Submission: Default price-quality paths for electricity distribution businesses from 1 April 2025

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About solar Zero

solarZero has 12,000 solar and battery system deployed across Aotearoa New Zealand. The systems are managed as a virtual power plant (VPP) and solarZero runs one of the largest VPP in the world. The VPP operates in the electricity reserves market and can provide a peaking plant into the wholesale market (over 30MW mid Dec 2023). solarZero has two non-network solutions; Upper Clutha and Coromandel. During Cyclone Gabrielle around one third of solarZero's North Island customers lost grid power but all the households kept their lights on and the fridge cold, in some cases for more than seven days.

We would be happy to meet and discuss this submission.

Introduction

The electricity industry is going through the first ever major change it has been through. That change is the introduction of late 20th and 21st century distributed and digital technologies at the distribution level. The adoption of this technology is one to two decades behind other industries and is also one to two decades behind the use of this digital technology at the transmission level, which enables the operation of the wholesale market.

At the same time as this technology-enabled change occurs, the electricity industry is being asked to step up and play a central role in the electrification of the economy, resulting in a substantial increase in demand. This second change is reflected in the expected increase in capex in AMP forecasts, which is unprecedented and unparalleled probably since the country began its electrification journey some 120+ years ago.

Figure E2 Comparison of capital expenditure forecasts from EDB AMPs forecasts

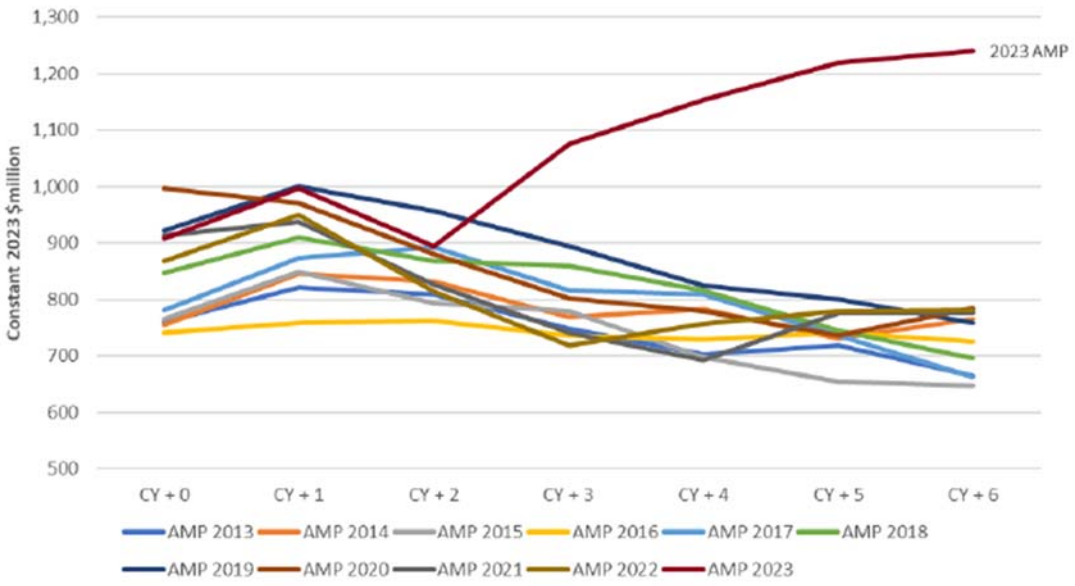
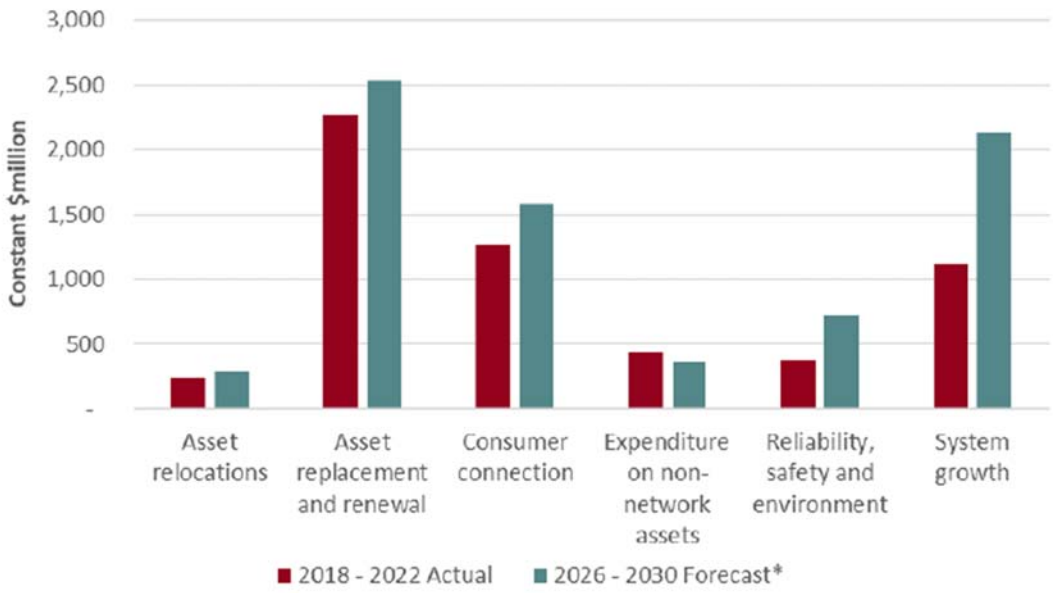


