



SUBMISSION TO THE PRODUCTIVITY COMMISSION ON TRANSITIONING TO A LOW EMISSIONS ECONOMY

CREATING A NEW
ENERGY FUTURE

CONTENTS

CONTENTS	2
Executive Summary	3
Introduction	4
Overview.....	5
Response to Questions.....	5

EXECUTIVE SUMMARY

1. In transitioning to a low emissions economy, both government and the private sector need to lead the call to action.
2. Regulators will play an instrumental role in enabling a framework which incentivises innovation and the uptake of new technology in the private sector. Technology will transition New Zealand to a low emissions economy.
3. Regulators will need to avoid attempts at prescriptive policy making, which is 'fragile by design'. The more adaptive regulation is to change, the less disruptive the transformation will be.
4. Textbook economic theory may not stack up against the swift pace of innovation. Consumers are not always rational beings and the response to climate change and uptake of new technologies will often be determined by social preferences and perceptions relating to the environment and energy independence. Behavioural economics cannot be ignored.
5. Currently the costs of the transition to a low emissions economy are in the spotlight, but a concerted effort is needed to shift the focus and highlight the costs of disruption that will occur if no action is taken.
6. There needs to be transparency in the process of transition and in New Zealand's progress. The focus in New Zealand for example, can no longer be on 'renewable' energy generation, but on carbon produced per kWh.
7. Resilience must increasingly be safeguarded. Climate change is increasing the unpredictability of the world we live in. This has significant impacts on our electricity network; we can no longer rely on a single dominant source of energy generation for example.
8. During this transition, there will be winners and losers. The regulatory framework must ensure that no single sector is required to do the heavy lifting alone. The framework for reducing New Zealand's carbon footprint must be equitable.
9. While there will be costs to this transition, we simply cannot afford to maintain the status quo. The cost of displaced peoples with sea level rise, food scarcity with rising temperatures and increasing storm severity, social inequality, and a failing export economy, is far greater than any transitional cost imagined.

INTRODUCTION

10. This is Vector's submission on the *Productivity Commission's low-emissions economy: issues paper*.

11. No part of this submission is confidential and Vector are happy for it to be publicly released.

12. Vector's contact person for this submission is:

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OVERVIEW

1. Businesses and government need to lead the call to action to reduce New Zealand's carbon footprint.
2. As a business portfolio, Vector is focussed not only on sustainability and the adaptation required to transition to a low carbon economy, but also the physical environmental impacts of climate change on our assets and business.
3. From our successful roll-out of smart meter technology and electric vehicle chargers to our focus on enabling solar generation, Vector is continuously creating opportunities to reduce emissions and provide increased control and optionality for consumers.
4. As New Zealand's electricity sector is over 80 percent renewable, there is a risk that a mindset of complacency has arisen in the sector. However, despite widely held assumptions, 'renewable' is not a term interchangeable with low or zero carbon. Therefore, with increased understanding, we hope the energy sector will develop an increased drive for action. There are opportunities to be captured under a framework of increased transparency and a principled, rather than prescriptive, approach to regulation.
5. Robust and transparent measurement and reporting of carbon is the starting point for systematic reduction. Improving the disclosure of emitted and avoided emissions at an organisational and product level will assist decision making and enable reduction targets to be set. Vector's own carbon footprint is independently assured¹ and we have begun to report on emissions avoided through our services such as electric vehicle (EV) charging.
6. If the mainstream population were better informed of the stark realities of climate change and the opportunity costs of not acting swiftly, there would be an increased uptake of decarbonisation activities across the economy. The scientific reality is that the world has less than three years to place itself on a manageable pathway to full decarbonisation, and then another two decades to have achieved it. Delaying action will create an insufficient timeframe for the economy to transition, with far steeper transition costs.

¹ Limited assurance has been provided over Vector's scope 1 and 2 emissions inventory (direct and indirect emissions from the use of energy, including electricity and steam) by Ernst & Young NZ Limited.

7. Vector believes that if we are smart as a nation and embrace, rather than resist, technology we could set the bar for emissions reduction and make a statement, as significant as our anti-nuclear stance, about truly moving the dial in net zero carbon generation.
8. While New Zealand is considered to be “ahead of the curve” in our renewable energy generation, our actions in moving to a low emissions economy will be observed as a possible future strategy by others. We therefore need to consider how we want to be viewed by the rest of the world moving forward.

RESPONSE TO QUESTIONS

Question 8: *What are the main barriers to the uptake of electric vehicles in New Zealand?*

