Government to interfere with the area of responsibility of the Electricity Authority and the Code. Encouraging massive investment in rooftop solar might be on many levels the best option to avoid supply shortages.
13.	If you answered yes to question 12 above, what measures do you think could be appropriate and why? What conditions do think you should be placed on plant operation? For example, do you have any views on whether there should be a minimum notice period for reductions in plant capacity, and/or for placing older fossil fuel plant in a strategic reserve?
	Yes, of course there should be a minimum notice period. However, I believe this might be legally not so simple. Does central Government issue licenses to operate (fossil fuel) power stations and does it have discretionary control to request capacity reduction or placing older

	fossil fuel plants in a strategic reserve? What is the strategic reserve for and who will bear the cost of mothballing and maintaining the capacity to become operational (specialist staff retention). How will monitoring and compliance enforcement take place? Question 13 seems to imply that Government has full control/command over generation facilities. Does this mean that Government is prepared to roll back or partially roll back the so called Bradford reforms?
14.	If you answered yes to question 12 above, what are the issues and risks with these measures and how do you think these could be addressed?
	Encouraging massive investment in rooftop solar, removing regulatory hurdles to rooftop solar and to community owned and operated microgrids.
15.	What types of commercial arrangements for demand response are you aware of that are working well to support industrial demand response?
	Typically an industrial consumer and a gentailer agree on a reduced electricity price (or compensation for loss of profit) in case the generator can request a demand response i.e a reduction in consumption. The condition of when such a request can be issued by the generator may be linked to certain conditions like the level of hydro lakes. The question is about the 'working well' - working well for whom? For the industrial consumer, for the gentailer, for the environment or for all the other electricity consumer. Unfortunately these agreements will not work well for all parties. How well have resources been managed by the generator (eg hydro lake levels, facilities maintenance) to avoid shortages, can the gentailer use the demand response to on-sell the saved electricity at a higher price. Because of the inherently intransparent nature the EA has just initiated a Code amendment for large supply contracts over 150MW (Meridian/NZAS). If there is scarcity of an essential good or service you typically have to ration (think food stamps) to allow for equitable allocation.
16.	What new measures could be developed to encourage large industrial users, distributors and/or retailers to support large-scale flexibility?
	Short term BESS, medium and long term V2G and smart grid demand management. For new measures to develop it will be necessary to stop believing in price/market mechanism to be the only viable instrument to control electricity use. This is a necessary paradigm shift with the fundamental change being that renewables are limited resources and that electricity generation, distribution and allocation must operate within these natural, social/cultural and economic limits. The grid structure is currently built around an extractive world view where natural resources have no value (except for the cost of their extraction) and are available in unlimited supply.
17.	Do you have any views on additional mechanisms that could be developed to provide more information and certainty to industry participants?
	Over next 30 years PV and wind generation will most likely be the two main sources of additional electricity generation. There may be a mix of additional geothermal, hydro, biomass/biogas, wave power and waste heat generation but the generation from those sources will be negligible compared with the increase of wind and solar generation. This means that information provided by short term and long term weather forecasts, wind and solar radiation intensity PV and wind turbine efficiency etc will become much more important than the information about the price of Indonesian coal that is used for the Huntly power station. Electricity cannot be stored. This truism becomes more relevant when generation relies more and more on intermittent renewables. As and island nation we cannot import electricity from neighbouring countries (like the integrated grid system in Europe allows), but in the past we were able to stockpile energy in form of oil, gas and coal that we imported from overseas. We have to learn to generate electricity sustainably from the resources available to

