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

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Release of information

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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.
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?
	In terms of extra measures to increase renewable generation output, there needs to be an investigation over the extent to which hydro spill losses can be reduced by imposing different operating rules on the source hydro lakes. There will always be a tension between maximising hydro power output (maximising renewable energy yield) and maximising income from hydro power generation. The extreme example is Meridian Energy being found guilty by the Electricity Authority of spilling water in December 2019, to keep prices high and gain an income advantage rather than using the water to generate. Consequently, unnecessary emissions were sent into the atmosphere from fossil fuel burning for power generation during the time of high prices. **In the case of hydro lakes, current consented operating water level ranges were not set with a view to minimise spill. In particular, having a narrower operating range on Lake Taupo has the potential to reduce spill loss in the Waikato River power stations. If the normal permitted upper water level is reduced then sudden inflows will arrive with the lake at a little lower level and hence with more capacity to store the water rather than spill at the Mercury stations downstream of the lake outlet. The held water can be used later for generation and thus somewhat increase the renewable electricity output from the Waikato River power stations.** **This increase in hydro power output will almost certainly result in an income decrease for Mercury, because an income-optimised loosely constrained system will always generate more income than with a more tightly constrained system. Nonetheless, the Waikato Regional Council should initiate a study for setting up new Lake Taupo management bounds with a view to minimising spill loss on the Waikato hydro power stations.**
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?
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?
	Yes. There is a need for a capacity market (or something equivalent) to encourage rapid construction of fast-response, sustainable and emission-free generation capability. This is particularly for small pumped storage schemes in the North Island (Boston Consulting Group Report, 2022, p.65). The needs met are: fast response to outages; meeting Transpower's minimum reserve generation requirement; backing up intermittent renewables (wind and solar) as they become increasingly developed; and providing an emission-free and sustainable alternative to gas peakers for doing the same task. Once constructed, small pumped storage schemes will be the cheapest operating option for firming because no fuel is consumed and they don't wear out with time like batteries.

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?
	Yes. New Zealand can't have an economic green transition without somehow finding sufficient new energy storage to solve the dry year problem. BESS will go nowhere to help with that. NZ Battery has reduced the energy storage options to the Onslow scheme or the portfolio scheme. The government needs to use its funding to construct one or the other (or some combination of both). Otherwise we give up on the green transition and have coal-supported dry years, with effectively having coal-fired EV's for the last 20 km of every 100 km journey. Coal is the default dry year election "policy" of the National Party, so discussion on the green transition is academic unless there is a policy change.
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? **Yes, support should be limited to renewable generation and renewable storage technologies only.** 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.
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?
	For large-scale pumped storage (Onslow), the risk is for an unlikely (but possible) long sequence of dry years. There is also a risk of dry years before Onslow completion. Both risks can be offset by including elements of the portfolio alternative as well, as these will be independent of climate (but expensive to operate) and can be constructed faster. There is also the risk of cost blowouts due to unexpected geology (as with Snowy 2.0). This risk can be offset by prior detailed drilling along the tunnel lines – already completed in part by NZ Battery field investigations. **For small-scale pumped storage schemes, the risk is the construction cost being a disincentive to private industry. A capacity market needs to be set up urgently. There should also be a survey to identify all viable North Island sites. NZ Battery has carried a North Island survey for large-storage schemes analogous to Onslow, but no such survey has been done for small schemes. There are, for example, a number of both open and closed loop possibilities in the Kinleith region (Bardsley – Pumped Storage on the Waikato River? *Current*, Nov. 2022, p.10-11).**
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?
	No – support for peaking generation should be directed only to small-scale pumped storage.
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?
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?

11.	Are there any issues or potential issues relating to gas supply availability during electricity system transition that you would like to comment on?
	There is no certainty that gas will be available in sufficient amounts when needed. Low hydro flows extending into the first part of 2021 were exacerbated by gas production issues from the Pohokura field. High resulting electricity prices resulted in industry closures, some gas had to be diverted away from methanol production to electricity generation, and a million tons of coal was burnt at Huntly to make up the shortfall.
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?
	Yes.
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? **Only until secure renewable alternatives become available, supported by firming and large emission-free energy storage backup (Onslow / geothermal heat / chemical via black pellets).** 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?
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?
	Risk is delay in getting renewable alternatives operating fast enough - eg pumped storage construction time. Incentives need to be emplaced for construction to be started as soon as possible.
15.	What types of commercial arrangements for demand response are you aware of that are working well to support industrial demand response?
16.	What new measures could be developed to encourage large industrial users, distributors and/or retailers to support large-scale flexibility?
17.	Do you have any views on additional mechanisms that could be developed to provide more information and certainty to industry participants?
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?
19.	Aside from increased market concentration of flexible generation, what other competition issues should be considered and why?