9. A major barrier impacting the uptake of electric vehicles (EVs) is the misconception that the charging infrastructure is not yet in place. There are now over 170 purpose built charging stations installed across New Zealand, including 85 rapid charging stations. The current EV charging infrastructure is therefore capable of supporting EV uptake, at least in the short term.
10. In Auckland, it has been difficult to get approval to install EV charging stations on the roadside, consequently most charging stations are on private property and are not always visible from the street. It is therefore not surprising that non-EV drivers in Auckland do not know the extent of the charging infrastructure. Vector has developed an EV Charging App to help address this issue. The App allows EV drivers, and would-be EV drivers, to find and get directions to charging infrastructure throughout the country. Only purpose built charging stations are included in the App to ensure EV drivers find and use reliable charging infrastructure.
11. While it is necessary to continue expanding and developing this infrastructure to enable further EV uptake, there is currently limited incentive for the private sector to do so.
12. Another barrier to the uptake of EVs in New Zealand, which is at the forefront of consumers' minds, is the prohibitive price and limited model options. While model options are improving, there is still a lack of SUV and mid-heavy vehicles for fleet managers to choose from, making it difficult for companies to fully transition their fleets to EVs.
13. New EVs can be \$15,000 more expensive than similar petrol equivalents,² which also means that second hand EVs are more expensive than their petrol equivalents. For many New Zealander's this makes buying an EV cost-prohibitive. Internationally price subsidies have addressed this issue.
14. In New Zealand education could help address this barrier as there is currently a significant knowledge gap regarding the running costs and battery life span of EVs.

² *Research into the long-term trends for electric vehicle price and supply - understanding developments in the global market*, Emission Impossible Ltd and Covec Ltd, June 2015,

Non-EV owners do not realise how few moving parts there are in an EV and therefore how little there is involved in servicing and maintaining them. They also do not realise that the EV batteries can be replaced, and recycled or reused when they are no longer fit for an EV. While there were predictions that EV batteries would only last seven to eight years, manufacturers are already finding that the batteries are lasting years longer.

15. With the fast pace of innovation and change in this sector, Vector expects that price concerns will soon not be a barrier to adoption. From 2008 to 2015, battery costs fell by 75 percent while their energy density increased more than four-fold (enabling longer vehicle range).³ A recent report from global financial firm UBS forecasts that EVs could reach the same total ownership cost as combustion engine cars as early as next year.⁴
16. However, the rapid evolution of technology worldwide also introduces a threat to the roll out of EVs in New Zealand. As EVs become more appealing to the masses, and uptake increases in offshore markets, there will be a significant increase in the number of second-hand fossil fuel vehicles hitting our shores. We need to be careful that New Zealand does not become a dumping ground for cheap second hand petrol and diesel powered vehicles, slowing EV uptake domestically.
17. Recently, the Australia New Zealand Draft Battery Standard ASNZ5139 has been the most significant threat to EVs, amounting to an effective ban on lithium-ion battery storage devices inside homes on the basis that they are a fire risk. The draft standard requires battery systems to be located outside of homes and garages, in purpose-built concrete “kiosks” or “bunkers”.
18. Worldwide, any potential safety risks have been considered appropriately mitigated, with lithium-ion batteries being installed in homes across Germany, United States and Japan.
19. If EVs can't be stored or charged in garages, it is unlikely that home owners will adopt the technology because of the expense, inconvenience, and of course the perceived risk. While Standards Australia appears likely to scrap the draft guidelines following overwhelming evidence from industry, the introduction of the draft standard early this year, halted momentum in the sector at a crucial time of

³ Page 4, *Global EV Outlook 2016: Beyond one million electric cars*, International Energy Agency, 2016

⁴ <http://www.businessinsider.com/7-stocks-set-to-take-off-in-the-electric-car-market-2017-6/?r=AU&IR=T>

growth and illustrated the detrimental impact of overly prescriptive and ill-informed regulation.

20. Regulations that require electricity networks and retailers to offer a 'low fixed charge' tariff option also acts as a barrier to EV uptake. This is further discussed in our response to question 35.
21. Finally, if the government does not take an active and visible role in promoting carbon reduction, for example investing in efficient and effective low carbon public transport options to displace the use of fossil fuel cars, the urgency and desire to move to a low emissions economy will be less likely recognised by the public.

Question 9: *What policies would best encourage the uptake of electric vehicles in New Zealand?*

22. Vector neither supports or discourages the introduction of price subsidies for EVs, although we note that in other countries price subsidies have had a positive impact on the uptake of EVs.
23. In major New Zealand cities, allowing EVs to use special vehicle lanes (including priority transit and some bus lanes) would have a positive impact. This access could be for a limited period, e.g. 24 - 36 months, until increased uptake is secured.
24. Providing incentives for trucking fleets, especially freight transport, to move from the current reliance on diesel to electric, would also create increased incentive for EV infrastructure to be built out, as there would be a heavy and consistent demand, which would have flow on benefits for individual consumers.
25. Policies that facilitate increased at-home controllable EV charging infrastructure, with cost reflective pricing incentives, would also provide significant encouragement for EV uptake. It would reduce the costs of operating an EV even further, helping to offset the higher upfront costs when purchasing an EV. It could also prevent upgrades to the electricity network, which, if required, ultimately increases the cost of electricity for everyone.
26. Another disruptive business model that promotes the use of EVs is vehicle leasing, for example Volvo's new subscription service.⁵ This can overcome the potentially prohibitive upfront costs. Volvo believes that the service will eventually be a core

⁵<http://www.thedrive.com/sheetmetal/14637/car-subscriptions-expected-to-make-up-a-fifth-of-volvos-sales-by-2023>

part of its business model, expecting it to account for nearly a fifth of all volume in as little as five years.

