Final Report

Prepared For:

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New Zealand

Transition to a Highly Renewable Electricity System

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1. EXECUTIVE SUMMARY

The New Zealand Government has committed to reaching net zero for long-lived gases by 2050; has set a target that 50 per cent of total energy consumption will come from renewable sources by 2035; and has set an aspirational target to reach 100 per cent renewable electricity by 2030. While electricity generation only contributes about 6% of New Zealand's greenhouse gas emissions it has a larger role to play in meeting overall emission reduction targets through the electrification of the wider energy system (especially transport and industrial manufacturing) which accounts for 40% of greenhouse gas emissions.

The NZ Government recently released a range of discussion papers including "Measures for Transition to an Expanded and Highly Renewable Electricity System" (Electricity Measures Paper). In some ways these papers are analogous to working out what you need in your backpack before you set out on your journey. However, in this case, where your journey extends out until 2050, knowing in advance everything you may need along the way is clearly impossible. Truth is, we're going to make a couple of stops along the way where we can refill and even upgrade our backpack. Being overly ambitious comes with the burden of carrying too much, going too fast, or taking off before having considered all relevant factors. We just need to get to the next check point.

The ongoing transition of the NZ electricity system brings a range of challenges but also opportunities. As the main incremental contribution of the electricity sector is to support electrification of higher emitting sectors, such as transportation and industry, the main manifestation of this contribution is the need for the electricity system to serve additional load growth over time. Growth can be forecast and the associated system infrastructure requirements can be planned.[1]

1.1. TAKING STOCK AND GETTING READY

New Zealand is rich with hydro resources, abundant wind, reasonable sunshine, and blessed with geothermal resources at the boundary between two tectonic plates. New Zealand also has a well-regarded and well-functioning electricity market that provides efficiently priced electricity to consumers in a secure and reliable manner. It is a market that is regularly under review, with three decades of lessons learnt having been applied to help ensure it remains relevant to ever evolving stakeholder requirements.

1 Most of Asia is growing faster than New Zealand's more aggressive outlook scenarios. From any objective external perspective, the growth in expected future transmission and grid requirements in general is not especially remarkable, however, different it may appear compared to New Zealand's more recent history. The more important challenge is to not to make grid and other investments so far in advance of growing load that the effective cost per kWh increases faster or higher than necessary. The related challenge is to ensure that prices incentivise efficient use of grid infrastructure which also contributes to lowering the resulting cost per kWh.

This view is shared by the kaitiaki of NZ electricity - the Electricity Authority – in their recent press release which stated that:

> *"While the electricity market may not be perfect, it has served consumers well and the importance of a well-functioning electricity market to enable the transition to a decarbonised economy cannot be understated."*

Three decades ago, electricity market development was a response to perceptions of inefficiency and overbuild flowing from a past Think Big era and the realisation that complex hydro-dominant systems could be operated efficiently in a decentralised manner using price signals. The efficiency and reliability of supply track record of New Zealand's electricity market era has been exceptional even despite a disproportionate number of so-called 1 in 100 year droughts.

1.2. CORE RECOMMENDATIONS

As New Zealand examines possible 'measures' to prepare for the energy transition, our core recommendations are simple:

- Allow the market to work as best as possible;
- Remove unnecessary obstacles to efficent decisions;
- Recognise that investors are irresponsible if they ignore real risks to which they are exposed – as such they will and should sit on the sidelines if the longer-term outlook is insufficiently clear or attractive;
- Markets abhor a vacuum and have, by corollary, a robust appetite for well-structured and objective information about system current and expected future conditions; and
- Minimise backstop measures to the extent possible and avoid 'think big' type projects, especially if they involve multi-year planning and development, and come at high cost and materiality. The time for these is not now.

The challenge is to approach the energy transition in a way that avoids heavy handed intervention whilst providing firm guidance regarding the problem the market is supposed to solve. Afterall, that is what any market is for: to solve the problem of balancing supply and demand through choices and efficient prices. Define the problem well, align the problem with customer preferences and supplier capabilities, and ensure adequacy of competition through ease of entry and exit.

Anyone can try to solve a complex problem by spending too much money, but where is pride in that? The most complex challenge is not decarbonisation but decarbonisation over time at a reasonable cost. That's exactly the challenge that a market-based system is well situated to deliver.

Accordingly, we suggest that a better approach for this journey would be to pack lightly, have some emergency supplies at the ready should conditions change and re-provision regularly along the way.

1.3. Avoid Do or Die

The transition to low carbon economies is an international endeavour. In signing the Paris Climate Change Agreement, NZ joined this endeavour. In advancing its response NZ should not act in isolation, but rather keep pace with the rest of the world, observing and learning from those 'out in front', including those who may stumble along the way.

Setting an 'aspirational' target may sound lofty but it often comes at a price. A reasonable set of steps, pacing, possible trajectories, options and costs must be defined not based solely on what happens in New Zealand but on what is happening throughout the world.

Making very substantial progress towards decarbonisation is not something that requires desperate acts or measures. Achieving full, absolute, decarbonisation of the power sector can increase costs based on present understanding, but that is not the challenge for 2023. The weight of the global community moving forward will drive innovation, bring costs down and create efficiencies. Everyone may fail despite their best efforts if enough make only poor efforts. Equally, however, those who move too quickly risk persistent higher costs by missing out on future optimisation. Success is not measured by how fast New Zealand decarbonises but on how cost-effectively New Zealand decarbonises in concert with the global community.

1.4. Making Use of the Market You Have

It is easier to destroy a market than to build one. Markets depend on stakeholders believing that the context within which the market operates is stable. In a sense, well-functioning markets depend on faith. Upon a loss of faith, markets only exist to the extent that there is a balance of power between suppliers and demanders. Market governance, economic regulation, and market design aim to regulate power so that stakeholders can transact with trust. Courts exist to empower those who shake hands or have pieces of paper with signatures, rather than to empower only those who have armies. The point is that markets are incredibly fragile. Markets do not work merely because of their associated rules and systems; they work because there is a reason to believe in the stability and comprehensiveness of those rules and systems.

The biggest risk and uncertainty of decarbonisation is and will continue to be the question of what an investor in an energy system believes he or she is competing against. Are carbon options still on the menu, are carbon options simply priced higher, are the competing stakeholders operating to the same profit motive? Will new projects have protective long-term contract cover not otherwise available? And so forth. It is not that difficult to understand or recognise the problems that arise for market-based-stakeholders or potential market-based investment responses in an energy transition in which government policy or action are responding to non-market signals.

1.1. RECOGNISING UNCERTAINTY

The further transition to a highly renewable future carries with it a number of uncertainties. Many of these uncertainties aren't particularly novel in nature and are part of the reasons markets came into existence in the first place, but they may be exacerbated.

The key ones we raise in this paper are the pace of future demand growth (which sets the need for new renewable investment), energy efficiency, potential demand exits (Tiwai), the frequency of dry years, and the emergence of new technologies.

Managing such uncertainties requires transparent information flows – such as an annually prepared Statement of Opportunity outlining the need for further system investment; providing sufficient detail for investors to perform their own due-diligence and respond accordingly. Markets present the collective views of participants, but rely on a transparent and level playing field of information being provided.

If new investment is not forth coming at the pace that is believed necessary, then two things may be happening – the market is failing to respond or the market is trying to tell you something. It is easy to assume the former at the expense of the latter. For example, perhaps investors are not convinced at the pace of New Zealand shifting to EV electrification in the absence of clear and specific non-partisan government policy; perhaps investors have taken a more global view of hydrogen production costs, or question the implicit willingness to pay associated with faster, deeper, decarbonisation.

Whilst it is tempting to simply say that markets require clear policy frameworks, that would be incomplete. A clear policy framework today that changes to another clear policy framework tomorrow can be just as problematic. The key desirable characteristic is that the underlying approach remains consistent. However, if the framework is that the government will simply make investments as it wishes from time to time, then that would not be a robust framework as no one can compete with a sovereign entity that is not necessarily committed to making decisions on the same basis as a commercial player would. And so forth.

Markets rely on expectations – if no one believes the story then they won't come in. Once certainty is introduced, investment will follow. This is where we differ in our perspective compared to the point of view inherent in the Electricity Measures Paper. To achieve meaningful emission reductions in the energy system begins with setting clear policy (including specific targets, dates, milestones and what will create the force of action) around the need for electrification of transport and industrial manufacturing – these two components alone produce over four times the emissions of electricity generation in NZ – and drive the anticipated increase in new renewable generation to be built. As demand increases, evidence-based planning becomes possible and will always be less expensive. Aspirational planning risks building out too much, too soon.