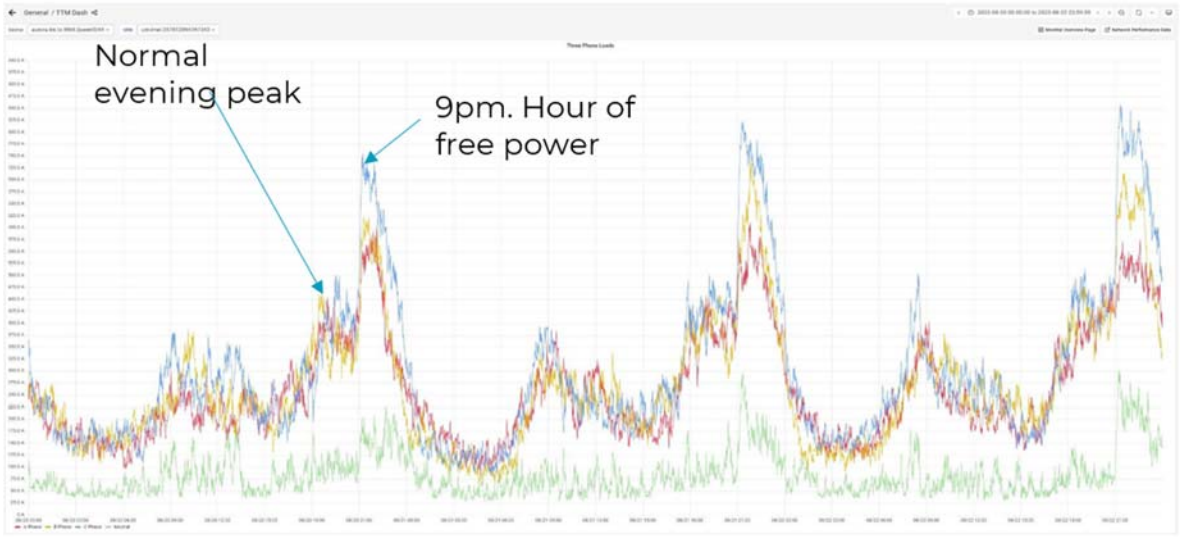
Figure E3 Breakdown of expenditure on assets



Over the past 130 years the electricity industry has become very **efficient** at creating a very capital **inefficient** sector. Residential demand has been seen as something that cannot be effectively managed, with the exception of hot water load control, resulting in a power system that is built for peak demand and an assumption that demand is otherwise inelastic, apart from hot water control.