	us here on these islands. Demand management i.e equitable allocation will play a much bigger role.
Part 2: Competitive Markets	
18.	Do you agree that the key competition issue in the electricity market is the prospect of increased market concentration in flexible generation, as the role of fossil fuel generation reduces over time?
	This is such a loaded question! Competition, the market approach does not work for infrastructure / essential goods and services. For instance, New Zealanders never bought into the planned privatisation of our health system. You may recall the doomed attempt to establish market conditions within the health system. The HFA (Health Funding Authority) was responsible for contracting health services for which hospitals and other organisations had to compete. It did not work, it was abolished in 2001. New Zealanders don't like the idea of privatisation of water. With electricity becoming an essential good /service due to the fact that in future it cannot be substituted for essential functions like heating, transport, communication etc the public will demand democratic / political control of the electricity sector. If Genesis looses Huntly then over time Meridian my reach 50% or more of the entire supply market and yes - the oligopoly will have even more power to set prices, delay maintenance and upgrades, re-value assets to enhance the appearance of their balance sheets in order to pay greater dividends etc, etc. Meaning not delivering essential goods and services for the wellbeing of electricity consumers but for the benefit of shareholders. And yes, the current wholesale market is not designed for renewable generation which output can change dramatically within minutes. The idea to keep the current structure of the electricity sector unchanged and to manage the intermittent nature of renewables proposing the deployment of fast CCGT or OCGT is intransigent.
19.	Aside from increased market concentration of flexible generation, what other competition issues should be considered and why?
	In 2022 Christchurch City Council decided to introduce a water surcharge for users who used water over and above the average per capita use; a rational decision to ensure water is not squandered. Compare this decision with the electricity pricing for industrial and commercial users who pay significantly less per kwh that households. NZAS, being probably the biggest industrial consumer, pays only one sixth of what the average household pays for a kwh. Volume pricing is a competitive method to increase market share and market power. If resources for renewable electricity generation are appreciated to be in limited supply then the current electricity pricing structure does not make sense. No amount of 'better' competition would lead to a situation where electricity prices increase with the amount of consumption.
20.	What extra measures should or could be used to know whether the wholesale electricity market reflects workable competition, and if necessary, to identify solutions?
	There are quite a few regulatory interventions in wholesale market thinkable that would somewhat extenuate the 'disruption' renewable generation introduces. The regulator could introduce a price cap for generators of renewables. Or the regulator could mandate contracts of difference where the Government tops up when the wholesale price falls under a strike price for renewables and is reimbursed as soon as the prices increases above the strike threshold. Windfall profits of generators could be taxed or the electricity market could be split by generation type or by island. All these types of interventions are politically costly, may result in legal challenges and will result in avoidance measures by market participants. A much better approach is to by-pass the wholesale market and achieve competition the outside.
21	Should structural changes be looked at now to address competition issues, in case they are

.	needed with urgency if conduct measures prove inadequate?
	By subsidising rooftop solar and allowing for the widespread deployment of community owned not-for-profit microgrids the oligopoly of the wholesale market will get real competition without the need to rely on conduct measures. Other countries have encouraged the deployment of renewables outside their traditional energy markets with great success.
22.	Is there a case for either vertical separation measures (generation from retail) or horizontal market separation measures (amending the geographic footprint of any gentailer) and, if so, what is this?
	I am sure that separation measures or geographic restrictions could weaken the market power of some gentailer and as result may improve competitive behaviour of the sector. However, as explained further above, even a good functioning, competitive electricity market is not the right structure to deliver essential goods and services. This is an ideological driven assumption, a costly mistake that manifests itself in other markets for essential goods and services like for instance the housing market.
23.	Are measures needed to improve liquidity in contract markets and/or to limit generator market power being used in retail markets? If yes, what measures do you have in mind, and what would be the costs and benefits?
	Again, hedging against the volatility of the wholesale market due to the variability of supply from renewables (or hydro lake levels) may result in more price stability for consumers, but the key assumption is that electricity is a tradable commodity and not an essential good/service.
24.	Should an access pricing regime be looked at more closely to improve retail competition (beyond the flexibility access code proposed by the Market Development Advisory Group or MDAG)?
	Distribution networks and possibly the national transmission network should be open to provide services to local microgrids i.e organisations outside the wholesale electricity market at transparent access pricing.
25.	What extra measures around electricity market competition, if any, do you think the government should explore or develop?
	The Government could finance, build and operate renewables and sell the electricity outside the wholesale market directly to the public. A Government not-for-profit entity could run this scheme in competition to the privatised electricity sector. Malcolm Johns (CEO of Genesis Energy, see under 3.) said that there is no shortage of capital waiting to invest into NZ's electricity infrastructure once the demand side is ramping up. I have no doubt that this is a correct analysis and that foreign capital will flow into NZ to finance the required capacity expansion to meet the 2050 climate target. This would mean that an increasing portion of essential infrastructure would be under the control of foreign investors and profits generated from these investments would flow overseas. Both scenarios can be avoided if the Government either sets up its own not-for-profit electricity entity and/or encourages privately owned rooftop solar and/or community operated and controlled microgrids operated by not-for-profit community organisations.
26.	Do you think a single buyer model for the wholesale electricity market should be looked at further? If so, why? If not, why not?
	The single buyer model gives Government some control in the market but exposes the Government to financial risk when for instance distributors don't pay or actual demand lacks behind the contracted electricity volume agreed with generators. It does not solve the problem of a fast and smooth transition to renewable generation and does not address the