1.2. 'Silver Bullet" Solutions

Big, high-capex, long-to-develop projects cast a long shadow on markets. Will they or wont they go forward? If they go forward, will they or won't they be completed on time? And if completed on time, will they or won't they come through at or under budget, or will they constitute a long-term burden on future generations? And, ultimately, if no management or shareholders feel the pain, will the decision process take financial risk into account? These are the questions that should be answered before starting. Having reasonable basis for answering these questions is what evidence-based planning is all about. For as long as such projects are in discussion but not resolved, the market faces a chilling, wintry wind, not unlike the uncertainty around future demand at Tiwai.

This is why a return to silver bullet schemes such as the seemingly ill-fated Lake Onslow pump storage facility, can be so damaging to the market context. It may be tempting to use a bigger stone to kill many birds at once, but the stone risks becoming so heavy it cannot be thrown at all. How does Lake Onslow fit into a market-based system? What market failure or evidence of failure exists to justify an intervention on such scale at this time?

Also illustrated by Lake Onslow is the additional uncertainty such grand plans present when there is no clear nonpartisan political support. While acknowledging that "we can and should be doing more to get renewables built", the National Party (as the leading party of the newly elected coalition Government) has previously advised that it will "immediately cancel the Lake Onslow project if elected in October"[2].

There may come a day when such projects may need to rise up and become a part of the overall system, 'but it is not this day'. In summary, our concern is that 'silver bullet' projects invariably take longer to implement, are expensive (with costs often exceeding expectations), concentrate risk of failure, and close out future optionality.

It would be a pity and a grave cost (waste) to take such actions 'today' as to compromise the electricity market's ability to contribute towards enhancing the economic efficiency and innovation of New Zealand's decarbonisation journey.

1.3. Flexible Solutions are Required

Flexible solutions, such as Demand Response (DR) have become increasingly used in electricity systems to help manage the increase in volatility, as well as to reduce peak demand and contribute to system reliability. Practical lessons can be drawn from the wide and varied use of demand response internationally to help maximise DR participation levels in New Zealand's renewables transition. DR can be both a permanent solution to market requirements or to act as a transitional measure to buy time while other solutions are developed.

2 Stuart Smith, National's Energy and Resources spokesperson, 16 March 2023

1.4. Freedom to Contract

Allowing investors to manage their price and volume risk is also important in managing the transition. This involves the freedom to contract with counterparties to set prices outside of the market through Contracts for Differences (CfD) and other agreements. Expanding the range of risk products on organised exchanges is beneficial but needs to be well considered alongside liquidity levels and market maker costs and risks.

The greater use of green corporate PPA agreements to support new renewable investment is part of a global trend. It matches renewable generation with load, especially those seeking 'green' solutions and starts to de-risk price volatility and volume certainty.

1.5. The Way Forward

Ultimately, we believe that New Zealand is well placed to achieve a reasonable transition to a low-carbon energy sector *because* of its electricity market. Taking steps known to undermine the market's effectiveness should be avoided. Reinforcing market effectiveness by working within the various prerequisites of market competition whilst reflecting the impact of externalities is still a viable and attractive approach. Setting targets that are aligned with international best practice reduces the risk of stakeholders having to second guess future commitment to current policies and positions. The fastest way to undermine a market is to take actions that cause market participants to wait for government action out of concern that any market-based investment exposure risks being undermined by such action anyway. As with any borderline, the first step is to recognise it exists and that crossing it has potentially unintended and costly consequences.

2. INTRODUCTION

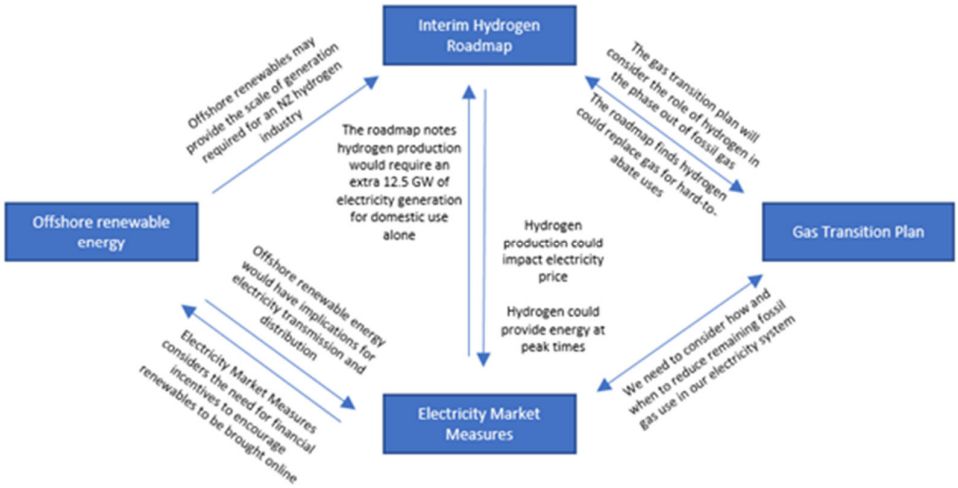
The Lantau Group (TLG) has been asked to provide its expert view on the government discussion paper ***Measures for transition to an expanded and highly renewable electricity system***. New Zealand already has a very high level of renewable generation available to meet its energy needs[3]. The key essence of this discussion paper is on how to achieve the transition away from the remaining thermal generation active on the system; meeting future demand growth for electricity with renewable sources; all while ensuring a "*reliable, and affordable energy system that supports economic growth and productivity*".

The paper sets out work already underway by government and regulators and seeks feedback on what else might be needed.

2.1. NZ GOVERNMENT REVIEW

The Government has committed to reaching net zero for long-lived gases by 2050; has set a target that 50 per cent of total energy consumption will come from renewable sources by 2035; and has set an aspirational target to reach 100 per cent renewable electricity by 2030. A suite of discussion documents (refer Figure 1 below) has been released as part of the process towards developing an overarching New Zealand Energy Strategy (NZES), to be completed by the end of 2024.

Figure 1: Key Connections Between the Discussion Documents



Source: Advancing New Zealand's Energy Transition, August 2023, Ministry of Business, Innovation & Employment

3 The renewable share of generation was 87.1% in 2022 according to MBIE annual electricity generation and consumption data.

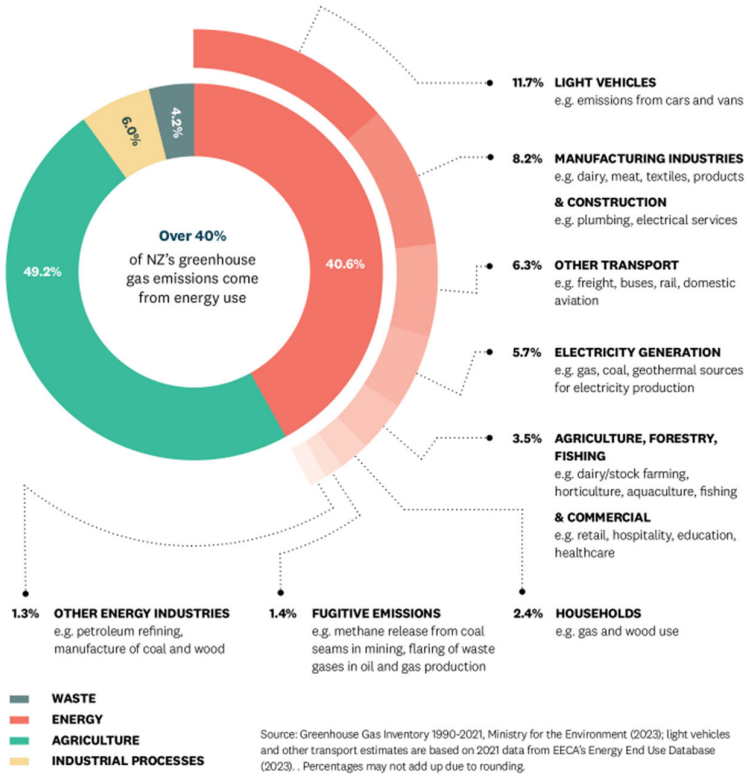
The stated objectives for the NZES are:

- energy affordability and energy equity for consumers;
- ensuring energy supply is secure and reliable, including the adaption to the effects of climate change and global shocks;
- the energy system transitions at the pace and scale required to support reaching net zero by 2050; and
- the energy system supports economic development and productivity growth aligned with the transition.