Technology now exists that enables both people and devices to respond to signals and alter demand patterns and even inject power into the network at times. The devices range from smart meters to computer control equipment on distributed equipment and household battery systems. Signals include pricing and control signals sent to aggregators who in turn instruct devices.

The world famous (in Otago) “hour of free power” demonstrates that people will respond to price signals as the graph below shows. The peak at 9pm, the “hour of free power” is much larger than the traditional 6pm peak.



The hour of free power creates a significantly larger peak in the student quarter in Dunedin (data from Aurora Energy).

This DPP period is the first critical one, since Aotearoa New Zealand began its electricifcation journey 120+ years ago, for shifting the industry towards a capital efficient future. As the capex projections show, if the industry does not change course urgently there will be a large amount of capital inefficiently invested in the power system under the status quo. To ensure that the capital spend is efficient the Commerce Commission together with the Electricity Authority must strongly support innovation and put in place a range of settings that will drive the industry towards a much more capital efficient future. The alternative is that New Zealanders will be lumbered with a power system that is much more costly than it needs to be.

Innovation takes time, a focused effort and involves a lot of learning. Learning is hard. Innovation involves figuring out new ways of doing things from setting lines prices to working with consumers, to new relationships with entirely new players such as aggregators, and much better use of data and information. All this needs to happen at the same time and quickly. If it does not happen quickly lines companies will go down the route of traditional investment saddling New Zealand with a very expensive power system for the coming decades. That is inflationary, low productivity and will reduce New Zealanders' overall wealth.

solarZero recommends that the principles/settings for this DPP are very different from the past. If they are the same then there will be significant inefficient expenditure as highlighted in the AMP capex projections. The principles/settings we recommend are:

- Assess the degree of optimisation of capital deployed, e.g. the difference between peak and off peak. Where the difference is small the lines company should be rewarded. Where the difference is high the lines company should be penalised.
- Substantial incentives for innovation. The entire industry needs to learn.
- Reward the use of Information and data. It is time the lines industry moved into the 21st century in terms of data and information.

The document focuses a lot on reliability and resilience. It also needs to focus on capital efficiency and innovation. That focus is critical if New Zealand is to have a cost-effective, capital efficient power system.

This submission responds to questions that are relevant to solarZero.

1: Have we properly understood and represented the changing industry context and are there other implications for the DPP4 you believe we should consider?

Properly understood and represented the changing industry context? Not quite. There are two key points that need much more focus.

First, timing. Based on the investment plans of lines companies, this DPP is critical. It will either (i) commit New Zealand to an expensive, traditional, low-productivity power system that is an inefficient user of capital or (ii) rapidly change the industry to an innovative, high productivity electricity system that efficiently uses capital.

The importance of the timing issue is completely missing in the document. This DPP will set the future course of the electricity system. That document does not appear to recognise this.

Second, and related to the first point, the document does not recognise that the electricity industry and the economy are both going through substantial change *at the same time*. The changes are coincidental: Electrification of the economy and the introduction of smarts into the electricity industry.

Both are one off changes. This DPP is not about refining the status quo in a process of continuous improvement. It needs to set the direction for a power system that is at a major fork in the road. Either the electricity industry powers the economy efficiently or it powers the economy inefficiently. The Commerce Commission will determine which fork the electricity industry takes. That choice is not made clear in the document.

2: We are proposing to adapt our approach to capex for DPP4 based on feedback from EDBs, that past expenditure is not a good starting point for considering future spend.
Do you have any particular concerns or issues with our proposed approach? If so, how could these concerns or issues be resolved?
What alternative data and external sources should we use to support our consideration of capex forecasts, beyond the information in 2023 Asset Management Plans (AMPs), responses to section 53ZD notices and 2024 AMPs and why should these be used?