27. An education programme could also address the multitude of misconceptions surrounding EVs, which could increase uptake and further incentivise the market to innovate and invest in the required infrastructure.
28. As the uptake of EVs increase, it will be essential to monitor the rate of uptake and location of EVs, due to the significant pressure EVs could place on the electricity network. Electricity distribution businesses will require this information to ensure sufficient build out and upgrades are made to cope with the increased demand on the network. Without sufficient planning and co-ordination, all consumers will face the risk of increased electricity costs and increased outages.

Question 12: *What changes will be required to New Zealand's regulatory, institutional and infrastructural arrangements for the electricity market, to facilitate greater reliance on renewable sources of energy across the economy?*

Role of the Regulator -

29. It is technology and not regulation that will drive decarbonisation in energy markets.
30. Regulators should identify and address barriers to the uptake of new technologies that utilise low carbon renewable energy sources.
31. Vector supports "competitive neutrality", which allows new and smarter technologies to be provided by any willing parties. This would promote greater uptake and innovation in the provision of new products and services.
32. Energy regulation, administered by both the Commerce Commission and the Electricity Authority, is increasingly becoming out of step with international frameworks that specifically recognise carbon as a mandatory consideration in decision making (e.g. Ofgem⁶). Carbon is not considered a relevant factor by either regulator under current statutory settings.
33. The importance of efficient and transparent process in the wholesale electricity market, particularly during dry years, should also be reviewed in the context of incentivising the uptake of new technologies and distributed low carbon energy generation.

⁶ *Corporate Strategy and Plan 2011-2016*, reference 44/11, Ofgem, 2011

34. The increases in the average wholesale energy prices at the North Island reference nodes in July this year was a trebling of the equivalent average price from the same time last year. While the increases in wholesale energy prices were attributed to below average low South Island water storage, the extent of the increase appears to be disproportionate with the one to two percent level of risk attributed to the lower than average storage by the System Operator.⁷ As climate change presents an increased risk of adverse climatic events, we must be confident that the wholesale electricity market cannot be manipulated, especially during 'dry years'.

Policies undermining low carbon renewable energy -

35. Regulators and incumbents not keeping pace with the increasing rate of change and innovation in the energy sector has led to perverse incentives affecting the increased uptake of low carbon renewable energy generation. For example, the implementation and regulatory acceptance of what many perceived as a 'solar tax' in the Hawkes Bay.⁸ This is an example of reform that focusses on a single technology to address an underlying and long-term need for accurate pricing of capacity services. Technology agnostic real-time pricing is required to provide consumers with the best signals for smarter investments, instead of penalising new technologies, which only serves to protect incumbent positions.⁹

36. Vector remains technology agnostic in relation to how New Zealand moves to a low carbon future and believes regulators should take the same approach. Maintaining a broad energy generation portfolio increases the likelihood that energy generation can be sourced close to consumption, which provides increased resilience and lower costs for consumers.

37. Until it's complete withdrawal from consideration, the most significant threat to the uptake of low carbon renewable energy generation is the Australia New Zealand Draft Battery Standard outlined in question eight, that many feared could amount to an effective ban on lithium-ion battery storage devices inside homes.

38. The benefits of battery storage are widespread, including providing backup power during system outages; reducing peak demand and peak demand charges; and helping to make time-of-use pricing a reality and an incentive. In remote and

⁷ System Operator Risk supply curves 20 July <https://www.transpower.co.nz/system-operator/security-supply/hydro-risk-curves>

⁸ *Solar tax to be taken to hearing*, press release, SolarCity, 1 February 2017

⁹ Page 41, *Toward 100% Renewable Electricity: How New Zealand can develop a fully renewable electricity system*, Norman Smith, Efficient Energy International, April 2017

regional areas, battery energy storage can also displace diesel generation, or offset the need for additional network infrastructure.

39. A critical requirement under the Electricity Industry Participation Code (the Code) inhibiting low carbon renewable energy generation is the restriction on consumers to have an energy retail relationship with only one trader per connection. This serves as a direct barrier to the development of disruptive business models able to promote low carbon energy generation, such as peer to peer electricity exchange, and should be addressed immediately.
40. As households increasingly attempt to combat climate change, demanding control over their energy usage, regulation must keep up and not unnecessarily burden individual households by recognising them as 'market participants' under the Code. It would be nonsensical for example, for an individual to be perceived as a 'generator' simply for having a solar panel on their roof. Regulators must be careful not to discourage individuals transitioning to a low emissions household.
41. The ability to trade electricity between consumers with peer to peer energy exchange would reduce energy sector emissions, as consumers would be rewarded for installing low carbon distributed energy generation (such as solar), and also for reducing their consumption at peak times, decreasing the need for potentially coal-fired generation to meet peak capacity. However, there are multiple challenges in the way that the New Zealand electricity market reconciles trades, recognises participants, and allows access to meter data, which inhibits the realisation of these benefits.

Data transparency -

42. To evolve and adapt to the challenges presented by climate change, the electricity sector needs greater availability of data. Access to electricity meter data is an enabler for several new services encouraging energy efficiency and a reduced carbon footprint, including; peer to peer electricity exchange, smart home energy management, EV charge scheduling, load shed participation, and electricity brokerage, generation and battery aggregation. Requesting data from retailers remains a clunky and delayed process and puts the development of these services at the risk of retailer performance under these obligations. We believe there is an urgent need to amend the Code to truly deliver ease of access to meter data and up to date, as well as ongoing access, to consumption data. It is positive to see

that data and data exchange is a central work programme for the Electricity Authority, however the urgency of this work is not yet sufficiently realised.