problem of the intermittent nature of renewables.

Part 3: Networks for the Future	
27.	Do you consider that the balance of risks between investing too late and too early in electricity transmission may have changed, compared to historically? If so, why?
	Transmission is necessary to transport electricity from the place of generation to the place of consumption. Solar installations - especially rooftop solar - can generate electricity at the vicinity where it is consumed. This not only partially saves the costly upgrade of the transmission network but also the transmission associated losses. If electricity generation does not take advantage of DERs, local demand management, V2G technology but follows the old paradigm of large power stations, large transmission facilities to distribution networks at the area of consumption then renewables would typically be concentrated in large offshore wind farms or large solar PV farms that feed directly into the transmission network. Turbine technology is very different to inverter technology and in any case balancing supply and demand in real time within a country wide grid is a huge technical challenge. The question regarding the balance of risk of too early or too late investment is quite academic. There is considerable uncertainty around the still evolving technology of renewables, an underperforming privatised energy sector and no clear plan as to how we almost double the current generation within the next 27 years. If we had started this journey 20, 30 years ago we may have made mistakes, but we would be further ahead than we are now.
28.	Are there any additional actions needed to ensure enough focus and investment on maintaining a resilient national grid?
	It is interesting to note how investment into the grid's backbone (including the HVDC link) is and has been dependent on the decision of NZAS to continue to operate in NZ or not. This 'dance' between the Government and NZAS that has been going on for some years and only very recently the CUWLP was completed allowing Manapouri's full load to be directed north if NZAS terminates its operation in 2024 at Tiwai Point. At this point the current capacity of the HVDC link would most likely not allow the transfer of Manapouri's entire surplus caused by NZAS termination to be exported to the NI. What is disturbing is that the partners in this dance know how long it takes to upgrade the transmission backbone but have not concluded a long-term PPA to ensure that Manapouri's supply can be fully utilised in any scenario.
29.	Do you agree we have identified the biggest issues with existing regulation of electricity distribution networks?
	No, demand management in the sense of electricity rationing is not discussed. The current thinking is that electricity is available in unlimited supply - at a price.
30.	Are there pressing issues related to the electricity distribution system where you think new measures should be looked at, aside from those highlighted in this document? How would you prioritise resolving these issues to best enable the energy transition?
	If the network is overloaded, reserve capacity and demand response exhausted then rolling outages are currently the only measure to avoid damage to assets. Outages may have severe effects on consumers and naturally the energy sector will try to ensure that ample capacity is on hand to avoid outages. Demand management is referred to as pre-contracted demand reduction with large scale consumers. Why is there no concept of electricity rationing. The idea is old, ripple control was introduced in the fifties, but now ripple control is tariff/contract based i.e. optional. The typical NZ household is on a single phase 60A connection. Why not shift the max load/fuse from 60A to 40A or 20A by selecting priority circuits within the switchboard. The household may not need to run the cloth drier or charge the EV to 100%