Past expenditure is not a good starting point for considering future spend, just as past philosophy and settings is not a good starting point. The electricity industry ought to be going through a major technological step change. We would hope that future spend would be quite different because the industry will start to adopt new and better technologies and new and better ways of doing things.

The work the Commerce Commission is getting IAEngg to do is important. It will be critical to have IAEngg consider optimisation, non-network network solutions and what efficiencies could be gained through having better data and information, particularly at the LV level. Looking at future expenditure through the same lens as used in the past will not deliver a modern, capital efficient power system. Instead it will deliver more of the same – a capital inefficient system.

An example is resilience. A distributed resilience solution may be more cost effective and provide greater resilience in some areas as compared to strengthening the network. By distributed resilience we mean solar and battery systems on a very high proportion of houses, businesses and emergency centres. Currently, we suspect that AMPs will be pricing in resilience solutions focused on strengthening networks. Shifting from a concept of strengthening the network to distributed resilience is an example of innovation and the shift in thinking and practice that is urgently needed to avoid creating a very expensive, capital inefficient future power system.

Essentially, the industry is racing towards creating a very expensive power system and the Commerce Commission, together with the Electricity Authority, EECA and MBIE need to work with the industry to get it onto a different track. Every action the Commerce Commission takes needs to help the industry transition to this smart future, including seeking alternative data and advice from external sources as to the shape of the future power system, and involving industry in those processes so that the industry learns.

4: We have concerns about the challenges in delivering increased programmes of work signalled by EDBs given current labour market, supply chain and economic challenges in New Zealand

To date solarZero has not suffered any supply chain issues. Distributed, smart solutions may be more resilient in terms of supply chain issues than large traditional solutions.

5: We will be using a s 53ZD notice to collect information about how EDBs have reflected resilience in their expenditure forecasts

What engagement have EDBs had with consumers about resilience expectations, especially as it relates to significant step changes in forecast expenditure?
What other considerations should we factor into our analysis of the resilience expenditure information collected from the s 53ZD notice and/or what is unlikely to be visible in the forecasts that we should consider?

As discussed above distributed resilience is a new tool/technology for helping improve community-level resilience. The Commerce Commission needs to challenge the industry to look at different ways of providing resilience. It needs to fund pilots and examples to help the industry learn about how new technologies can help address resilience in a more cost-effective manner.

There is a strong social element here and learning about communities needs to be a key part of this. The impacts of "natural" hazards is not about nature – it is about communities and people. We need a much stronger understanding of communities and how distributed resilience can be built cost-effectively together with communities.

It seems highly likely that there have been few conversations with communities about resilience and the kind of power system that may best provide the most-cost effective resilience in different locations. Distributed resilience needs to be part of the industry's tool kit and needs to be part of the conversation with communities.

6: We would like to understand how potential changes in capital contributions policies could be accommodated in DPP4

How could changes to capital contributions policies, either in advance of or within the regulatory period, be accommodated within our capex forecasts for DPP4?

This is not a core area for solarZero. However, smart technology should reduce the amount fof infrastructure needed and therefore the capital contribution. The Commerce Commission needs to explore this area and provide guidance on it.

7: We are interested to understand if EDBs are assessing investments driven by expected pace of change which may not be consistent with choices otherwise made under a least-cost lifecycle basis.

Are there specific investment decisions being considered due to concerns on delivering increased scale of investment in limited time which are not consistent with a least-cost lifecycle basis assessment; for example, areas where EDBs are intending to build well in advance of forecast need or for demand or generation that are only speculative?
On what basis are these investments being assessed?

E97 Our view is that EDBs who are investing and operating efficiently will be planning to meet expected customer demands for service quantity and quality on a least-cost lifecycle basis. Capacity will therefore be sized over an appropriate planning horizon taking into account the economies of scale and scope inherent in electrical equipment and electricity networks. As a result, there ought to always be some level of growth capacity involved in planning distribution networks for forecast demand because doing so will result in lower lifecycle costs to consumers than always investing incrementally.