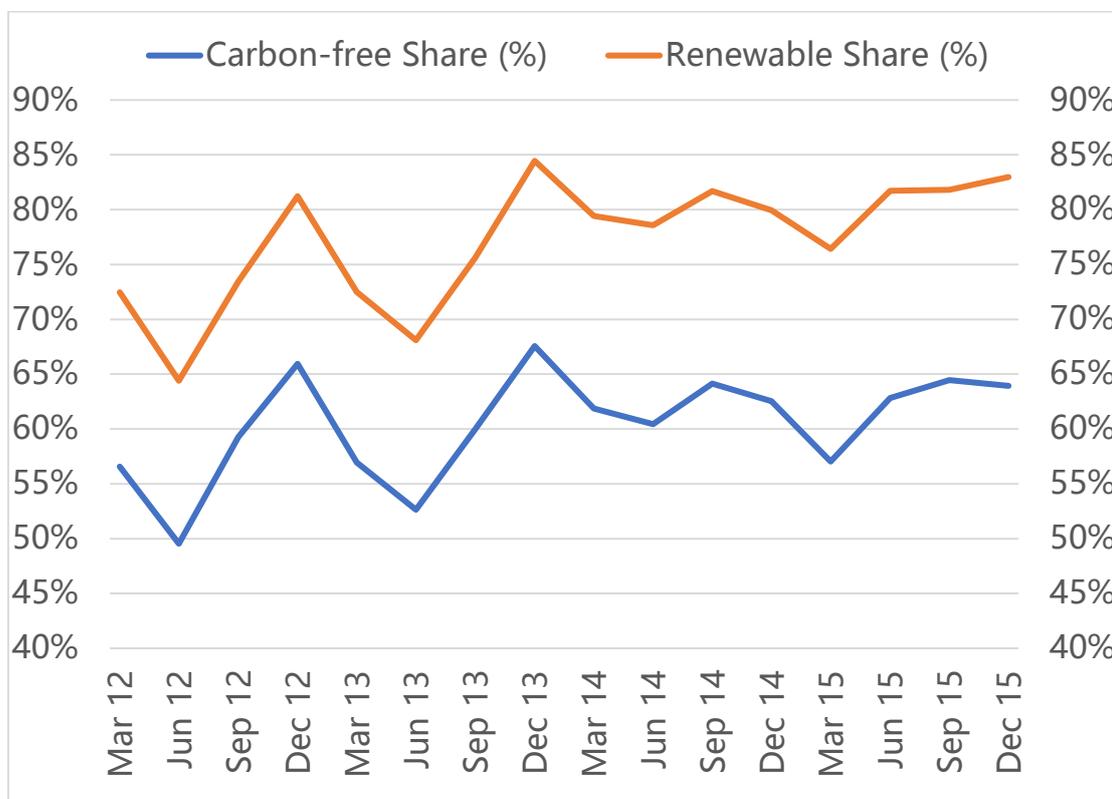
Question 13: *What evidence is there on the possible physical effects of future climate change on sources of renewable energy in New Zealand, such as wind, solar and hydro power?*

43. A changing climate will bring future uncertainty for the resources that power a range of renewable energy generation within New Zealand. The impacts will vary depending on the nature of the climate change experienced at different regional levels. Our current reliance on hydro resources based primarily in the lower South Island could be problematic if the climate variables (precipitation, temperature, snow, etc) follow a pattern that leads to adverse conditions for lake levels. Wind and solar, by way of their distribution throughout the country, are less exposed to regional variance.
44. With our dependence on weather systems to feed our largely hydro renewable energy resources, and the exposure to extreme storm events, there will need to be an increased focus on improving the resilience of supply in the face of climate change. Without this the country can expect to experience disruptions to energy supply and the economic consequences of this.
45. Increasing the diversity of our renewable mix and encouraging more distributed energy along with appropriate energy storage will assist in mitigating climate change impacts.

Question 14: *Apart from the regulation and operation of the electricity market, what are the main opportunities and barriers to reducing emissions in electricity generation?*

46. There is a mindset shift required to reduce emissions in electricity generation. The focus in New Zealand is on 'renewable' generation. What must be realised however, is that renewable energy generation does not equate to zero carbon generation. Environmental Defence Agencies overseas are changing the classifications from "renewables" to requiring carbon per kWh transparent reporting.
47. This is relevant in New Zealand, as when you closely examine MBIE data on New Zealand's renewable electricity generation from a carbon per kWh perspective, we are significantly lower than the 'over 80 percent' figure that is assumed, in the form

of 55-65 percent. Reporting carbon per kWh would therefore seem an obvious step for New Zealand given this delta.



48. Transparency of renewable generation will help us avoid the complacent mindset that no further action is needed in New Zealand. This mindset simply does not stack up. If you combined every country which emits less than one percent of global emissions, together they add up to over 25 percent of global emissions¹⁰. If New Zealand opts out of its fair share, every other small country has the right to also opt out – and a quarter of global emissions would continue to rise.