	when there is peak demand. This behaviour could be controlled via price signal, it must be automated. Many smart grid concepts have been developed decades ago and 'smart' appliances for households and commercial/industrial should be readily available. we have rolled out smart meters that allow for two-way communication. This is a matter of regulatory measures, especially for EVs and charging stations to support a nationwide V3G standard.
31.	Are the issues raised by electricity distributors in terms of how they are regulated real barriers to efficient network investment? Please give reasons for your answer. Is there enough scope to address these issues with the current ways distributors are regulated? If not, what steps would you suggest to address these issues?
	The invisible hand, the religious believe that markets are the best way to allocate resources, permeates these question. No amount of tweaking the regulatory framework will result in an optimal allocation of resources since each player takes responsible only for a small aspect of the overall task to supply electricity equitably, reliably and sustainably. If the housing market would function for the wellbeing of people the Government would not have to invest in social housing. The regulatory framework - the E.A. and the 'Code' are complicated enough and incomprehensible for the average electricity consumers. It is time to apply Occam' razor, simplify the sector and concentrate on the technical challenges at hand.
32.	Are there other regulatory or practical barriers to efficient network investment by electricity distributors that should be thought about for the future?
	Most New Zealanders would see the transmission and distribution networks as a public good and not as private property that is held by state sanctioned monopolists. Investment into these networks must allow for resilience (i.e. redundancies), reliability (high level of maintenance) and for transition / future proofing (renewables, EV chargers etc). Infrastructure facilities are beyond the scope of private companies. Infrastructure has to be planned, build and operated under political and democratic control. Why else would the Government have bought back the rail network from Toll in 2004?
33.	What are your views on the connection costs electricity distributors charge for accessing their networks? Are connection costs unnecessarily high and not reflective of underlying costs, or not? If they are, why do you think this is occurring?
	What can you expect from a monopolist other than maximising profit? If distribution networks would be a public good and part of the commons (like the road network) then you would expect connection charges to be low and prices and/or excessive regulatory barriers to be subject to public scrutiny.
34.	If you think there are issues with the cost of connecting to distribution networks, how can government deliver solutions to these issues?
	Renationalise distribution and transmission networks and bring them under political/democratic control. The 1998 power crisis when the Auckland CBD was without power for 5 weeks is a good example how cost efficiency thinking led to neglected asset management and contingency planning.
35.	Would applying the pricing principles in Part 6 of the Code to new load connections help with any connection challenges faced by public EV chargers and process heat customers? Are there other approaches that could be better?
	It is ironic that the problem of high cost, low service value that was one reason for privatising the electricity sector some 40 years ago seems to be still a problem today. The distribution network topology will be hugely effected by the decarbonisation effort. The underlying issue is

	not how regulations can be tweaked to better facilitate the infrastructure for the implementation of public chargers and/or process heat. The fundamental question is if electricity is a commodity where the user-pays principle is appropriate or if electricity is an essential good/service that should be universally and equitably available.
36.	Are there any challenges with connecting distributed generation (rather than load customers) to distribution networks?
	Load balancing is a big technical challenge. DERs are most effective when their generation is consumed locally. Appropriate line capacity, local storage facilities and line conditioning may be required. Embedded microgrids using the distribution network require new power metering and ICP association methods.
37.	Are there different cost allocation models addressing first mover disadvantage (when connecting to distribution networks) which the Electricity Authority should explore, potentially in conjunction with the Commerce Commission?
	I support the distributing of connection cost among all system users and charge users on a transport capacity basis.
38.	Should the Electricity Authority look at more prescriptive regulation of electricity distributors' pricing? What key things would need to be looked at and included in more prescriptive pricing regulation?
	Again this reminds me of past attempts to force the health system to become competitive. The Health Funding Authority (HFA) was abolished because the initial idea of 50 officials at the Ministry of Health concluding contracts with health providers mushroomed very quickly into a huge organisation monitoring contract performance. More prescriptive pricing regulation sounds great, but who monitors. Private organisations have a right to safeguard their know-how and disclosure of financial data is limited. Regulations with no or little compliance are ineffective.
39.	Do current arrangements support enough co-ordination between the Electricity Authority and the Commerce Commission when regulating electricity distributors? If not, what actions do you think should be taken to provide appropriate co-ordination?
	The Commerce Commission and the Electricity Authority have committed to a combined work programme for 23/24 - so there are attempts to co-ordinate and cooperate. However, their brief is different. The CC is regulating monopolies to ensure fair pricing and minimum quality standards. The EA is to promote competition, reliable supply and efficient operation of the electricity industry. Promoting competition does not apply to Transpower and the lines companies - they are in effect monopolies and nobody is contemplating competing transmission or line companies. The CC's brief of consumer protection may not necessarily congruent with EAs responsibilities. This conflict could be avoided by no creating monopolies but publicly owned and operated entities that are transparent and under political/democratic control.
40.	Will the existing statutory objectives of the Electricity Authority and Commerce Commission adequately support key objectives for the energy transition?
	No, as stated further above the competitive model for a privatised energy sector may has been suitable for the old hierarchical structure of generation, transmission, distribution and retail. The new network will look different where each node may generate, consume and possibly distribute. For example, none of the current participants of the sector would support rooftop solar because it deprives every participant of transaction volume and revenue. However, rooftop solar may be a significant contributor to achieve resilience, decarbonisation and

