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### **Issues paper: Low-emissions economy**

Meridian Energy is New Zealand's largest electricity generator producing energy only from renewable sources and is a major nationwide retailer through our Meridian and Powershop brands. Our hydro stations generate enough electricity to power around 1.4 million homes each year and our wind farms generate enough electricity to power around 152,000 homes each year. In Australia, Meridian owns wind farm assets and retails electricity through its Powershop subsidiary. In the UK, the Powershop platform retails to customers via a franchise agreement. Listed on the New Zealand and Australian stock exchanges Meridian is 51% owned by the New Zealand Government.

Meridian is committed to meeting future energy needs with renewable energy and helping to minimise our country's contribution to climate change.

Meridian notes the Productivity Commission has been asked to undertake an inquiry into how New Zealand can maximise the opportunities and minimise the costs and risks of transitioning to a lower net-emissions economy. The inquiry's purpose is to "identify options for how New Zealand could reduce its domestic greenhouse gas emissions through a transition towards a lower emissions future, while at the same time continuing to grow incomes and wellbeing."

Meridian strongly supports the Commission's work and looks forward to its eventual report.

*Climate change is the issue of our time and successfully transitioning to a low-carbon economy is the opportunity for New Zealand business. It's important that the business community gets the right signals and is supported to play its part to adapt, innovate and future-proof our economy.*

Mark Binns, Meridian's Chief Executive.

These comments were made by our chief executive in support of a report by the Parliamentary Commissioner for the Environment (PCE) published on 27 July 2017, *Stepping stones to Paris and beyond: Climate change, progress and predictability*. The PCE's recommendations are, in Meridian's view, worthy of careful consideration by the Productivity Commission. We comment on this further below and respond to a number of the questions from the issues paper.

Q1

**How can the Commission add the most value in this inquiry?**

Meridian agrees with the Commission that it can add the most value by:

- synthesising existing pieces of work on how New Zealand might attain a low emissions economy, and defining how this piece of work is different;
- providing an independent and robust analysis of whole-of-economy trade-offs based on sound economic analysis;
- developing ways to assess the benefits and costs of different pathways for New Zealand to transition to a low-emissions economy (rather than, for example, providing more or different scenarios of what the future might look like);
- taking a longer-term view when identifying policies and institutions that will be required to achieve a low emissions economy to enhance productivity and wellbeing;
- describing what a low emissions economy will mean for businesses and households in New Zealand;
- developing conceptually sound but practical recommendations for change; and
- bringing its expertise and understanding of innovation, and the development, adoption and diffusion of new technologies in the New Zealand economy to this task.

In addition, a useful outcome of this inquiry would be to grow awareness of the interconnected nature of water, environment, energy and climate change matters. Responsibility for water, environment, energy, and climate change matters is spread across

various ministries and regulators. This can result in siloed thinking and conflicting interests, which may not be helpful in maximising the opportunities and minimising the costs and risks of transitioning to a lower emissions future.

To give an example, the National Policy Statement on Freshwater Management developed by the Ministry for the Environment seeks, among other things, to maintain and improve fresh water quality and quantity outcomes for lakes and rivers. One of the possible outcomes could involve increased minimum flows or a reinstatement of flows in rivers with hydro-electric infrastructure. This would impact the levels of hydro generation achievable and any future investment in hydro generation, which in turn may have unintended consequences, including:

- energy cost and security of supply implications; and
- an increase in greenhouse gas emissions from the electricity sector.

The Productivity Commission can also add value by taking into account recent work in New Zealand on wellbeing (the Living Standards Framework developed by Treasury) and recognise that not transitioning to a low-emissions economy would increase negative climate change impacts on wellbeing, including productivity.

At a high-level, we would encourage the Productivity Commission to review transition opportunities not against business as usual forecasts of New Zealand's future, but against the potential decline in productivity and wellbeing that a high-emissions future would create. There is scientific consensus that a warmer world would impose restrictions and difficulties for human society, in the form of more variable and extreme weather patterns and sea level rises, and that these would have obvious impacts on the productivity and wellbeing of New Zealanders.

**Q5**

**What are the issues for government to consider in encouraging alternative low-emissions land uses?**

Having a secure energy supply is fundamental to New Zealand's economic productivity. New generation capacity is needed to meet increases in electricity demand and power the country's economic growth. Accordingly, enabling (or avoiding barriers to) renewable energy generation must be a key part of any government strategy to transition to a low-emissions economy.