49. Between 1990 and 2015 New Zealand’s net emissions increased by 64 percent,¹¹ While our population is growing and we have less ‘low hanging’ fruit than other nations, we cannot afford to regress. This complacent mindset needs to be reinvigorated with greater transparency and reporting on New Zealand’s progress and full transparency on carbon per kWh.

50. The other shift that needs to occur is the lack of debate and analysis regarding New Zealand’s dominant reliance on hydro generation. As climate change

¹⁰ Climate Analysis Indicators Tool, World Resources Institute, 2014

¹¹ Page 4, *Stepping stones to Paris and beyond: Climate change, progress, and predictability*, Parliamentary Commissioner for the Environment, July 2017

increases the unpredictability of weather events, we must question whether we can afford to be dominated by a single source of electricity generation. Nor does New Zealand want to continue to be reliant on large coal winter peaking power stations, such as Huntly. Other dominant hydro systems such as Brazil are moving to much more aggressive investment in utility scale solar and battery to provide greater resilience for anticipated drier periods.¹²

51. Unlocking distributed energy resources like rooftop solar, demand response, EV charging and other customer-sited storage, can help reduce carbon by directly avoiding carbon intensive forms of generation, or, shifting energy demand patterns to better align with when solar and wind are producing.
52. To ensure the emissions benefits of distributed generation are obtained, pollution standards or emissions intensity metrics could be implemented to drive energy network modernisation efforts. Intensity metrics could measure the variable carbon value of a kilowatt hour of electricity for every hour of the year, to better understand which hours of the day are the dirtiest and help quantify the environmental benefits of co-ordinated low carbon distributed energy generation.¹³
53. Network modernisation represents a monumental opportunity to achieve cleaner, more affordable, resilient electricity service.

Question 20: *Acknowledging the current review, what changes to the New Zealand Emissions Trading Scheme are needed if it is to play an important part of New Zealand's transition to a low-emissions future?*

54. Vector supports a New Zealand Emissions Trading Scheme (ETS) that is equitable, with responsibilities fairly allocated and cross-subsidies avoided. This would avoid market distortions and increase confidence in the scheme, ensuring its sustainability.
55. Predictability of ETS settings is critical for the long-term success of the scheme. Businesses require sufficient time to incorporate any ETS changes to their business planning and inform their customers of impending changes.
56. Predictability could be ensured, for example, through:
 - early signalling of unit auction design;

¹²<http://www.renewableenergyworld.com/articles/2016/02/new-developments-in-brazil-s-solar-power-sector.html>

¹³ <http://www.edf.org/media/comed-launch-unprecedented-environmental-measurement-tool>

- allowing a two-way auction, where ETS participants have the option of offloading their units back to the market;
- clear guidelines around international unit access;
- development of a liquid forward or futures market;
- legislating carbon reduction targets; and
- incentives for businesses to invest in carbon reduction initiatives in New Zealand or overseas, e.g. mechanisms akin to the Clean Development Mechanism in the Kyoto Protocol that generate carbon credits for such initiatives.

57. If carbon reduction targets were legislated, political consensus would be imperative. New Zealand cannot successfully transition to a low emissions economy if incoming governments could abolish the legislated targets, or weaken the regulatory body charged with overseeing and implementing the targets.

58. Administratively, it would assist ETS participants and potential participants if all information related to the scheme could be found in one website, rather than in multiple websites hosted by several government agencies. This would minimise search and transaction costs, and increase awareness and confidence in this market.

59. More broadly, a sector-by-sector review of abatement responses would inform policy decisions on whether non-ETS options are more effective in reducing emissions for particular sectors/activities. This could include, for example, issuing guidelines that facilitate the use of new technologies capable of reducing the carbon footprint of the energy sector, or removing barriers to their introduction into the mass market.

Question 22: *What type of support for innovation and technology would best help New Zealand's transition to a low-emissions economy?*

60. Both government and the private sector need to encourage research and development (R&D) – this is not purely a role for government or the private sector individually.

61. Once the critical nature of climate change is recognised, R&D will dramatically increase. Therefore, significant emphasis must be placed on transparency and education.

62. There needs to be recognition of industry leaders 'taking the first step', for example with a contestable R&D fund. Companies can be sceptical of change, especially in relation to climate change. Those that take the lead should be incentivised or rewarded for developing reference cases that set the market, and create comfort for other companies with the transition.
63. Industry overseas (and to some extent domestically), has focussed on pilot trials. Crucially, it provides data and customers at an early stage. This is a form of R&D that needs to be better recognised for its value in creating and enabling innovation.
64. Regulators must also allow existing capability to be leveraged for the development of new energy solutions. A current example is storage technology, which has the potential to fundamentally change the nature of the 'peak' driven energy sector.
65. Storage will unlock the benefits of low carbon energy generation sources, which historically had the challenge of being unable to dependably generate electricity at times of peak energy demand.
66. We caution against any prescription for storage that could ultimately result in the benefits of the technology being unrealised.