climate targets.

41. Should the Electricity Authority and/or the Commerce Commission have explicit objectives relating to emissions reduction targets and plans set out in law? If so,

- should those objectives be required to have equal weight to their existing objectives set in law?

Why and how might those objectives affect the regulators' activities?

There are 3 factors that will require the electricity sector to change and adapt.
1. Power electronics make it possible that new generation technologies like wind turbines and PV panels have become the most cost effective and scalable generation technology.
2. Decarbonisation of transport, process heat and other fossil fuel consuming processes require a rapid expansion of renewable electricity generation.
3. Climate change affects centralised infrastructure and resilience of individual households and communities requires 'hardening' of infrastructure decentralisation of generation, transmission and distribution.
The current oligopoly is not designed to adapt to these factors of change. Time is running out, New Zealand has deadlines to meet (carbon zero) and the energy sector requires clear and precise directives that are to be effectuated and implemented at great speed. The current structure of the sector made up of competing private agents and tightly regulated monopolies who's main purpose is to make profit for shareholders will not achieve this.

42. Should the Electricity Authority and/or the Commerce Commission have other new objectives set out in law and, if so, which and why?

If the EA and CC get a new set of objectives set out in law, what are the criteria for success? How will we measure, monitor and audit that these objectives take effect? New Zealand has declared a climate emergency. Time has run out for experimentation with new regulations to enforce behaviour in a state sanctioned oligopoly; behaviour that does not necessarily align with the general purpose of private companies to create value for their shareholders.

43. Is there a case for central government to direct the Commerce Commission, when dealing with Electricity Distributors and Transpower, to take account of climate change objectives by amending the Commerce Act and/or through a Government Policy Statement (GPS)?

The electricity sector is very aware what the expectations of the Government are in terms of climate change objectives. In addition to explicit mandatory and permissive considerations, a court may find that some things which are not explicitly referred to in an Act (or which are only referred to as permissive considerations) are nevertheless so obviously relevant that they must be taken into account.

44. If you answered yes to question 43, please explain why and indicate:

- What measures should be used to provide direction to the Commerce Commission and what specific issues should be addressed?

How would investment in electricity networks be impacted by a direction requiring more explicit consideration of climate change objectives? Please provide evidence.

Transpower and the lines companies do their own risk assessment. If line companies decide not to bury cables in their rural networks but to run uninsulated medium or high voltage cables on power poles they risk that their network is compromised in storm events. Climate change consideration would require investment in a 'hardened' network infrastructure. However, if a private company cannot exercise control of its asset it stops to be a private

