TE PŪ NGAO, TE PŪ WARO
CARBON AND ENERGY PROFESSIONALS NEW ZEALAND
EDUCATE | COLLABORATE | INSPIRE

Electricity Market Measures Submissions
Ministry of Business, Innovation and Employment
15 Stout Street
Wellington

2 November 2023

Submitted by email

Submission on:

Measures for Transition to an Expanded and Highly Renewable Electricity System

By Carbon and Energy Professionals New Zealand

INTRODUCTION

CEP welcomes the opportunity to comment on MBIE's consultation on Measures for Transition to an Expanded and Highly Renewable Electricity System.

CEP congratulates MBIE on the comprehensive and thoughtful nature of its work in preparing the document. Transitioning to renewables is a critical and major step forward in our collective journey to a low emissions future.

For context, CEP is the professional body that represents energy efficiency and carbon professionals in New Zealand. We train and certify individuals in a wide array of energy efficiency, carbon management and carbon measurement disciplines. CEP and our members will be crucial to the success of policies aimed at creating a low emissions future and we welcome the opportunity to input into the development of policies and strategies.

CEP is affiliated with Engineering New Zealand as a Collaborating Technical Society. The CEP membership comprises expert level practitioners in energy efficiency and carbon management, the people who will deliver the engineering expertise to transition to a low emissions economy.

CEP is a not-for-profit Incorporated Society. Supporting effective energy, carbon and sustainability management is embedded in our constitution.

We focus our comments on areas where our organisation and membership can provide relevant comment or advice rather than responding directly to all listed consultation questions.

We section our submission in line with the sections in the consultation document.

1. GROWING RENEWABLE GENERATION

Increasing the level of renewables will be an essential part of delivering a low emissions economy. As the consultation document states, growth is required not only to replace fossil fuel generation but also to satisfy significantly increased demand as transport and industry modify and, in particular, electrify.

One glaring omission from this section is the lack of reference to energy efficiency and the role it will play in accelerating the shift to renewables. More efficient use of energy will lower demand, ceteris paribus, meaning the level of build required will be lower, the removal of fossil fuel generation from the mix hastened and the attainment of a highly renewable system eased and brought forward. Improving efficiency is not independent of a highly renewable system, it is an integral part of it.

The consultation document is premised on a centralised generation, transmission and distribution system. While this is understandable and a reasonable starting point, it does risk devaluing the potential contribution of domestic or small-scale generation. It is not a stretch to envisage new sub-divisions, for example, being energy self sufficient if the dwellings are properly designed and constructed for efficiency, generation and storage. In Europe, dwellings are being retrofitted to be energy self sufficient. If this were better encouraged the transition to a highly renewable system would be accelerated. There would be the added benefit of increasing local resilience. Such developments would not necessarily be independent of a centralised system but a valuable contributor to increasing flexibility and accelerating the attainment of a fully renewable electricity system. Reviewing the Building Code to increase emphasis on efficiency and facilitate domestic generation would be a valuable contributor to accelerating a highly renewable system.

Maintaining sufficient, dispatchable capacity during the transition will be crucial. This could be pursued through two, basic philosophies; the maintenance of flexible fossil fuel generation or accelerating the build of renewables supported by storage solutions to provide quickly dispatchable capacity. Inevitably, some combination will likely prove the optimum way forward. However, fundamentally, CEP supports the latter route for two main reasons. Firstly, renewables plus storage is a more sustainable, long term solution. Supporting fossil fuel generation will have a limited useful life at best and could involve inefficient investment in quickly stranded assets at worst. Secondly, supporting fossil fuel generation could prolong reliance on fossil fuels and defer attainment of a highly renewable energy system. While acknowledging fossil fuels will be required for a period, supporting continued reliance is not favoured. Supporting the uptake of storage solutions, of small and large scale, is a more enduring and progressive approach, especially as they can realistically be expected to become more economically viable. There is clearly a case for investigating the potential for local storage solutions with bi-directional flows at the household level that would improve resilience as well as facilitate the removal of fossil fuel generation.