Paragraph E97 contains some fundamental assumptions that need to be challenged. Given the substantial technological changes that are already beginning to impact the electricity industry (e.g. EV, energy efficient appliances, demand response, price responsiveness) the pattern of growth may be quite different than in the past. Pricing, for example as has been proven in the "hour of free power" in the Otago student quarter, has the potential to significantly influence demand patterns. Lines companies, via pricing, can now influence peak demand growth. This is new and proven.

The Commerce Commission needs to focus on the way that lines companies are controlling peak demand via pricing. Whilst this is an area that the Electricity Authority focuses on, it needs to be an area of intense focus by the Commerce Commission. Lines pricing will determine the rate of growth of peak demand and the degree to which networks consider it necessary to build new infrastructure to meet growth.

Now is the first time in history that lines pricing can be used to influence demand profile at the residential level, via for example smart metering that can track electricity usage to a particular time. The industry needs to be encouraged to actively use pricing and a range of other mechanisms to influence the demand profile and develop a power system that uses capital much more efficiently than it has in the past.

Lines companies need to:

1. Manage peak demand growth via pricing, demand response and influencing the uptake of technology like solar and batteries (which will be via pricing), working with communities and aggregators.
2. Only when these means are exhausted should building new infrastructure be considered. The Commerce Commission should put tests in place to assess whether the lines company has indeed reasonably exhausted attempts to manage peak demand growth.

8: Input price inflation – We are considering amending our approach to forecasting opex input price escalation to better reflect the mix of inputs EDBs face

Do you have a view on another index, or weighted mix of indices, which would improve the quality of opex forecasting compared to our current approach? (Using a 60/40 mix of percent changes in Labour Cost Index (LCI) all-industries and Producers Price Index (PPI) input indices.) If so, what evidence supports this view?

This section focuses on the indexes that should be applied to increasing opex, such as inflation indices. It misses an important point: Opex is likely to increase significantly because lines companies ought to be funding more non-network solutions, demand response programmes and the like. Currently that funding is likely to be considered Opex. Whether considering this kind of expenditure as Opex needs to be debated.

9: Scale factors - We are considering revising our approach to scale growth trend factors, to better reflect EDBs increasing focus on investing to meet growth and renewal needs

3.51 Our initial reassessment of these relationships (using regression analysis) is that they remain robust but could potentially be improved. In a context of increasing capital investment by EDBs we need to consider whether this approach to opex remains the most likely to reflect forecast growth.

D7 We consider it is appropriate to forecast opex in this way because most opex relates to recurring activities. As such, the expenditure can be expected to be influenced by certain known and predictable factors.

The assumption in D7, that *expenditure can be expected to be influenced by certain known and predictable factors* is just plain wrong and simplistically heroic. The industry is going through a massive change. Factors influencing the industry are neither known nor predictable. Could Aurora Energy have predicted that the "hour of free power" would catch on and that students would behave in a particular way, resulting in a massive peak and requiring Aurora Energy to spend hundreds of thousands of dollars?

Having said that, lines companies can influence the destiny of the network in these uncertain times. They could either:

- Build an unoptimized, expensive network that consumers will end up paying for, effectively for ever. That is essentially the status quo and the path based on *certain known and predictable factors*, or;
- An optimised power system that efficiently uses capital. This option requires lines companies to influence the demand profile and encourage the use of new technology.

Figure E2 indicates that there is going to be a substantial increase in Capex. We assume that with new technology, clever pricing and contracting regimes, the Commerce Commission needs to very carefully think about Opex given the investment conditions are clearly changing, as evidenced by lines companies estimates of Capex. Using past approaches, as suggested in paragraphs 3.51 and D7 won't cut it.

Opex should not be thought about as it has in the past. Using a base-year approach is no longer relevant. Opex needs to increase substantially if the hump in capex is to be reduced and the power system optimised. The past relationships between parameters such as length of lines and opex will no longer hold, unless the Commerce Commission decides to steer the industry down an unoptimized and expensive path.