	company. What if the electricity sector makes hay as long as the sun shines. Transpower and line companies should be publicly controlled entities so that climate change objectives can be actioned.
Part 4: Responsive Demand and Smarter Systems	
45.	Would government setting out the future structure of a common digital energy infrastructure (to allow trading of distributed flexibility) support co-ordinated action to increase use of distributed flexibility?
	The current discussion around flexibility measures focus on technical solutions that help project the current paradigm into the future, that there is unlimited electricity supply (even in the carbon zero world) if you can pay for it. There are no proposals for demand management / smart grids that incorporate the idea of electricity rationing. What are the signals the Government is intending to send out to electricity consumers that the time of limitless energy availability comes to end. Yes, there are certainly price signals, but electricity as an essential good/service has to be affordable. Our income and wealth distribution is such that a significant part of the population is affected by the cost of living crisis and on the brink of energy poverty. Base allocation of electricity and increasing prices the more you consume seem to be an anathema There are elements of demand management that have little or no effect on consumers, like control of smart appliances, smart EV chargers that incorporate V2G technology etc. Of course these measures should be implemented - the technology is evolving but has been around for years and it is a matter of adopting nationwide technical standards (like the old ripple control). The question is how much expensive reserve and storage capacity the sector has to build - the less demand management the more reserve and storage. Who co-ordinates this, the market, the invisible hand? Will the Government decree a digital infrastructure and a minimum volume level of traded distributed flexibility? Who monitors and enforces compliance? I can't see the market approach being successful. The discussion paper accompanying the submission states that New Zealand has not incentivised rooftop solar because it is relatively more expensive than commercial/industrial sized PV and wind generation. Other countries have apparently come to a different conclusion. In this context I don't want to discuss the economy of scale of PV technology or the resilience aspect of rooftop solar, but the impact on consumer behaviour that ownership of one's own electricity generation has. There are many examples of households, farms and commercial enterprises that are off-grid or not reliant on the grid/reticulation and manage resources like electricity, water and wastewater/sewage sustainably, effectively and efficiently (in terms of the environment, reliability, and affordability).
46.	Should central government see how demonstrations and innovation to help inform how trade of flexibility evolves in the New Zealand context, before providing direction to support trade of distributed flexibility? If yes, how else could government support the sector to collaborate and invest in digitalisation now?
	A very cynical political approach to climate change is to defer decision to the point where disaster strikes. Immediate action in the face of inevitability is easier to sell to the public than uncertainty and the prospect of mistakes. We have declared a climate emergency - why would we do that if we don't act accordingly. In an emergency you don't wait to see how things evolve, you act to avert harm.
47.	Aside from work already underway, are there other areas where government should support collaboration to help grow and develop flexibility markets and improve outcomes? If yes, what

	areas and actions are a priority?
	Subsidies for small scale renewable generation preferably with battery storage, make regulatory changes to allow for community scale embedded microgrids. Other countries have developed a range of different incentives like tax relied, capital support, guaranteed feed-in tariffs etc. There is no shortage of examples that work. This may not necessarily be in collaboration with the energy sector.
48.	Could co-funding for procurement of non-network services help address barriers to uptake of non-network solutions (NNS) by electricity distributors?
	The term Non Network Solutions or Non Network Alternatives is inherently wrong. The electricity network should be controlled by a set of standards and must be in the public domain (like for instance the road network). The idea that the network is privately owned and that it is at the discretion of current network providers/electricity sector to allow or discourage/inhibit uses like demand management or DERs is wrong. If the model of a privatised energy market would work then we would be ahead of the curve, i.e. MBIE or the public would not have to worry about the transition because the transition would already have happened and the electricity sector would have planned, financed and implemented the mix of measures that will make up an electricity system fit for the carbon zero future. The disruptive technologies like demand management, V2G, DERs etc benefit the electricity system as a whole but impinge on the transaction volume and ability to maximise value for shareholders of individual players. Co-funding in the sense of putting money into a system that is not fit for purpose is counter productive.
49.	Would measures to maximise existing distribution network use and provide system reliability (such as dynamic operating envelopes) help in New Zealand? If yes, what actions should be taken to support this?
	Dynamic operating envelopes are a great concept. However, the devil is in the detail. Typically the term is used in the context of low voltage DER connected to the local distribution medium and low voltage network (the last mile). When in midday rooftop solar produces more surplus energy the network can manage, the inverters are signalled to reduce output. If in the evening too many EV's are charged the chargers / ICPs are signalled to reduce consumption. This has a financial component. Rooftop solar will generate less revenue when the inverter/ICP is instructed to reduce output to the grid. Gentailers in Australia have been 'caught' forcing inverter shut-off by supplying the last mile with higher than the nominal voltage and thus increasing their transaction volume at the expense of DERs. If more consumers and DERs are added to the distribution network, when is the decision made to upgrade the network capacity. How are the cost for the network allocated - will DERs pay. What is the mechanism for cost or envelop allocation? Who monitors and regulates process. If DERs make up only a very small proportion of the network capacity dynamic network envelopes are probably not an appropriate tool. Australia's electricity network one of the highest decentralisation ratio that is estimated to reach around 50% in 2050. Dynamic operating envelope considerations, grid aware inverter technology, behind the meter battery storage, virtual power plants and embedded microgrids are all developments that will play an important part in the transition to renewables in Australia. Whether these tools and technologies are useful and appropriate in New Zealand depends on the uptake of DERs and the Governments resolve to support such uptake.
50.	What do you think of the approaches to smart device standards and cyber security outlined in this document? Are there other issues or options that should be looked at?
	I agree to cybersecurity standards for smart devices, but again the devil is in the detail. Because many 'smart' devices have a long life span it will be difficult to safeguard them against cyberattacks and hacking. Risk classification of devices is important and often dedicated data