Question 26: *What are the main uncertainties affecting New Zealand businesses and households in considering investments relevant to a low-emissions future? What policies and institutions would provide greater confidence for investors?*

67. The main uncertainties for investment into a low emissions future is legislative change. New Zealand's regulatory framework should provide efficient signals, incentives and long-term stability for businesses and consumers to make informed investment and purchasing decisions.
68. Businesses require certainty around carbon prices and price trends (e.g. volatility is avoided or limited) and new technology standards (i.e. the devices they are using are not subject to rapid obsolescence). Under the ETS, uncertainty could be mitigated by early signalling of the design of New Zealand unit auctions, policy/guidelines around the access to international carbon markets, and the development of new markets.
69. Legislating carbon reduction targets, as has been done in the United Kingdom, would also increase certainty for the private sector, and show greater commitment from government to move to a low emissions economy. With legislated targets, an

independent body with appropriate powers would also be required to enable implementation.

70. We encourage greater transparency and increasing public awareness around the above policies/regulations, including through social media, which could have a wider reach at lower cost.
71. As stated in our response to question 12, a regulatory framework that is highly prescriptive will not enable competition and innovation in markets for new technologies that will support the transition to a low emissions economy. A policy of principled legislation and 'technology neutrality' would provide greater confidence for investors
72. Prescribing specific functionalities for new technologies (rather than minimum service levels) could limit providers' flexibility in making the optimal technological choice. It could lock investors and households into technologies subject to obsolescence or prevent other parties intending to enter the market developing alternative technologies.
73. We support the development of policies that leverage various parties' capabilities to provide new technology solutions capable of reducing New Zealand's carbon footprint, and reduce uncertainty and risk for parties willing to provide those solutions.

Question 30: *How can adaptability best be incorporated into the system supporting New Zealand's low-emissions transition?*

74. Principles tend to work better than prescription for regulatory policy because they allow for both consistency and adaptation. Prescriptive policy is 'fragile by design' and a policy or regulatory strategy based only on one view of the future is unlikely to survive for long.¹⁴
75. The question to be asked by regulators is not "how do we fix the failure", but rather what can be done to facilitate, promote and accelerate institutional adaptations (including markets) that will in turn promote, facilitate and accelerate the adaptations in business and consumer behaviours.¹⁵
76. It must also be acknowledged that consumers are not always rational beings, and textbook economic theory will not always be sufficient when analysing how to

¹⁴ *Adaption in regulatory policy with specific reference to energy networks*, George Yarrow, April 2017

¹⁵ *Adaption in regulatory policy with specific reference to energy networks*, George Yarrow, April 2017

reduce carbon footprint. The uptake of new technologies is often reinforced by social preferences and perceptions relating to the environment and energy independence. Residential electricity consumption accounts for 32 percent of electricity demand¹⁶ and is a disproportionate driver of winter peak demand and network investment. New technologies have the potential to exacerbate or alleviate the strain that residential usage places on energy infrastructure and our emissions profile, depending on when, and how, they are taken up. Therefore, behavioural economics will need to be a significant consideration of any framework.

77. Good regulatory strategy must be resilient, able to handle unpredictable and unpredicted environmental change without collapsing or giving rise to major dysfunctions.
78. One approach for regulators in a climate of uncertainty, is to undertake ‘supportive oversight regulation’.¹⁷ This requires regulatory bodies to approve (or decline) specific types of institutional arrangements, with the actual rules left to be determined by those with ‘skin in the game’. ‘Supportive’ is added to ‘oversight’ because, to be effective, new developments may require legislative change.
79. A good follow up question for policy makers to ask is: “how does any existing resolution of the trade-offs look if there is obvious potential for further periods of radical change?”
80. Given the rapid pace of change now underway, regulators may need to consider offering a range of “examples” of how they will respond if certain scenarios or structures develop.
81. An adaptable regulatory approach tends to be simpler than the prescriptive alternative, because it entails the devolution of the adaptive work to other economic agents. This type of simplification is not tantamount to deregulation, rather a re-allocation of regulatory effort. There is a large space between rigid prescription and ‘anything goes’ and as always there are trade-offs to resolve and balances to be struck.¹⁸

Question 34: *Who are the most important players in driving forward New Zealand’s transition to a low-emissions economy?*

¹⁶ Page 5, *Electricity in New Zealand*, Electricity Authority, 2016

¹⁷ *Adaption in regulatory policy with specific reference to energy networks*, George Yarrow, April 2017

¹⁸ *Adaption in regulatory policy with specific reference to energy networks*, George Yarrow, April 2017