11: Step-change criteria - Given the possibility of a greater need for step changes in opex in a context of industry transition, we have clarified further how we are thinking of applying the step-change criteria and the supporting evidence we expect

Commission views

D184 Under the base-step-trend approach to setting allowances, and the operation of the IRIS mechanism, EDBs have incentives to manage their networks to required levels of service quality in the most efficient way. Depending on the circumstances, purchasing flexibility services or making ACOD payments may be the most efficient solution for an EDB. The EDB may face an opex-capex substitution decision. For example, entering into a contract for flexibility services may increase opex, but reduce capex that would otherwise have been required (as in the peak demand example above). If substituting opex for capex results in overall lower costs to consumers, the decision to enter into the flexibility services contract is efficient. We understand that flexibility services and ACOD payments have not yet been widely adopted by EDBs in New Zealand.

We agree with paragraphs D184-188. Opex step changes will be needed, if Opex is the way that the application of new technologies and new approaches is to be considered. Whether it is the correct way to categorize this expenditure needs to be debated.

A key point that is not sufficiently recognised in the document is that a substantial amount of learning needs to be done.

12: Our initial view is to maintain the principle of no material deterioration and set quality standards on a basis consistent with that established in DPP3

Reliability and resilience is an area where new technologies can offer significant benefits to consumers and communities. For example, during Cyclone Gabrielle around one third of solarZero's North Island customers lost power, some for more than seven days (a white paper on the performance of solarZero's systems is attached to this submission). Of the 2,700 impacted solarZero customers all kept their lights on and all kept their fridges cold.

Lines companies need to be encouraged to explore new technologies for resilience, such as solar and batteries providing "distributed resilience". SAIFI and SAIDI, if continued to be used, need to be more granular. Where lines companies make the decision that distributed resilience is a more cost-effective approach than that strengthening the network, the lines companies should be rewarded. Exactly how such a mechanism could work needs to be thought through. SAIDI and SAIFI in their current form would not reflect or support a distributed resilience approach.

13: Our initial view is to maintain the DPP3 settings of a 10-year reference period updated for the most relevant information and normalisation approach for major events

Weather events are going to become more extreme due to climate change. New approaches are needed to deal with these increasingly extreme events which will occur more often. The Commerce

Commission should encourage lines companies to adopt a distributed resilience approach. It may not be cost-effectively possible to maintain a traditional power system during storms like Cyclone Gabrielle, particularly as storms become increasingly severe. We suggest a workshop on this topic and the subsequent preparation of guidance documentation. The guidance needs to cover where this kind of approach is appropriate, technology aspects, regulatory (e.g. how SAIDI and SAIFI can be reconfigured) and social aspects.

14: Our initial view is step changes in reliability, if appropriate, may be accommodated through setting of values or revisions to definitions

The document comments that a step change may be needed if non-network solutions don't work out as planned. The reverse also needs to be considered: New technologies (both hard and soft[1]) could offer new solutions, particularly as businesses and communities learn how to apply distributed energy resources. The Commerce Commission needs to think through how to adjust settings to more strongly encourage uptake of more cost effective distributed energy resources and related VPP technologies because these are going to become more ubiquitous over the coming 5 years.

17: Section 53M(5) allows us to reduce the regulatory period if this would better meet the purposes of Part 4 of the Act. We are considering whether we should reduce the regulatory period from five to four years

The industry is going through a once-ever substantial change due to (i) electrification of the economy and (ii) new technology. All aspects of the industry will need to change during The Transition, including the processes run by the Commerce Commission and the like. Changing from 5 years to 4 years is not really much of a change and is not nearly enough of a change to help the industry transition to a much more capital efficient state.

We suggest a different approach. We suggest that an industry learning stream of work is established that connects with the innovation allowances and funding. As industry rapidly learns through this process the AMP and DPP processes can pick up this learning. But the key point is that the learnings are applied by the industry as the learnings become available.