Consistent with the above, it is difficult to see compelling reasons to support existing or new fossil fuel gas fired generation (baseload or peak). Arguments supporting such a move on the basis of affordability are short-term and misguided. Affordability is better tackled through efficiency improvements, for example, supporting the uptake of household insulation and efficient equipment, such as heat pumps. Price is only one part of a three part equation for household electricity bills. Connectivity and level of use are at least as significant. Reducing use reduces household bills and is an enduring rather than short-term solution, it also accelerates the transition to a renewable system. A focus on efficiency would also reduce risk associated with gas availability.

Arguments for supporting fossil fuel plants on the basis of security of supply carry slightly more weight but only if security of supply issues become a material risk. As above, security of supply risk is reduced if use is reduced through improved efficiency and flexibility.

Commercial scale demand response appears to be operating fairly well, if at a modest level. The focus, understandably, has been on large users. Extending to medium sized users will be eased if local storage at commercial scale emerges. One of the hurdles for extending demand response lies in the timeline of notifications to users, such that they are able to make decisions on consumption effectively, and with only modest disruption. If local storage could buffer supply fluctuations providing a longer transformation window to users, they are more likely to consider engaging in flexible use.

2. COMPETITIVE MARKETS

High market concentration is a significant risk and more needs to be done to encourage smaller scale, regional, local or community generation supported by storage and bi-directionally enabled micro-grids. More locally based solutions will also improve resilience.

Cases for vertical or horizontal separation are not compelling although market shares of the existing (and future) participants should be monitored. There is, however, significant risk of market distortion if an individual, major facility was constructed, for example, the Lake Onslow project. A facility of this capacity would, in effect, become a price setter for the market. Ownership of such a facility, or more significantly control over when and at what level it is employed could easily distort pricing and market signals. If held by a private entity it would leave wholesale prices under the control of a single participant, if held publicly it could be used to cap pricing and distort investment signals.

3. NETWORKS FOR THE FUTURE

It is still unclear what the shape of electricity networks in the future will look like. Local generation, storage and flexibility will increase, as much to support resilience as providing economic supply.

It is easy to say: If New Zealand did not already have a national transmission grid, we wouldn't build one. The economics and resilience benefits of distributed generation would outweigh a centralised system. However, with a grid in place and major generation facilities at the opposite end of the country to the areas of largest demand, New Zealand is reliant on the grid. It is essential it continues to provide the backbone of electricity supply. With demand certain to increase and distributed generation likely to take decades to gain a material presence in the system, significant and early grid and network investment are critical.

Pricing structures around connectivity should reflect immediate needs and potential long term trends. For example, high demand, commercial or public facilities should be able to connect to the grid easily and at modest cost to encourage electrification. Low use, remote connections should, perhaps, be looking at self sufficiency. Over time it is reasonable to expect the transmission network to follow a managed retreat from remote areas to be replaced at the fringes by local, self contained networks.

A critical deficiency of the current network system is a lack of accurate, publicly available data on capacity, in particular distribution capacity at the micro level. For example, recently we were alerted by the Ministry for Education to a deficiency in local data. MfEd is running a major programme to reduce emissions from schools with the two most appropriate options in almost all cases being either the installation of heat pumps or a switch to biomass boilers. It is struggling to access reliable data from distribution companies about the infrastructure supporting individual site capacity and potential infrastructure bottlenecks. As a consequence, MfEd is struggling to determine the viability of configuring heat pumps for schools' needs, such as whether it could install one large or several small heat pumps or if the heat pump option is viable at all. The result is that sub-optimal outcomes may eventuate. This is particularly frustrating because, perhaps, a site could support the optimum technology and the decision against it is not distorted because of infrastructure constraints but simply because possible infrastructure constraints are not known. This is just one example of one application. There would be many more. If New Zealand is to electrify transport in a meaningful way, installers of fast chargers, for example, will need access to reliable, household level data on local capacity and bottlenecks. Mass electrification will require widespread access to reliable data on infrastructure capacity and limitations at the household level to determine if electrification is viable at any particular site.

Anecdotal feedback from CEP members indicates connection charges are too high and are a material deterrent to electrification, especially in potential cases of first mover disadvantage.