The above objectives are neither intrinsically unreasonable nor unrealistic. Whether they are reasonable or actually achieved, however, is less about the objectives themselves and more about the common sense and robustness of the efforts to achieve them.

The importance of renewable electricity in helping to meet the energy system objectives stated is disproportionate to its 5.7% contribution to NZ's greenhouse gas emissions. This is because transforming the energy system towards net zero will require significant electrification of transport and manufacturing industries (refer Figure 2).

Figure 2: The Make-up of Energy-related Emissions



Source: EECA website, accessed 12 October 2023

What will it take to make the transition over the next 25 years to full decarbonisation. What can we confidently do? How can we make the best use of market forces? How can we go into the tool box and not just pull out a hammer every time we have a problem?

We observe a temptation around many countries to accelerate the development of roadmaps and plans and proposals for achieving decarbonisation faster, albeit at the risk of introducing greater uncertainty into otherwise functional market-based processes. The energy trilemma which stresses affordability offers no prescriptive solutions as affordability has no universal meaning. Something is sensible to do if the benefits it creates outweigh the associated costs incurred. Whether that same something is considered "affordable" is not about the value created but about how it is paid for. The trilemma would be more actionable if it replaced affordability with cost-effectiveness. That would usefully separate the questions of 'what to do' from the questions of 'who should pay what for them'.

Important dimensions for consideration include:

- Whether the costs incurred and associated with decarbonisation progress made by New Zealand are disproportionate to what is being incurred and achieved by others. A global problem that intrinsically requires a global solution means that the cost of solutions that achieve local decarbonisation are of no economic value to New Zealand unless global solutions are also sufficient and timely. There is clear value in nudging all global stakeholders forward, but that value falls off dramatically if too few follow, and the choices available to New Zealand's power sector are comparatively expensive.

- What the alternatives really are. Decarbonised energy may in fact be more expensive than carbonised energy, but if enough, globally, are committed to decarbonisation, the ordinary economic damage to any one is minimised, allowing all to benefit from the extraordinary global decarbonisation achievement benefits.[4] Robustly mitigating the threat of competing with future lower cost competition from carbonised energy resources leave a fair playing field for everything else. The biggest risk and uncertainty of decarbonisation is and will continue to be the question of what an investor in an energy system believes are the credible, competing opportunities that a possible investment decision must overcome. Paralysis increases with uncertainty. Investment is at the core of the electricity market. Enabling stakeholders to evaluate investments favourably that align with a reasonable decarbonisation pathway is at the core of how an electricity market contributes to efficiency and lower cost over time.

4 In a prisoners' dilemma, both prisoners have an incentive to turn in the other, as doing so has a higher personal pay-off provided that the other does not do the same. Only if they both hold firm to their prior commitment is the larger total benefit realized as they are both unpunished.

Continually characterising decarbonisation as a higher cost keeps the debate locked in the context of the carbonised energy system which eventually delivers climatic peril. At some point – though not yet today in specific choices – the choice of cheaper but carbonised will not be a choice.

In dealing with such a long-term target (to achieve net zero by 2050) it is clearly not possible to plan with much certainly in advance other than the immediate years ahead. We have created the analogy that preparing for this journey is akin working out what you need in your 'backpack' before you set forth. However, in this case, where your journey extends out until 2050, knowing in advance everything you may need along the way is clearly impossible. Being overly ambitious comes with the burden of carrying too much, going too fast, or taking off before having considered all relevant factors. We just need to get to the next check point.

The challenge is to approach the energy transition in a way that avoids heavy handed intervention whilst providing firm guidance regarding the problem the market is supposed to solve. Define the problem well, align the problem with customer preferences and supplier capabilities, and ensure adequacy of competition through ease of entry and exit.

Accordingly, we suggest that a better approach for this journey would be to pack lightly, have some emergency supplies at the ready should conditions change and re-provision regularly along the way. We discuss the initial contents of this 'backpack' in Section 3.5.

2.2. FURTHER CONTEXT

It is essential to note that the NZES follows New Zealand's ratification of the Paris Climate Change Agreement's ("Paris Agreement") emission reduction targets[5]. These targets represent a significant cost and opportunity for the New Zealand economy. The Cabinet paper recommending approval of the Paris Agreement placed the economic cost of New Zealand's 2021-2030 reduction target at $36 billion (2012 prices)[6]. If New Zealand is unable to meet its targets through domestic reductions and carbon offset prices it will need to seek offshore mitigation at a cost estimated to be between $3.3 to 23.7 billion[7].

5 This commitment is to reduce net emissions by 50% below NZ's gross 2005 level by 2030.

6 Financial and economic implications will result from obligations to take progressively higher emission reduction targets and provide progressively greater amounts of financial assistance to developing countries. The economic cost of New Zealand's 2021-2030 target is estimated at $36 billion (2012 prices), or 1.20% of RGNDI. The costs of our subsequent targets under the Paris Agreement and future packages of financial assistance to developing countries are unknown.

7 Climate Economic and Fiscal Assessment 2023, NZ Treasury and the Ministry for the Environment

Whilst absolute numbers seem large, New Zealand's Gross National Income per Capita was approximately NZD 45,000 in 2021. The impact of NZD 36 billion over 9 years represents less than 0.2% per year share of GNI/capita. That is not to argue there is some magical threshold below which we should be concerned with monetary costs, but rather to ensure that we provide the information and context necessary to bring balance and perspective to the challenge ahead. Making very substantial progress towards decarbonisation is affordable, and is not by any measure something that requires desperate acts or measures. Achieving full, absolute, decarbonisation of the power sector too quickly can increase those costs based on present understanding, but that is not the challenge for 2023. We need to allow ourselves at least some time and degrees of freedom to incorporate new insights and information from developments globally over the next decade.

A reasonable set of steps and pacing and possible trajectories, options, costs and so forth must be defined not based solely on what happens in New Zealand but on what is happening throughout the world. Winning the game is not the same as being able to say that a climate catastrophe was "not my fault", but involves working together. Accordingly the climate challenge is the type of problem for which a successful solution will not arise by being out in front like Phar Lap, but being in tight formation like a peloton. This means that market-based solutions will be more likely to emerge in contexts where policy targets appear reasonably aligned with evolving international norms. The UK's recent reversals of more aggressive targets is a good example.[8]

The best way forward in any challenge depends on two key skills:

- **Recognise the Problem.** Will other countries upon which global decarbonisation outcomes also depend keep up their bargain just as New Zealand does? Without the cooperation and participation of all or most, the actions of some or even many, may be fruitless. This uncertainty drives the rationale of a balanced approach that keeps New Zealand as a constantly willing and nudging leader. The solution to the prisoners' dilemma [problem] is to turn it from a single shot game to a repeated game in which the relevant stakeholders have the opportunity to build trust and optimise coordination.

- **Focus.** Removing distracting options from the table whether by increasing their cost or rendering them implausible removes the most debilitating risks from the market, giving it the very best chance of identifying least cost timetables and options. This is nothing more than recognising, through one mechanism or another, that markets fail when the presence and cost of material externalities go unheeded.

8 The British Prime Minister's net zero speech on 20 September 2023 delayed the phase-out date for the sale of new petrol and diesel vehicles from 2030 out to 2035. This came after the March 2023 Carbon Budget Delivery Plan (CBDP) had already scaled back some of the measures being taken from the more ambitious (but ruled unlawful) 2021 Plan. A shortfall has now been acknowledged by the government, which expects future "unquantified" emissions cuts to make up the gap.

They should not be seen as only a cost. If, in fact, all ratifying nations of the Paris Agreement act pursuant to their ratified obligations, the absolute cost of energy may increase globally, but the more damaging and uncertain *relative* impacts (the penalty on a leader if others do not follow) are greatly reduced. Similarly, the presumption that any form of business- as-usual will continue to be available and, if so, predictable, is a sort of hubris as well. Investors in fossil fuel resources globally will also face rising uncertainty regarding both the supplies they would be competing with and the demand they would be able to serve. It is as likely as any other scenario that fossil fuel price volatility increases significantly, as it is now too easy to develop highly different future narratives about how supply, demand, and fuel markets will develop over the next two decades. Continuing the shift to renewable energy gains relative value as a way to reduce exposure to volatility in that context.