20: Our initial view for DPP4 is to retain revenue-linked quality incentives for both planned and unplanned SAIDI, with targets, caps, collars, incentive rate and revenue at risk set on a consistent basis with DPP3

Something needs to change. The industry is going through a once-ever change and new measures are urgently needed to provide information on the direction of change. To restate, the change is whether the industry commits New Zealanders to a high cost, low smarts power system or a low cost, high smarts power system.

We suggest a government-industry working group is group is urgently convened to look at quality incentives.

[1] Soft refers to social/working with communities.

A key quality indicator needs to be around the efficient use of capital, both currently and as a quality indicator for future investments. One simple measure is the difference between peak and off peak demand. This indicator can be used to assess investments and expenditures – will they reduce the difference between peak and off peak? This measure needs to become a central part of the quality incentives framework.

As mentioned earlier, new technology results in demand appearing much more elastic than it has in the past. This is a paradigm change. Lines companies need to become experts not just at building networks to meet anticipated peaks, plus some load management in the form of hot water control, but expert in how to shape the demand profile and therefore improve the efficiency of capital utilization. Lines companies that become expert at this need to be rewarded.

Thinking about the efficiency of capital utilization is a paradigmatic step change. As part of this step change an industry-wide programme of learning and innovation is needed. As outlined elsewhere in this submission, the prize is large: A capital efficient power system as compared to a costly power system.

21: Caution around treatment of non-performance of less proven solutions may create a reticence by EDBs to implement these types of solutions and result in a focus on more proven established technologies, typically, capex investments. Our intention is that the compliance with the quality standards and penalties under the QIS do not act as a potential impediment to innovation

This is essential. How this concept can actually work in practice needs to be explored. We suggest workshops and collating international experience in this issue.

22: The regime's baseline incentives may be insufficient to support innovation, such that we consider it is appropriate to have an innovation (and/or non-traditional solutions) incentive scheme. Do you agree with our understanding of the regime's baseline incentives to support innovation, and the need for an innovation and/or non-traditional solutions scheme? Would you be interested in participating in a targeted workshop, and if so, are there any topics you consider should be covered?

A massive amount of innovation is needed, quickly, to avoid New Zealand becoming locked in to an expensive power system that uses capital inefficiently, essentially forever. A workshop that leads to a plan being rapidly developed to encourage innovation is urgently needed. An industry-wide learning, knowledge and experience learning system is needed. Funding needs to be made available to support this so that the industry moves up the learning curve more quickly than it otherwise would. The benefits are large in terms of a much more efficient and reliable power system that makes much better use of new technologies (both hard and soft) more quickly. We would be very keen to help plan a workshop on innovation, urgently.

23: We are interested in feedback on our initial thinking about how to design an incentive scheme to encourage innovation and/or non-traditional solutions in DPP4. What are your views on the key principles (see Attachment I)? Are they effective as the basis of an innovation and/or non-traditional solutions scheme? Are there others you think may be suitable?

An incentive scheme is needed. The industry needs to rapidly go through a steep learning curve to apply new technology that will result in a more efficient and reliable power system. The application of new technology needs to run ahead of decarbonization of the economy, i.e. needs to happen now.

The proposed key principles (I20) do not reflect that the industry needs to go up the learning curve rapidly. For example, a new solution may only be riskier than BAU because the industry does not have experience in applying that solution – once the industry has learnt how to do it, the solution becomes reliable.

The language and fundamental underpinnings of the key principles in I20 need to change. They need to reflect a learning and innvotion paradigm.

24: Our initial view is that a specific incentive for demand-side management and energy efficiency is not required for DPP4

That view is completely wrong. There is an urgent need for a specific incentive for demand-side management and energy efficiency. This is the critical period. The choice of path the industry takes over the next 5 years will determine whether New Zealand has a power system that deploys capital efficiently or one that is costly.