82. Business and government need to lead the call to action, driving New Zealand's transition to a low emissions economy. We know from BNZ customer research, New Zealanders hold the government responsible first and foremost. Businesses are a close second.¹⁹
83. It is the government which must carefully set the framework so that businesses have the imperative and clarity to make investment choices that reduce New Zealand's carbon footprint.
84. In the energy sector, retailers, network operators and technology providers all need to resist being kept in regulatory 'boxes'. All industry players need to openly embrace new technology and avoid patch protection, which limits those who can uptake new technology, enable customers, and reduce carbon emissions. Importantly, in a country the size of New Zealand, no credible player should be prohibited from innovating.
85. Electricity distribution businesses will play a key role in enabling the energy sector's transition. The medium-term challenge for New Zealand's networks is perhaps greater than for any other part of the electricity system. Distribution businesses are responsible for managing the stability of networks under growing complexity - shifting electricity demand, changes in technology, policy mandates, energy supply, climate change impacts (i.e. rising sea levels impacting network infrastructure), customer demands, and more.
86. The capacity of electricity distribution businesses to develop and pass to consumers a more dynamic set of cost reflective time-of-use energy and capacity prices is key to progressing to a more resilient system, with improved economic signals and rewards for consumers, effective management of daily and winter/dry year risk, and in turn, effectively enabling increasing renewables.²⁰
87. Electricity distribution businesses cannot be charged with ensuring the lights stay on, while also being locked out of employing new technologies, especially in the context of such complexity. Distributors should, for example, be strongly incentivised to invest in innovative methods for peak demand shaving, which carries many additional benefits including reduced network costs.

¹⁹ *Climate Change – what's a bank got to do with it?*, media release, BNZ, 21 October 2015

²⁰ Page 41 *Toward 100% Renewable Electricity: How New Zealand can develop a fully renewable electricity system*, Norman Smith, Efficient Energy International, April 2017

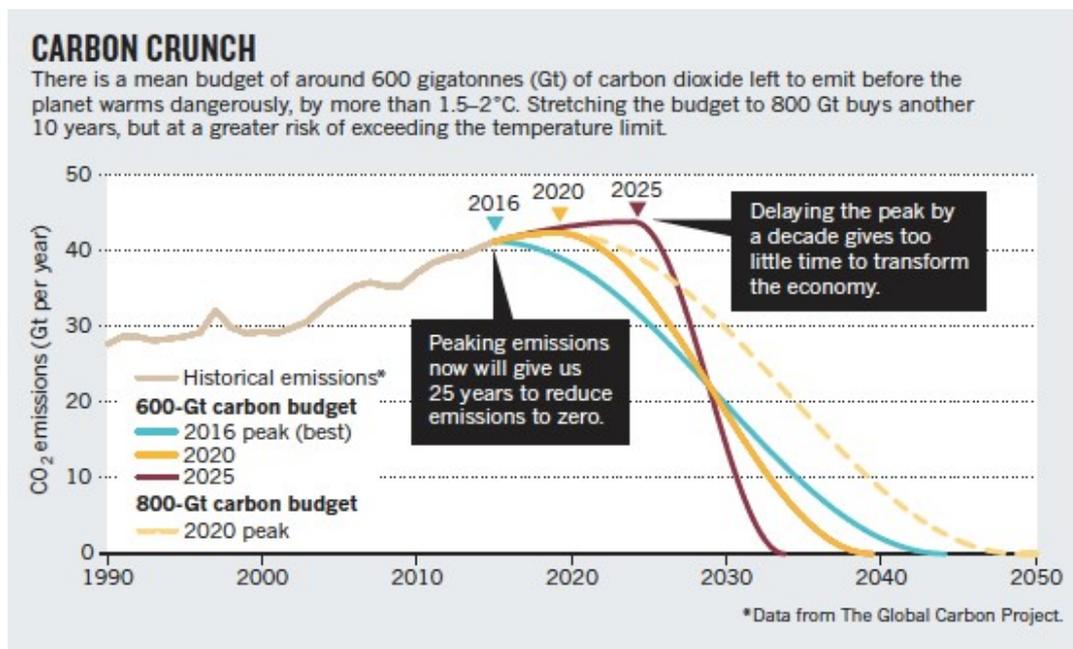
Question 35: *What measures should exist (and at what scale and duration) to support businesses and households who have limited ability to avoid serious losses as a result of New Zealand's transition to a low-emissions economy?*

88. EVs and rooftop solar storage are game-changing technologies for the energy sector and emission levels. As the price of EVs, solar panels and battery storage continue to fall, we expect a greater uptake of these technologies. Notwithstanding the improving economics, a lack of access to finance and home ownership represent persevering obstacles for some. Unfortunately, these obstacles are often felt hardest by those of limited means who lack savings, have poor credit, and/ or are renting.
89. Pricing has a role to play in signalling the value of new, lower emission technologies like rooftop solar and EV. However, pricing is frustrated by the existence of the Electricity (Low Fixed Charge Tariff Option for Domestic Consumers) Regulations 2004 (the LFC Regulations). Originally conceived, in part, as a support mechanism for the vulnerable, the LFC Regulations are a blunt, ineffective tool, often benefiting those that are better off²¹. The vulnerable cannot be defined by how much electricity they consume, yet it is this definition that underpins the LFC Regulations.
90. We believe the LFC Regulations should be abolished in favour of more targeted measures to assist those of limited means. Examples might include government:
- funding;
 - rebates; or
 - cheap finance.
91. Vector has developed numerous initiatives which assist lower income households, including launching the Energy Efficient Communities Project in conjunction with Entrust, which will deliver hot-water heat control units, LED lightbulbs and energy advice. Vector also recognises increasing opportunities to utilise distributed generation and peer to peer systems to create sustained reductions in energy costs and facilitate energy gifting for those in need.