The point is uncertainty is rising of a type and nature that neither has been part of the fabric of the historical electricity supply sector nor is a facet known to be handled robustly by competitive electricity markets. Swinging the pendulum away from the market through paralysing uncertainty or heavy handed interventions is equally to be avoided for having a similarly atrocious track record.

The market alone will not guide the sector towards meeting the Paris Agreement. But a highly interventionist approach has no assurance of delivering a lower cost long-term solution. A feeding frenzy of Government projects without the discipline of market forces (including the pricing of the carbon externality) or practical economic frameworks assures the failure of the existing market for any purpose other than short-term balancing, making the most expensive and material decisions the product of partisan sausage making.

2.3. ELECTRICITY MEASURES PAPER

The Government's Emissions Reduction Plan (ERP) contained an action to:

> *"Investigate the need for electricity market measures by 2024 that support affordable and reliable electricity supply while accelerating the transition to a highly renewable electricity system."*

The electricity measures paper is presented in a number of parts and seeks feedback on whether there are any gaps in which further or alternative measures may need to be developed to support a successful electricity system transition. We have been asked to focus our attention on the first two parts of the paper:

- Part 1 – Growing Renewable Generation
- Part 2 – Competitive Markets

The Measures Paper assumes as an endpoint that New Zealand's electricity system will either be 100% renewable or that significant progress will have been made towards a more highly renewable electricity system. It is important that this is an assumption – there is no way to know in 2023 whether it is actually going to be the outcome. The same study done two or three years later may conclude otherwise, given the rapid development of technologies and perspectives. And so forth. This is the conundrum. The pathway to decarbonisation depends on developments that are yet to occur.

Objectives Being Sought

It is useful to break down the objectives enunciated in the paper into a number of components and to differentiate between objectives and constraints.

Achieving the "highly renewable" objective can be broken down to:

- managing intermittency and dry year with less thermal dependence;
- ensuring that future energy demand growth is being met by new renewable sources; and
- retiring thermal in a planned manner.

A key component to achieving these objectives is to have a clear articulation of the value associated with them and the metric(s) to be used to measure their fulfilment. Absent those, there is no chance a market-based mechanism can be expected to work efficiently. It is also important to provide stakeholders with as much information about future demand drivers and likely outcomes so that stakeholders make informed decisions. Demand projections are not guaranteed, of course, and they may not be seen as credible unless the process and method of their estimation is sufficiently transparent. Singapore has a history of secrecy around demand forecast assumptions and outlooks - a history that has, in our view, contributed significantly to investment uncertainty and market inefficiency.

Just because a market demand *forecast* is trending upward does not mean that investors will follow suit. It is also important to provide the tools for stakeholders to conduct their own due diligence around forecasts and any other factors that influence the risks to which they would be exposed were they to take action based on an otherwise attractive forecast opportunity.

2.4. WILL THEY / WON'T THEY

If a thermal investor could deliver a lower cost short term solution but a high risk longer term solution viz a viz a cleantech investor who delivers a higher cost short-term solution and a lower risk long-term solution, who 'wins'? A market can reach a point of stalemate where neither side has clarity to act. To induce investment prices need to increase, but once built there is no assurance that the investment environment will be the same in the future as it is in the present.

Much of the concern about security, adequacy, and reliability can be tied back to this fundamental question of 'will they/won't they' --- the short-term market signals the need, but the policy and other externality exposure risks in the longer-term cannot be overlooked. This is a classic situation in which the solution involves simplification. Either risk must be accepted and managed through long-term PPAs, insulating the investor from the uncertainty of how the market evolves, or the cheaper short-term options must be taken off the table by raising their cost or eliminating their eligibility.

Carbon taxes and fossil fuel moratoria and renewable portfolio standards are common approaches presently. Whilst none are absolute assurances, it is not unreasonable for stakeholders to form their own views as to whether settings for such instruments and mechanisms will be gradually or periodically stepwise changed so as to advance decarbonisation over time.

None of these additional decarbonisation risks necessarily alter anything to do with dry year risk management. Either this is left to the market or the risk is modified through interventions. This is an age old debate whose essence does not change just because of a prospective accelerating shift to renewables or other zero carbon technologies. The nature of volatility may change, but the process of determining whether the market design should change or whether it is a market parameter that should change, or whether it is a particular form of market intervention that is required --- these questions remain the same.

And as one would expect, an increase in intermittent renewable generation sources, all else equal, can require more system resources to be applied to maintaining reliability. If we don't believe the market will deliver this, or if we don't believe that the mechanisms and insights gained from attempting to deal with hydro scarcity in the past have landed on a robust solution, then we should start there. The fact that we are talking about decarbonisation with additional intermittent resources is not necessarily creating an *entirely* new problem. It's mostly a similar, well-established, problem with the additional nuance of pricing the carbon emission externality.

The objective around energy affordability and energy equity for consumers is more of a constraint rather than an objective. It is also difficult to define and thus somewhat illusionary to achieve.

3. ACHIEVING LONG TERM OBJECTIVES

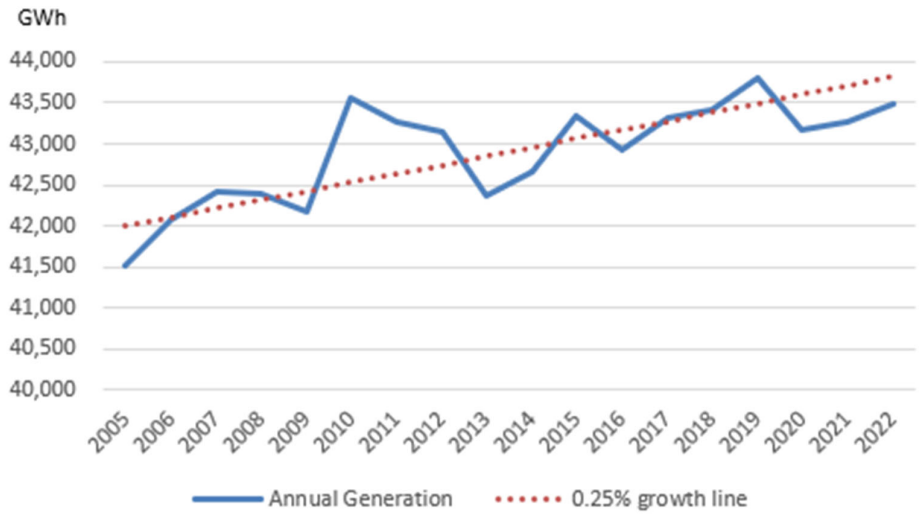
3.1. DEMAND GROWTH UNCERTAINTY

The concept of demand growth uncertainty isn't new, and something that electricity markets have had to deal with since they first came into being, and central planners before that (often solving the problem with investing too early).

However, in the case of managing the Energy Transition a new dilemma arises which is largely ignored by the Measures Paper. It is not the electricity system becoming 100% renewable which has the most material impact on achieving a net zero outcome for energy use in NZ but rather the electrification of transport and industrial manufacturing. Transport and industrial manufacturing contribute 26.2% of NZ emissions vs electricity generation at only 5.7% (refer Figure 2). It is thus extraordinary that attention has not been placed on the plan to achieve the electrification required. How bizarre it thus becomes to expect the electricity sector to plan the build of new renewables to meet a largely unplanned electrification process that is required for NZ to achieve its Paris Agreement targets and thus avoid costly offshore mitigation.

MBIE's analysis projects that electricity demand could grow by 18 to 78 per cent between 2018 and 2050 across five different scenarios assuming different levels of economic growth, technological progress and policy changes. Who should believe this and what should they do about it. The range is wide, the consequences of aiming high and getting low or aiming low and getting high are very different. The forecasts are long term in nature and the rate of growth is low by objective standards even if it is higher than normal for New Zealand (refer Figure 3). Power systems have grown for decades at rates above 6 percent at times throughout the developed and developing world.