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?
21.	Should structural changes be looked at now to address competition issues, in case they are needed with urgency if conduct measures prove inadequate?
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?
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?
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)?
25.	What extra measures around electricity market competition, if any, do you think the government should explore or develop? **Encouraging pumped storage schemes so that their selling bids will keep prices down.**
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?
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?
28.	Are there any additional actions needed to ensure enough focus and investment on maintaining a resilient national grid? **Yes. There is a specific issue that should be given attention. With reduced fossil fuel power generation, the North Island will become vulnerable to a worst-case scenario of a massive Alpine Fault earthquake coupled with an extended outage of the HVDC cable. An insurance option here, at relatively low cost, would be to engineer the Lake Taupo outlet to enable significant drawdown of Lake Taupo to give maximum power output from the Waikato River stations for an extended time. This can be thought of as extreme contingency storage that we hope would never be needed. However, once in place, the re-engineered outlet would also enable more effective operation of the Mercury stations on the Waikato River because managed outflows from Lake Taupo could be higher when needed, even when the lake level is low. All this could only be initiated in consultation with all iwi around Lake Taupo, who are the lake owners.**
29.	Do you agree we have identified the biggest issues with existing regulation of electricity distribution networks?

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?
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?
32.	Are there other regulatory or practical barriers to efficient network investment by electricity distributors that should be thought about for the future?
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?
34.	If you think there are issues with the cost of connecting to distribution networks, how can government deliver solutions to these issues?
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?
36.	Are there any challenges with connecting distributed generation (rather than load customers) to distribution networks?
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?
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?
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?

40.	Will the existing statutory objectives of the Electricity Authority and Commerce Commission adequately support key objectives for the energy transition?
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?
42.	Should the Electricity Authority and/or the Commerce Commission have other new objectives set out in law and, if so, which and why?
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)?
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.
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?
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?
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?
48.	Could co-funding for procurement of non-network services help address barriers to uptake of non-network solutions (NNS) by electricity distributors?

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?
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?
51.	Do you think government should provide innovation funding for automated device registration? If not, what would best ensure smart devices are made visible?
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?
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?
54.	**No** 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? **Yes**
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?
56.	Is a regulatory review of critical data availability needed? If so, what issues should be looked at in the review?

Part 5: Whole-of-system considerations

57.	What measures do you consider the government should prioritise to support the transition?
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.
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?

60.	Should MBIE regularly publish opportunities for generation investment to enable informed market decision-making?
61.	How should the government balance the aims of sustainability, reliability and affordability as we transition to a renewable electricity system?
	By introducing a capacity market to encourage construction of small distributed pumped storage schemes, particularly in the North Island. Also, there needs to be completion of the present NZ Battery investigation of dry year options.
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?
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?

General Comments:

The October election has shown that even the concept of a National Energy Strategy is meaningless unless there is cross-party support. A true National Energy Strategy must take a long-term consistent view, not having massive and arbitrary changes from one election to the next.

In the rush to the electrified economy, there is a risk of environmental considerations being lost in the need for ever more renewable generation. Part of the energy strategy should also involve reconfiguration of the renewable energy mix so that some of the worst hydro excesses of the past can be reversed. For example, 50 km of forested shoreline in Lake Monowai (Fiordland National Park) has been flooded by raising the lake for the sake of a small power scheme with a mean output of just 4 MW. The Whanganui diversions of the Tongariro power scheme, deeply offensive to the Maori people, contribute only in the order of 20-30 MW – taking into account the water passage through the Waikato River power stations as well. In both instances, the schemes are better closed and the power made up by expansion of lower-impact wind generation. The Monowai scheme might remain as a run of the river system outside of the national park.

Any long-term energy strategy must also consider the end-view, setting up for future generations as best we can. Energy efficiencies can only slow the rate of approach to an inevitable renewables limit. At this point it will no longer be considered acceptable to impose further on our environment as an energy source.

Even decades from now, memories of Fukushima are likely to prevent any consideration of critical uranium reactors in New Zealand. However, accelerator-driven thorium reactors might be an acceptable alternative. These systems are subcritical (cannot melt down) and produce relatively small amounts of reactive waste, mostly short-lived. Active research is being undertaken at various localities around the world, particularly in India which has abundant thorium reserves. However, it will probably be decades before thorium reactors have been fully developed.

Thorium is more common than uranium and, unlike uranium, all of the thorium can be used for energy. This means thorium has significant energy potential. To an order of magnitude, a ton of thorium has the same potential energy as a billion tons of water in Lake Onslow.

Given that thorium is a possible long-term energy future for New Zealand, it is suggested than a thorium centre be set up at a New Zealand university. The centre would carry out low-profile work at first, making contact with various international research groups and, importantly, establishing the extent of New Zealand's thorium reserves. It appears that most can be found in the heavy mineral component of coastal sands in central and southern Westland (Hutton, 1950).

In the meantime, consideration should be given to a ban on thorium exports from New Zealand, as a potential strategic energy element.

It may be that at some later date an experimental thorium reactor is set up in New Zealand. This would be most conveniently located near the Huntly power station, which would be the logical site for a fully functional reactor sometime in the future.

Reference

Hutton, C.O. (1950). Studies of heavy detrital minerals. *Bulletin of the Geological Society of America*, v.61, p.635-710.