²¹ For instance, a 2016 Vector pricing survey of 472 residential consumers revealed that more than half the households earning more than \$120,000 per annum used less than 8,000 kWh per annum, qualifying them for a 'low fixed charge' tariff.

Question 36: What are the essential components of an effective emissions-mitigation strategy for New Zealand that will also be economically and politically sustainable?

92. In order for an emissions-mitigation strategy to be effective it must be long-term and have cross-party consensus. An effective strategy will give early and long-term signals on policy direction, and provide sufficient transition timeframes to meet any policy changes. This will provide certainty to business and industry, enabling long-term emissions reduction strategies to be implemented.
93. New Zealand needs to reach some form of political consensus soon in order for the economy to act within a timeframe that is effective. The amount of CO₂ being emitted is increasing year on year, and according to research conducted by the Global Carbon Project²², we only have two decades left to fully decarbonise if we are to stay below the two-degree target set in the Paris Accord, and avoid irreversible damage. This means that it is essential for New Zealand's emissions-mitigation strategy to be ambitious, more so than previously thought.



94. An effective strategy will incorporate the need for investment in new technology and R&D, and must apply to all areas and industries ensuring an equitable allocation of responsibilities. A one size fits all approach to emissions mitigation will not work. An effective strategy needs to reflect this by having options and

²² www.globalcarbonproject.org/carbonbudget

remaining flexible. A key part of this lies in remaining technology agnostic, avoiding subsidies, and providing the right incentives to invest and innovate.

Question 39: *What do you see as the main benefits and opportunities to New Zealand from a transition to a low-emissions economy?*

95. Transitioning to a low emissions economy opens immense opportunities for businesses to create long-term value and for innovation and R&D to become one of New Zealand's key advantages.
96. Developments in technology and the changing nature of job profiles will have a disruptive effect on employment. However, there is the opportunity to create more jobs in areas that are future focused and resilient to change. The commercialisation of low carbon solutions, including clean technology, will open an important demand in emerging markets and provide the opportunity for New Zealand to become a key player in the global transition to a low emissions economy. According to the Better Business Better World Report, this market will be worth at least \$1.2 trillion by 2030.²³ There will also be opportunities for supply in new industries to develop with funding from green financing.
97. The transition to a low carbon economy will improve New Zealand's economic resilience, with reduced exposure to higher fossil fuel prices, as we transition to more renewable low carbon energies that can be produced domestically. Our tourism sector and significant range of agricultural exports that are dependent on New Zealand's reputation as "clean and green" will also benefit, from both the direct reduction in carbon emissions and the indirect benefits to air and water quality. This increased 'clean and green' brand will provide New Zealand with a competitive advantage by being able to produce goods and services from a low emissions economy relative to international peers. This will in turn spur the development of new industries such as green financing.
98. Recognising the likely impact of climate change, it is also in our interest to be an active part of the global response. If we can help to show other countries the way and increase the urgency of the response, New Zealand will benefit from avoided costs associated with late adaptation.
99. A significant opportunity in transitioning to a low emissions economy is enabling greater social equity. A scenario of escalating energy costs and the energy

²³ Page 29, *Better Business Better World*, Business and Sustainable Development Commission, 2017

insecurity that would impose, inflicts a high toll on low-income consumers. In New Zealand, we already see more people unable to afford the energy they need to heat their homes to a healthy standard. Improving energy productivity and increased energy security through an increase in distributed generation would help control the cost of energy and allow more people access to clean and affordable energy, helping narrow the economic and social divide.

100. The costs associated with the disruption that will occur if we do not act also need to be considered alongside the benefits of acting. The cost of mitigation measures from increased weather events such as severe storms, floods and sea level rise would continue to increase. People could become displaced and need to be rehomed, and the number of climate related refugees could rise putting further pressure on New Zealand economy and infrastructure.

Question 40: *What does your long-term vision for a low-emissions economy look like? Could a shared vision for New Zealand be created, and if so, how?*

101. Vector envisages a future where New Zealand has embraced the low carbon transition, alongside the rapid acceleration of technological change, to create a smarter economy that is based on clean energy. We would expect these changes to have driven far greater efficiency and increased productivity than the alternative. This transition will have enabled all New Zealanders to have equal access to affordable energy and new technologies. New Zealand will have a competitive advantage with less exposure to rising carbon costs and the reputational benefit from environmental improvements that will come with a less emission intensive economy.

102. Carbon information will be readily available driving both daily and longer term decision making for consumers and businesses alike. With appropriate pricing, fossil fuels will only continue to be used in the applications where they can't be substituted. Where carbon is produced in industrial processes, it will be viewed as a resource rather than waste, with carbon capture and recovery a viable technology. This will open up new industries, creating a range of employment opportunities.

103. Alleviating climate change requires long-term vision. The current level of ambition around climate change is too low, and has been called out internationally as being inadequate and unable to meet the targets set in the Paris Accord. The Net Zero report has provided a good starting point with the use of scenarios that identify the

direction that needs to be taken, while allowing business to have the flexibility to determine how to respond. New Zealand can reach a shared vision if the issue is taken off the political agenda and not threatened by the three-year political cycle. Cross party consensus, increased education, embracing technology, competitive neutrality, and transparent reporting will be critical.