Figure 3: Annual Net Generation Growth



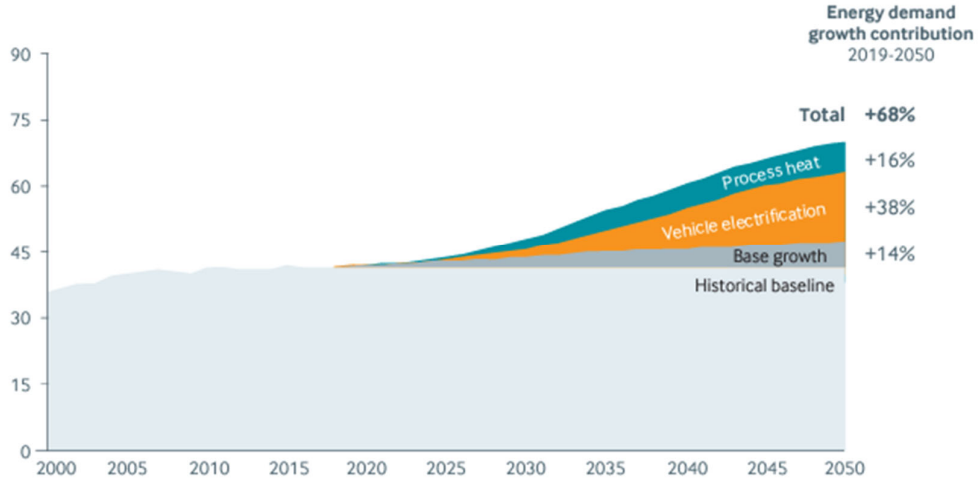
Source: MBIE data tables for electricity (growth line added)

What exactly is the concerning uncertainty surrounding demand growth? The main source of uncertainty concerns transport electrification. Of course if substantial global land transportation is not either electrified or switched to green molecules by 2050, it barely matters what New Zealand's power sector accomplishes. Accordingly, the main risk is to determine when to invest in grid build out and charging infrastructure and what to assume about the relationship between prices and charging behaviour. We would prefer to assume that New Zealand will do the smart thing and do all that is necessary to signal the efficient time to charge and use the grid, and will undertake to plan and build out the grid as needed in closer alignment with actual transportation electrification outcomes. Grid use lowers the cost per kWh. Grid investment without commensurate increase in grid use raises the cost per kWh. Frankly, affordability depends more on alignment of timing of supply and demand, which benefits from smart use of infrastructure, than on investment per se.

If we want to manage cost we should be willing to go the right speed – and not just go fast with investment and potentially slow with utilisation improvement. It's not uncommon to think big about infrastructure, but the more the buildout precedes the utilisation, the higher the cost per kWh will be. The same can be said for the form of rate base recovery. The more that depreciation and return are recovered up front, the more that those who barely use a new grid asset are asked to pay for it, conveying a windfall gain to future generations for whose future use the asset was more specifically designed and intended.

Transpower's Accelerated Electrification base case estimates electricity demand between 2020 and 2050 of 68%, driven primarily by transport electrification and then the electrification of process heat (refer Figure 4).

Figure 4: Gross Energy Demand (TWH) – Accelerated Electrification



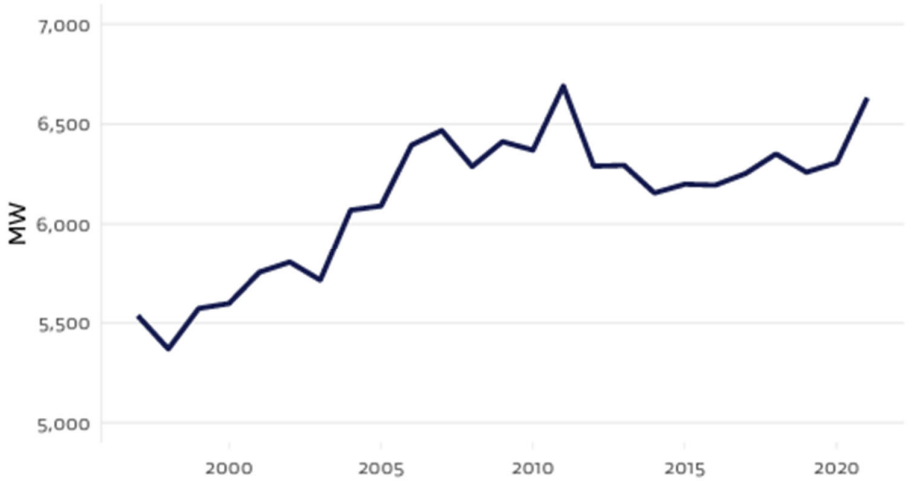
Source: Whakamana i Te Mauri Hiko – empowering our energy future, Transpower, March 2020

However, focusing just on increasing annual electricity demand can be misleading. The electricity system will need to be sized to meet ***peak*** demand growth and this is projected to be more modest. Transpower have noted in their projections that ""while electricity demand is estimated to increase by 68 per cent, peak demand only increases by 40 per cent, reflecting the increasingly important role of ***demand response solutions***"[9]. This assumption is well aligned with historic peak demand seen in New Zealand which, while fairly volatile, has been largely flat over the last 15 years (refer Figure 5). It also implies a smartening of grid use and a potential significant downward pressure on cost per kWh. Setting aside subsidy options, nothing helps affordability more than efficiency.

Transpower also rightly highlight the impact of electricity efficiency in their projections:

> *"Despite assumptions around positive economic performance and population,* **base electricity demand growth** *– ignoring possible gains from fuel switching – out to 2050* **is largely flat**. *This is a consequence of increasing efficiency balancing out energy growth as a result of a growing economy."* [10]

Figure 5: Annual Peak Electricity Demand[11]



Source: Energy in New Zealand 22, MBIE, Calendar Year 2021

9 Whakamana i Te Mauri Hiko – empowering our energy future, Transpower, March 2020 (emphasis added)

10 ibid

11 Based on grid export data, averaged over half hourly trading periods. Therefore it does not show the peak instantaneous demand on 9 August reaching 7,157 MW.

A further consideration for projecting future demand growth is also any potential significant demand exiting the system. The elephant standing in this room is the Tiwai Point Smelter. Consuming approximately 12% of New Zealand's total electricity demand, if this demand were to exit the system, then Transpower's base growth projection of 14% out to 2050 could largely be met from transferring existing South Island Hydro northwards.

So many other uncertainties pale in comparison to this. Given the value that having more time can have when innovation is happening and new technology costs are falling, and given the paralysis that an extraordinary binary risk has on market behaviour, there are few focus areas that can restore a more healthy and efficient energy market than to resolve or figure out how to manage the impact of any future Tiwai Point Smelter exit decision. Given that it is still only 2023, one could argue that it is prudent to push off any decision whose answer depends on which way the Tiwai outcome falls.

Related Paper on Hydrogen Production

The Interim Hydrogen Roadmap presents a story with domestic demand for hydrogen of 180,000 tonnes per year by 2035, rising to 560,000 tonnes by 2050. This could require additional electricity output of 11.5TWh in 2035 increasing to 33.9TWh in 2050, or it could require import of H2 from exporting markets.

In 2023, no one yet knows. Truth is no one can answer this question affirmatively. Everything written currently about hydrogen is still bollocks from a larger scale, long term optimisation perspective. Any scenario where New Zealand is an efficient scaled up hydrogen exporter is, by definition, a scenario where New Zealand has no problem meeting decarbonisation using a simpler mix of policy and electricity market mechanisms. If those exports depend on policy or subsidy, however, then all bets are off and the probability is equal that the investments will be wasted or the required resources could have been better used in other ways.

Key Observation

Our key observation on demand growth projections is not to suggest that one set of figures is more correct than another, that peak generation required has not been given sufficient focus, or that the hydrogen growth path presented errs on the fanciful, but rather to say that any form of electricity projection is prone to error which introduces uncertainty, and the further out you project, the greater these errors and uncertainties become. If the idea is that major infrastructure should be developed 'soon' for such distant effects, that would be a mistake. However, if there are steps that can be taken to shorten the time of development from a point of decisions, that may be prudent. The shorter the time of development, the later the point of decision can be. The option to defer commitment is a positive source of value.