	links and physical access control (instead of internet access) is more secure.
51.	Do you think government should provide innovation funding for automated device registration? If not, what would best ensure smart devices are made visible?
	No. I don't think the Government (or the electricity sector) has any business behind the meter.
52.	Are extra measures needed to grow use of retail tariffs that reward flexibility, so as to support investment in CER and improved consumer choice and affordability?
	There are already retail tariffs that reward flexibility e.g. night- and daytime, EV tariffs, with and without ripple control. That flexibility does not extend to feed-in prices because most CERs feed in their generation surplus during midday. My understanding is that hedging load and price risks is a core competency of the electricity sector, why expose consumers to that risk? Why not reward consumers for low usage and progressively increase the charge with more consumption?
53.	Should the government consider ways to create more investment certainty for local battery storage? If so, what technology should be looked at for this?
	yes, the Government should support the combination of household solar and/or battery storage. with low interest loans where repayment is linked to the household income. A separate incentive should be available for guaranteed feed in tariffs that are staged depending on time of day / day of week. The Government could over a high guaranteed FIT for weekday mornings and evenings and a low tariff for the all other times.
54.	Should further thought be given to making upfront money accessible to all household types, at all income levels, for household battery storage or other types of CER?
	To exploit the potential of smart EV chargers and V2G technology the Government will have to set standards and provide financial incentives. The Government should look at a projects to upgrade switchboards/meters to allow real two-way communication for instance for the selection of priority circuits.
55.	Should government think about ways to reduce 'soft costs' (like the cost of regulations, sourcing products, and upskilling supplier staff) for installing local battery storage with solar and other forms of CER/DER storage? If so, what technology should be looked at?
	Yes, soft costs should be reduced especially for DERs controlled and operated by local not-for-profit organisation. VPP or microgrids that are run by charitable community energy groups try to fill the gaps left by the corporate electricity sector (community resilience, community ownership, amelioration of energy hardship within the community etc)
56.	Is a regulatory review of critical data availability needed? If so, what issues should be looked at in the review?
	From a consumer standpoint there is very little data available. The rollout and implementation of smart meters was/is a mess. At the time when the rollout began the expectation was that they would be HAN ready, that consumers would have usage information of their main circuits. In 2009 the then Parliamentary Commissioner for the Environment Jan Wright called them "dumb meters" and recommended their introduction be stopped. There is no standardisation on meters/hardware functionality, no standards for data transport. Low competence / experience of staff of metering companies with the product they are installing. The current generation of meters benefits mainly the industry, not the consumer.
Part 5: Whole-of-system considerations	