Electricity distribution companies operate a local monopoly and should be subject to regulation consistent with that market position. However, the application of price caps for new connections could be counterproductive in that distributors could limit expansion only to opportunities that allow profit within the price cap. The net effect may be a constrained or slowed expansion of capacity. It is essential, therefore, that complementary regulation or incentives are introduced to ensure expansion will continue should price capping be introduced.

4. RESPONSIVE DEMAND AND SMARTER SYSTEMS

Smarter systems and energy use are essential for the transition and CEP conceptually supports activities in the area of facilitating demand response and more efficient use.

Smart systems controlled by consumers will help deliver efficiency and flexibility. Therefore, CEP supports standards that incorporate smart functionality into consumer products. There may also be merit in a labelling scheme for smart devices.

Smart systems controlled by electricity retailers or distributors could bring efficiencies but also come with risk in several forms. Firstly, adopting smart systems for load control should not be employed as a replacement for adequate investment in infrastructure. Secondly, there is risk smart systems that manage load remotely take control away from consumers, potentially to their detriment and dissatisfaction. Smart systems controlled by retailers or distributors are not dissimilar to the ripple control systems commonly triggered in New Zealand. Overall, these have delivered system efficiencies. Nevertheless, survey results published by EECA in 2020, albeit with a sample size that does not provide statistical significance, indicate 21% of people reported they had run out of hot water and attributed that to ripple control[1]. There will be economic incentives for distributors and retailers to control load remotely. In the case of distributors it might be to avoid investment, in the case of retailers to avoid periods of peak wholesale prices. It is essential consumers are protected from algorithms designed for the benefit of others rather than themselves.

Thirdly, individuals applying smart devices may not fully understand the implications of their decisions. When certain New Zealand retailers began to offer electricity pricing linked directly to wholesale prices, their strong marketing messages of overall cost reductions secured many customers. Many of these customers failed to realise the price risk they were exposed to in the wholesale market and when the inevitable spikes occurred, they were left significantly worse off and discontent. In that example, the marketing outweighed the small print. If vehicle charging, for example, is controlled remotely or through an algorithm set around pricing or capacity signals and normal usage, it is conceivable consumers could wake to uncharged or insufficiently charged vehicles. Consumers will need to be adequately educated on the risks associated with smart devices and understand the full implications of ceding control to a distributor, retailer or algorithm.

The above concerns are not to suggest smart devices operating through algorithms or AI can't deliver system efficiencies – they will – but to highlight these system efficiencies come at the cost of less consumer control. In developing policy, it will be essential to balance the desire for system efficiency with consumer expectations and experiences.

Battery storage infrastructure at the local level should be encouraged and, potentially, incentivised. Local battery storage will flatten the aggregated demand curve, satisfy short-term shortfalls in supply and provide flexibility for demand management for smaller and medium sized businesses as well as households.

Subsidising household battery installation would achieve many of the benefits of demand management but at high cost to the taxpayer. Further work and consultation on the relative merits of such a policy would be worthwhile.

A review of critical data availability is critical. The development of a detailed, accurate database of distribution infrastructure and bottlenecks that will have widespread accessibility is essential

[1] https://www.eeca.govt.nz/assets/EECA-Resources/Research-papers-guides/Ripple-Control-of-Hot-Water-in-New-Zealand.pdf

5. WHOLE-OF-SYSTEM CONSIDERATIONS

Priority should be assigned to:

- Enabling electrification through understanding what is and is not feasible is essential and urgent, i.e. the development of a nationwide, accurate and detailed database of distribution infrastructure and bottlenecks;
- Elevating the role of energy efficiency. This to include facilitating widespread application of household insulation and uptake of efficient technologies, such as heat pumps. This is an enduring solution that will substantially alleviate energy poverty as well as help accelerate a transition to renewables;
- Uptake of smart devices should be encouraged with the caveats that consumers need to understand the risks associated with smart devices and distributors are not permitted to employ smart device technologies in avoidance of improving infrastructure;
- Encouragement of local (perhaps even household) storage solutions to improve flexibility and flatten the demand curve.