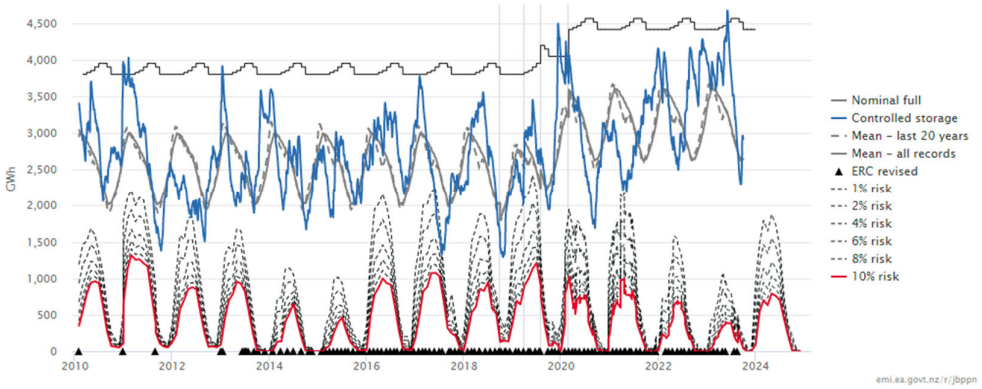
Building policy and regulation on such uncertainties requires the need for flexibility, frequent review, and a willingness to adapt. The firmer or larger the projects for the distant future appear to be, the more risk is transported from the future to the present. This additional risk compromises efficiency in the existing electricity market for no obvious upside benefit.

3.2. MANAGING DRY YEARS

The New Zealand electricity system is prone to the impact of climatic events due to its dependency on hydro generation characterised by limited storage capacity. Thermal generation is currently an essential part of the electricity system. It is required both for firming intermittent renewal and to be held as a contingency for managing dry year risk.

Figure 6 shows historical hydro storage levels in New Zealand relative to risk curves denoting the chance of having insufficient water storage to meet electricity demand. Significant low storage events were encountered in 2012, 2017 and 2019. When such events occur, more thermal generation is called upon to balance the system. These used to be called "1 in a hundred year" events. This is clearly no longer the case. Climate change will only further increase the frequency and volatility of lower storage levels.

Figure 6: Historical Electricity Risk Curves



Source: EMI website, Electricity Authority

One of the issues that will need to be tackled as part of the transition to greater renewables is how to plan thermal retirement around dry year risk. The simple answer is that you can't, given the unpredictability of dry years (albeit there is a relationship with El Niño and La Niña weather cycles).

Whilst it is good to establish firm deadlines, it is reasonable to have well-structured flexibility. Have a clear framework – set a retirement date but allow for the option of deferral of, say, six months upon the payment of a penalty charge whose payment would only make sense if the year of retirement happened to be a dry year of sufficient extremity. This approach combines commitment with structured flexibility – moving away from reliance on non-binding commitments or arbitrarily rigid deadlines.

Ultimately, the risk of extreme hydro-variability can only be mitigated using solutions that draw from insurance analogies.

3.3. EMERGING TECHNOLOGIES

In undertaking long term projections, such as out to 2050, a further uncertainty is introduced by emerging technologies. Some of this uncertainty is about when will known emerging technologies become commercially viable and a further uncertainty is what current unknowns will become known. Illustrating this point is the classic case of Thomas Malthus modelling the limits of population growth to the available increase in agricultural production but failing to predict the impact of the industrial revolution.

A further salient point is the pace that battery technology improves – in terms of cost, energy efficiency, scalability, size (ease to collocate with intermittent generation supply) and reduced lifecycle carbon impact. Betting the farm on alternative present-day technologies may result in long-term regrets. For example, the Lake Onslow 'battery' project currently being investigated (but now largely in doubt following the recent Government elections) proposes a pump storage scheme that will provide 1000MW of generation capability with 5TWh of storage for $15.7 billion and a construction and commissioning timeframe of between 7 and 9 years[12] (following a final investment decision not expected before 2026).

The other problem with such grand schemes is that earlier needed alternative investment is unlikely to enter the market while such Damoclean proposals loom overhead. Dampening the dynamic efficiency of the market at a time when unprecedented new investment is required is something we would caution against.

Demand Response

Another anticipated beneficiary of emerging technologies is the area of demand response. While NZ has historically made good use of demand response with ripple control, industrial interruptability and voluntary reduction (supported by Official Conservation Campaigns), new opportunities should now emerge with the introduction of real time pricing to the wholesale market (refer Table 1). The international shift observed with greater 'hybrid' demand response options is also likely to see greater potential in New Zealand - where loads operate with storage and/or generation behind the meter to provide a more flexible response to the system when called upon.

12 Based on Phase 1 investigations of the NZ Battery Project.

Table 1: Rollout of Real-Time Pricing

Date	Introduces
1 November 2022	From 1 November 2022 wholesale market pricing is calculated in real time. The settlement price for each trading period will be calculated at the end of the trading period and published immediately. Retailers are able to reliably develop new products and **consumers who are on plans where they buy from the spot market, will for the first time be able to make decisions on prices that they will actually pay.**
27 April 2023	From April 2023 the dispatch notification product will enable the inclusion of Distributed Energy Resources and aggregated demand management in the wholesale market, subject to approval by the system operator. Enhancements to dispatchable demand will allow large industrial consumers to bid in demand management in a way that better suits the physical constraints of their plant and processes.

Source: Real Time Pricing, Electricity Authority, 2022

With many systems around the world looking to greater participation of intermittent renewables, including behind the meter, the shape of net grid demand, in particular intra-day demand, has become more volatile. Demand response has become increasingly used in electricity systems to help manage this increase in volatility, as well as to reduce peak demand and to contribute to system reliability.

Practical lessons can be drawn from this wide and varied use of demand response internationally to help maximise participation levels in New Zealand's renewables transition. In particular, we draw attention to two reviews undertaken of Demand Response schemes to determine what features are more conducive to successful outcomes.

- ***Australia*** - The Australian NEM is a particularly useful case study to look at as it has tried multiple demand response schemes in recent years and thus allows different design features to be evaluated against a similar background[13].

- ***UK*** - Another, useful example to look at is the UK, where In 2016, Ofgem surveyed large industrial and commercial consumers to assess the potential for demand response and to identify barriers preventing greater flexibility[14].

13 How does WDR (Wholesale Demand Response) compare to other demand response options? AEMO website: https://aemo.com.au/en/initiatives/trials-and-initiatives/wholesale-demand-response-mechanism/wdr-frequently-asked-questions

14 Industrial & Commercial demand-side response in GB: barriers and potential, Ofgem, October 2016

3.4. Avoid Big Bang Solutions

In general, when dealing with a wide range of uncertainties, in a dynamic environment with emerging technologies, we would caution against the temptation of possible 'silver bullet' or big bang solutions. They tend to be longer to implement, expensive, concentrate risk of failure, become outdated before they commence operation, and close out future optionality. Most importantly, there is so much change ongoing throughout the global clean-tech sectors that the prospect of magically planning the future correctly in 2023 is dim at best.

As much as it would be good to accelerate decarbonisation there are more opportunities to proceed such as allowing investors to learn from international endeavours, making use of emerging technologies as they become available and more cost effective, and using the market as the means of signalling expectations of growing demand (and associated firming and hydro risk requirements) that will need to be met. We discuss this more in Sections 3.6 and 4.1. Such options are not reliant on mega projects. An ill-timed or ill-conceived or unintentionally complex or contentious mega-project crowds out other solutions that should rightly be considered the lower hanging fruit.

3.5. Coordination and Focus Required

Managing uncertainties is not a novel concept. It begins with:

- clearly defining objectives (example being what is 'affordability');
- correctly identifying and defining problems first so they can be solved;
- setting reasonable and robust targets and milestones; (and more important establishing guidance about how those targets and milestones were set and what factors influence the choices made, as such guidance is necessary to assess robustness in a real-world context);
- avoiding the temptation to move too many pieces at once – it not only creates confusion but also makes it more difficult to identify what actions are working and which ones are not;
- allowing for the review; recalibration, and evolution of all aspects (recognising that you'd always want to be able to reflect the latest thinking in the evolution of plans, targets, and activities);
- coordinating endeavours across multi facets (rather than creating multiple funds that sit with different authorities for their allocation to what is most aligned with their specific perspectives of the problems to solve);
- correctly placing incentives (both carrots and sticks) on those parties best able to solve problems (or to not introduce them); and

- recognising that meeting targets by 2050 will span multiple different governments – nonpartisan agreement will be necessary as the robustness of any singular perspective cannot be assured over time.

We then translate the above approach into what the initial contents of our 'backpack' might contain before we set forth on our journey to carbon net-zero (but bearing in mind that frequent taking stock and re-provisioning of our backpack's contents will be required along the way).