57.	What measures do you consider the government should prioritise to support the transition?
	As outlined above the model of a largely privatised electricity sector that is regulated by independent watchdogs is not fit for purpose. The Bradford reforms may or may not have been the right decision 30 years ago - that is now irrelevant. Going forward it is in my view not possible to achieve the energy transition trusting in the powers of the "invisible hand". Any whole-of-system view must address this fundamental problem.
58.	Are there gaps in terms of information co-ordination or direction for decision-making as we transition towards an expanded and more highly renewable electricity system and meeting our emissions goals? Please provide examples of what you'd like to see in this area.
	There are always gaps in information and information gathering can always be improved. Decision making is about taking action with incomplete information. What is now required is the authority and the means to implement a plan - and not just on paper but in real life. Time after time New Zealanders have experienced that ambitious policy targets weren't met, were classified as aspirational and with a shrug business continued as usual. Here an example: Government has set the goal that by 2030 the electricity sector will be based on 100% renewables retaining the current level of supply reliability, affordability, sustainability and availability. Translated into a project plan, achieving this goal will require many milestones and critical paths to be met in good time. No doubt the Government will monitor these milestone. The question is if there are delays and the electricity sector does not seem to be able to provide proof that the objective will be achieved in time, is the Government equipped to step in, take control and bring the project to a successful conclusion? Or, is it a case of leading the horses to water but not being able to make them drink.
59.	Are there significant advantages in adopting a REZ model, or a central planning model (like the NSW EnergyCo), to coordinate electricity transmission investment in New Zealand? Would a REZ model for local electricity distribution be an effective means of addressing first mover disadvantage with connecting to electricity distribution networks?
	While I can see the many advantages of a central planning model (a given if the split-up sector is reunified) I cannot understand the 'first mover disadvantage'. If building/financing a transmission line into an area with ample renewable resources is in the public interest why should the first generator in this area bear the cost of all assets necessary to connect to the grid. I wonder if any of the SI hydro projects we cherish today would have been built under such rules. I believe the forerunner of NZAS, Consolidated Zinc Proprietary Ltd, decided in 1963 it could not afford to build the Manapouri power station as planned and the Government / NZED took over.
60.	Should MBIE regularly publish opportunities for generation investment to enable informed market decision-making?
	Certainly, if the Government does not plan to make use of those opportunities itself.
61.	How should the government balance the aims of sustainability, reliability and affordability as we transition to a renewable electricity system?
	Obviously something has to give. Now as we loose them we appreciate how wonderful fossil fuels are (energy density, abundance, storability etc etc), but our survival will depend on giving them up. We have to work hard to meet future demands of decarbonisation and to maintain the level of infrastructure reliability and resilience - technological advances will help with the transition to renewables. Given New Zealand's income and wealth inequities we have to make

	electricity affordable for those who suffer under energy hardship. What if smart management and technological advances are not sufficient to provide abundant energy? When it comes to balancing the aims electricity abundance is the first one I would sacrifice - hence the suggestion to develop plans around how electricity can be rationed effectively.
62.	To what extent should wholesale, transmission, distribution or retail electricity pricing be influenced by objectives beyond the (affordability-related) efficiencies achieved by cost-reflective pricing, such as sustainability, or equity?
	New Zealand in 10, 20, 30 years will be a significantly different place. Infrastructure cost may skyrocket as a result of persistent severe weather events. Our population may not increase by 2% p.a. but by 10% due to climate refugees arriving en mass at our shores. Electric energy is needed for almost everything and anything (communication, transport etc) that stands between a functioning society or a disintegrating, collapsing state. During the Gabrielle storm event community water supply was cut off and people relied on tankers to bring in drinking water. Should that water have been dispensed at a price that represented cost + profit margin? Certainly not! Today and more so in the future electricity is a social good, an essential glue that keeps society together. It is not a commodity. The transition to renewables should also be understood as a transition of electricity becoming part of the commons. In New Zealand nobody can own water and nobody can own the sunshine, wind, wave action or tides. Pricing of a social good will follow different rules.
63.	Are the current objectives for the system's regulators set in law (generally focusing on economic efficiency) appropriate, or should these also include more focussed objectives of equity and/or affordability?
	Efficiency is a given, we can't afford to squander. If we apply the same extractive, human-centric perspective with which we exploited the earth' fossil fuel reserves in the past to renewable energy sources then we have learned nothing. The topmost priority is the integrity of the environment. If we plan electric facilities the question is not the least negative impact but how we can benefit the affected ecosystem. The second priority is society and the common good. Only then we should look at economic cost and benefits.

General Comments:

I have been critical about the current structure of the electricity sector, disapproving of the market model, the private company status, the ineffectiveness of regulators like the EA or CC to enforce necessary changes etc. Please rest assured that I have high respect for the people, companies and organisation that work in the sector. I think they do admirable work under a less than perfect regulatory structure. They will help building the future and I am grateful to them.