Our suggested packing list might go as follows:

- An update on New Zealand's progress towards meeting its Paris Agreement Obligations with specific progress, targets and milestones to achieve NDC1 (inclusive of shortfalls expected to require offshore mitigation).
- Specific allocations of the above to the 'energy system' with a further breakdown by electricity generation, transport, industrial etc.
- Translation of the above into a strategy – the New Zealand Energy Strategy (NZES).
- Clear guidance from Government to relevant bodies (e.g. regulators and Transpower) through Government Policy Statements in support of attaining the NZES and the expected roles that these bodies will play.
- Workplans from above bodies to confirm how they will meet Government Policy Statements.
- Translation of the NZES into specific Government policy and objectives as it relates to EV adoption, electrification of industry etc.
- System demand projections created/revised based on the NZES as supported by the electrification policy, inclusive of anticipated firming requirements and an impact assessment of dry years.
- Translating the above into a 'statement of opportunities', inclusive of sufficient information, for investors.
- An update from the EA on progress towards implementing the findings of its market competition review.
- A plan for regular review and recalibration of electricity industry progress towards balancing additional demand and supply.
- Any relevant actions relating to transmission and distribution (outside scope of this paper).

3.6. CAN WE RELY ON THE MARKET TO DELIVER?

In our view, New Zealand has a well-designed and well-functioning electricity market. We reviewed the electricity market in some detail during the Electricity Authority's 2021 review of Competition in the Wholesale Electricity Market. We fully concur with the statement made by the Authority in releasing its findings into this review:

> *"While the electricity market may not be perfect, it has served consumers well and the importance of a well-functioning electricity market to enable the transition to a decarbonised economy cannot be understated."*[15]

In its decision paper the Authority has confirmed the actions it will take to constrain the exercise of market power and encourage investment in renewable generation to promote competition in the wholesale electricity market:[16]

- Continue proactive monitoring and enforcement of trading conduct in the spot market, and investigate the application of trading conduct rules to the forward market;
- Investigate mechanisms to accelerate the development of the demand response market (in addition to its current work programme directed at this, e.g. real time pricing and empowering consumers to participate in the electricity system in new ways);
- Clarify disclosure requirements (and consider amending the Code to provide certainty about such requirements) about current or expected constraints that could impact generation capacity, and arrange a centralised location for disclosure; and
- Explore better information sharing processes and obligations with the Commerce Commission on any information the Authority collects that may raise concerns about restrictive trade practices, collusion, or misuse of market power.

To facilitate investment in new renewable generation the Authority will:

- undertake regular monitoring of progress on generation investments, and an annual update of the investment pipeline and impediments;
- regularly collect information on offtake and 'firming' agreements (and if feasible declined requests) to understand and build the evidence base about the nature and scale of current and emerging access issues reported by developers of new generation;

15 Press release by the Electricity Authority, Promoting Competition in the Wholesale Electricity Market in the Transition Toward a Renewables-Based Electricity System, 12 May 2023

16 ibid

- improve the Electricity Hedge Disclosure System to improve its functionality and make contract details more transparent;

- investigate and test the case for providing or requiring longer-dated futures (for instance products traded on the ASX); and

- analyse thermal generation transition risks in the context of demand to 2030, its role in hydro firming and more prevalent solar and wind generation, and options to mitigate transition risks.

However, it is important to recognise what markets do well and where their role is (and should be) limited. A well-functioning market provides price signals to support short-run and long-run efficiency. In the short-term to promote efficient use of available resources (allocative efficiency) and in the long-term to provide signals for new investment when it is needed and incentivise innovation (dynamic efficiency). Electricity markets are also able to reach efficient outcomes subject to technical constraints provided. For example, in the short-term the NZ market will dispatch electricity in the most efficient manner to meet demand while preserving system security requirements.

It is also important to note that markets deliver efficient prices, and these will not be affordable to everyone. Just as the price of food, shelter, clothing or other essentials can be out of reach to some. Affordability is about ability to pay. Efficient pricing is about what resources, including opportunity costs are involved in providing electricity supply. The question of what is efficient or cost-effective is a different question from what affordable to a particular customer segment. The policy instruments that are appropriate and effective in addressing affordability differ significantly from those that are appropriate to ensuring the reasonable efficiency of decision-making and pricing in the electricity sector.

The New Zealand market operates using a sophisticated nodal pricing algorithm which provides locational pricing signals to support investment decisions (and provide a level of transparency) on the trade-offs between transmission expansion vs siting of new generation and loads. It was determined in the TPM that nodal prices would substantially determine efficient timing and location of use of grid resources in the context of the energy transition. Whether true or not, it is a strong assumption that will need to be continually reviewed in association with future grid investment decisions.

Where electricity markets are less able to support the energy transition is:

- to signal investment in technologies which may not be the most efficient option at the time; or

- providing longer-term pricing signals to fully meet the payback period required for investors (and their lenders) to proceed.

In the former case, where a specific technology is being sort, then some additional overlay may be required – such as a carbon cost in the case of bringing forward specific renewable technologies before they become competitive. Where a specific technology is only needed for a short period of time (e.g. more thermal peaking as a transitional measure) or under specific events (e.g. dry year) then market prices must be allowed to rise to compensate for this (which may be problematic). Some form of bilateral contracting may be the better option here in order to have the right resources available with a high degree of certainty and not create intra-marginal rents that may be seen as a windfall to other participants. This then becomes a limited case of 'competition for the market' rather than 'competition in the market'.

Where the market is less able to support the transition, we would suggest that a select and targeted approach be adopted outside of the market (such as bilateral contracting) rather than try to distort market pricing signals or create a subsidy (which tend to be crudely focused and less linked to performance outcomes).

4. GROWING RENEWABLE GENERATION

We focus on two aspects of the Electricity Measures Paper in detail – the first being Part 1 – Growing Renewable Generation. This part addresses the issue of ensuring sufficient renewable generation is built and that fossil fuel generation will be replaced in a way that maintains security, reliability and affordability, including ensuring sufficient firm capacity during transition. It also considers the role of large-scale flexibility to provide demand response.

4.1. ACCELERATING SUPPLY OF RENEWABLES

The Measures Paper highlights a concern that "there remains a risk that signalled investment may not come forward in sufficient time or quantity to enable electrification, while maintaining security and affordability". A number of factors are identified that may inhibit or slow the required new development, with specific attention drawn to regulatory and market uncertainties. Concerns are raised that as more renewables enter the market the price volatility will increase which will translate to heightened investor risk. That's an ironic concern as the energy only market design itself uses and even relies on exposure to price volatility to compel contracting for risk management. The market is, by design, supposed to be volatile. If you want more longer-term contracting activity, an increase in volatility is more likely than not to be essential to achieving that objective.

The range of issues and possible measures for discussion are summarised in Table 2 below.

Table 2: Accelerating Supply of Renewables

Challenge/issue	… Price risk for investors in baseload renewables … Regulatory and market uncertainties could be hindering investment in new renewable generation
Further potential measures	… Support the development of new renewable generation through financial support mechanisms including power purchase agreements, renewable certificate obligations, contracts for differences and feed-in tariffs.

Source: Electricity Market Measures – Webinar Slides, 29 August 2023

If volatility is seen as a concern by government, then market stakeholders must equally be concerned with reactionary intervention that reduces their access to adequate revenue or even appropriate risk management instruments.

If green technologies are favoured, then the question is whether volatility or price increases would otherwise lead investors to adopt non green technologies. There would then be a clear need for a carbon charge, a carbon-based technology or fuel prohibition, or a quantum-based requirement (such as RPS). The faster and deeper the desired transition, the higher the willingness to pay must be. There is no free, green, lunch.

Statement of Opportunities

We note that as part of the Electricity Authority's actions it will take to encourage investment in renewable generation[17] it has invited MBIE to produce an ***Annual Electricity Generation Investment Opportunities report,*** targeting international developers, with input from NZ Trade & Enterprise, Transpower, the Electricity Authority, Overseas Investment Office, and Ministry for Environment.

Such a report will also start to give greater clarity on the future demand expectations of the system. As we discussed in Section 3.1, demand growth uncertainty inherent in New Zealand's renewable transition provides a huge risk for investors to plan around as well as to allow the NZ Government a degree of certainty that their Paris emissions targets will be met and expensive offshore mitigation not required.

Hedging Risk

The next step is to allow the development of risk management tools for investors. We note that some activity is planned in this area following the Authorities review of competition in the market, specifically the Authority plans to:

- improve the Electricity Hedge Disclosure System to improve its functionality and make contract details more transparent; and
- investigate and test the case for providing or requiring longer-dated futures (for instance products traded on the ASX).

While this should help improve the level of hedge products made available, we would always highlight that generation investment is a long-term prospect that extends beyond what can be realistically expected from the tenure of electricity future products. Even the largest most actively traded electricity futures markets will see very little liquidity in long-dated (5-7 year) contracts. For example, baseload German Power Futures traded on EEX are available up to 10 years out[18] but have very little activity more than 4 years out.

17 Electricity Authority confirms actions to promote competition in the wholesale market, Press Release, 12 May 2023

18 EEX began offering 10 year power future from 27 September 2021

Table 3: EEX German Power Futures - Baseload

Future	Last Price	Last Volume	Settlement Price	Volume Exchange	Volume Trade Registration	Open Interest
Cal-24	114.75	8,784	-	3,698,064	2,099,376	84,736
Cal-25	113.99	8,760	-	762,120	972,360	20,992
Cal-26	105.35	8,760	-	236,520	306,600	5,126
Cal-27	91.50	8,760	-	26,280	-	941
Cal-28	-	-	-	-	-	139
Cal-29	-	-	-	-	-	13
Cal-30	-	-	-	-	-	7
Cal-31	-	-	-	-	-	2
Cal-32	-	-	-	-	-	2
Cal-33	-	-	-	-	-	-

Source: EEX website (accessed 5 October 2023)

As we've noted, it is not uncommon for a generator to look to hedge wholesale market price volatility by matching generation output with a load. This can take the form of vertical integration, where a participant owns both generation and either load (such as cogeneration) or has a retail portfolio.

Alternatively, such an arrangement can be reached by way of contract, such as a PPA between a generator and a load or retailer. Such arrangements are commonly referred to as a Corporate PPA, or when the generation is renewable in nature, a Green Corporate PPA. As NZ has a mandatory market, such PPAs would need to be financial, most likely taking the form of a CfD. This will allow the parties to fix prices thereby removing price volatility.

5. COMPETITIVE MARKETS

Part 2 of the Measures Paper considers the competition issues that may arise in the electricity market during the transition away from fossil fuels. The concern is that as the level of dispatchable fossil fuel generation reduces the remaining dispatchable generation and other flexible resources will become more concentrated, resulting in a reduction in competition.

The range of issues and possible measures presented for discussion are summarised in Table 4 below.

Table 4: Workable Competitive Electricity Markets

Challenge/issue	… Increasing market concentration of dispatchable generation providers as the use of fossil fuel generation reduces … Reducing competition could adversely affect electricity prices and reliability
Further potential measures	… Support for conduct or structural measures, including: o horizontal separation of generators with significant market share in flexible hydro storage o regulated access pricing for flexibility services o central procurement of new and existing flexible resources.

Source: Electricity Market Measures – Webinar Slides, 29 August 2023

What we see here is a potential market power issue. However it must also be recognised that the speed with which new flexible capacity can be added to the market will be much faster in the future as the technologies include demand response, biofuel or H2 based OCGT and CCGT or reciprocating engines, as well as battery energy storage – many of these can be installed at smaller scale within a year. Market power can be effectively mitigated by the speed and flexibility of entry, along with ongoing monitoring.

Conduct Measures

When we looked at competition in the New Zealand market as part of the Authority's 2021 review, we made a number of observations that still hold true.

1. In any electricity market, we would expect that it is possible for some market participants to have some market power at some time or in some locations. The practical standard for electricity market structure in New Zealand or anywhere to date has not been perfect competition. However, it is not the existence of market power that should give concern, but whether such market power is being exercised to a degree that necessitates consideration of corrective, mitigating, or other forms of targeted action.

2. In trying to address a problem perceived with short run allocative efficiency it is important that the 'measure' applied does not dampen long-run dynamic efficiency. In an environment where a key policy objective is to attract new investment to support a low emissions economy, such 'measures' run the risk of being counterproductive.

3. Freedom to contract between well informed and willing buyers and sellers in the absence of market power being an unduly material factor, is a cornerstone of workable markets.

4. The light cast by transparency helps to ensure an orderly market (absent the possibility of enabling tacit collusion). A salient example being the requirement for disclosure of risk management contracts provided for under part 13, subpart 5 of the Code.

5. There will need to be a greater acceptance that high prices are sometimes required to allow a market to be both allocatively and dynamically efficient.

6. The Authority can support the energy transition by ensuring that its regulatory tools do not distort pricing signals through blunt un-targeted measures. The recent weekly trading conduct reports are an excellent example of a prudent regulator lifting confidence in market outcomes through increased transparency.

We are pleased to see that following the 2021 review, the Authorities actions to constrain the exercise of market power (refer Section 3.6) are well aligned with these observations.

The Measures Paper provides the range of preferred conduct measures outlined by the Market Development Advisory Group (MDAG):

… Develop a dashboard of competition indicators for flexibility services – to better assess how competition for flexibility products is changing.

… Improve transparency of hedge market information – to make it easier for participants to compare prices, especially for non-baseload contracts. This would also facilitate surveillance of the contract market to assist in detecting breaches of Part 2 of the Commerce Act 1986 or trading conduct provisions in the Electricity Industry Participation Code 2010.

… Extend existing trading conduct rules to the hedge market – to deter participants from exercising significant market power in the market for flexibility products.

… Develop a flexibility access code (non-price elements) – to promote reasonable access to flexibility products. The code would focus on how participants receive and respond to requests for flexibility contracts, modelled loosely on the code being developed in the supermarket industry to address similar types of concerns regarding access to wholesale supply.

- Introduce market-making for a shaped hedge product, such as some form of cap or peak product – to create better forward price discovery and market liquidity for flexibility services.

These are also well aligned with our earlier observations. However, we would caution that expectations of liquidity and cost of market making be appropriately managed when dealing with shaped hedge products.

Structural Measures

More interventionist measures such as separation of generation is not something we would advocate. When previously commenting on proposals for vertical integration in New Zealand we commented that this is not the time to be contemplating untargeted and potentially interventionist regulatory policy or to be re-raising vertically integrated arguments that were previously closed off in the 2019 Electricity Price Review recommendations:

> *The Electricity Price Review concluded in 2018 that the structural separation of Gentailers was "unnecessary" because lower-cost and less risky options were available to "counter the drawbacks of vertical integration" while retaining the benefits of integration.*

The resurrected Single Buyer proposal takes this a step further. This proposal is analogous to a jilted lover unable to find closure.

6. ABOUT THE AUTHORS

6.1. DAVE CARLSON

Dave Carlson is an experienced energy market operator, designer and change manager with a track record spanning Asia, Africa, Australia and New Zealand.

Before returning to New Zealand in 2016 he was a Senior Vice President at SGX (Singapore Securities Exchange), responsible for new initiatives in the gas and power sectors. Prior to that he spent 10 years as the CEO of the Energy Market Company, EMC, the national electricity market operator for Singapore.

Dave has served on and chaired many industry and governance panels in Singapore to further liberalise energy markets including market rule evolution, the implementation of retail contestability, developing gas trading and introducing electricity derivative products.

Dave continues to work with a number of national utilities, regulators, market operators, private generator-retailers, and government clients in Southeast Asia, Australasia and the Middle East. He has a BSc in Mathematics from Victoria University in Wellington and passed the Associate Examinations of the Institute of Actuaries, London.

Dave is a senior advisor to, and board member of, The Lantau Group.

6.2. MIKE THOMAS

Mike Thomas, is a founding partner and the Managing Director at The Lantau Group with 35 years of consulting experience, focusing mainly on the energy sector in the United States, New Zealand, and throughout the Asia Pacific region. He advises clients on market design and development; regulatory matters; commercial transactions and disputes; and business and regulatory strategies.

He was part of a 1988 team advising the New Zealand Treasury on possible market reform directions, and lived and worked and raised three children in Wellington for ten years from 1997 to 2007. In New Zealand, Australia and around Asia, he has focused on the economics of complex energy systems and the crucial decisions that stakeholders must make in relation to those systems, including governance models, policy frameworks, energy security, market design, competition effectiveness, and regulatory oversight.

He started his career in 1988 with Putnam, Hayes & Bartlett, in the United States. Prior to co-founding The Lantau Group in 2010, he headed the Asia Pacific Energy & Environment practice of a global consulting firm. Mike has an MPP from Harvard Kennedy School and a BA in economics from Carleton College.