Securing planning and environmental approval is a key step in the development of new renewable energy generation. This means engaging with the Resource Management Act framework. In Meridian's experience there is a pressing need for decision-makers within that framework to be provided with clear direction as to how to encourage low-emission land uses, such as renewable energy generation. It is not sufficient for any direction to simply identify the benefits of renewable energy generation or to highlight a preference towards low-emission land uses. Instead, decision-makers need unequivocal guidance as to how they should treat the benefits of renewable generation projects that will set the platform for a low emissions economy. Meridian encounters a variety of different approaches to this issue depending on where a proposed renewable energy development will take place.

Q8

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

Q9

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

Meridian is a member of Drive Electric, a not-for-profit organisation with the goal of making electric vehicle ownership in New Zealand mainstream. As per the recently commissioned Drive Electric whitepaper *Peak Pressure: what challenges do electric vehicles pose to New Zealand's electricity grid*, the up-front price difference between electric vehicles (EVs) and internal combustion engine vehicles is currently a barrier, but this gap is closing fast. We are increasingly seeing the choice of electric vehicles grow and with corporate fleet and other initiatives increasing sales to New Zealand, more everyday consumers will start to access affordable EVs in both the new and the second hand market. Given the pace of change, Meridian does not believe direct intervention to address the current price difference is necessary or appropriate.

There are already a number of positive government interventions to support EV uptake such as exemption of road user charges, bulk buying EVs for government and the private sector, supporting the roll out of charging infrastructure, and a contestable fund of \$6 million per annum to encourage uptake and innovation. These policies should continue.

Meridian would also like to see more done in the area of education where 'range anxiety' persists, despite the hugely improved performance of recent EV models and the significant increases in the available charging infrastructure.

Research undertaken by Concept Consulting in 2016<sup>1</sup> indicates that the current flat structure of most retail electricity tariffs,<sup>2</sup> along with low carbon costs, constrains the uptake of electric vehicles because:

- the electricity cost from charging EVs at off peak times (like overnight) generally being too high;
- the payments which future EVs could earn from injecting power back into the electricity grid at times of peak demand being too low; and
- the carbon price that internal combustion engine owners pay from tailpipe emissions being too low.

These factors are to some extent currently offset by the exemption for EV owners from having to pay Road User Charges. However once the Road User Charges exemption ends:<sup>3</sup>

*EV owners will effectively be penalised relative to their true costs if existing electricity and carbon pricing arrangements continue. In that situation, EV uptake is likely to be slower, relative to a situation where the full benefits and costs are signalled to consumers. Our analysis suggests the cost to society from this slowing of EV uptake, and the resulting increase in public costs could be of the order of hundreds of millions of dollars including the cost of increased greenhouse emissions (among others).*

The Electricity Authority is currently encouraging distributors and in turn retailers to make an 'industry led' move to service-based and cost-reflective pricing. Once distributors reform their price structures retailers will in turn be able to make available to EV owners tariffs that are more cost-reflective. Meridian currently offers an extended cheap EV rate between 9pm and 7am in the main metro areas. A move to more widespread cost reflective network pricing would potentially enable us to improve our offering.

Finally, in relation to questions 8 and 9 Meridian has seen a draft of the joint submission to the Commission from the Electricity Retailers Association of New Zealand (ERANZ) and the Electricity Networks Association (ENA). Meridian supports that submission. For the reasons given by ERANZ and ENA, Meridian considers that the Electricity (Low Fixed Charge Tariff Option for Domestic Consumers) Regulations 2004 are currently a barrier to the uptake of electric vehicles in New Zealand and that repeal of the regulations would encourage the uptake of electric vehicles.

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<sup>1</sup> [http://www.concept.co.nz/uploads/2/5/5/4/25542442/new\\_technologies\\_economic\\_report\\_v2.0.pdf](http://www.concept.co.nz/uploads/2/5/5/4/25542442/new_technologies_economic_report_v2.0.pdf)

<sup>2</sup> As opposed to tariffs that are more service-based and cost-reflective such as Time-of-Use tariffs

<sup>3</sup> Concept Consulting, *Electric cars, solar panels, and batteries in New Zealand Vol 2: The benefits and costs to consumers and society*, at page ii

**Q10**

**In addition to encouraging the use of electric vehicles, what are the main opportunities and barriers to reducing emissions in transport?**

There are opportunities to reduce emissions in the transport sector by encouraging:

- the electrification of public transport including electric buses, electric trains, electric light rail, and electric trams;
- mass transport rather than individual transport; and
- urban design that supports bikes and pedestrians.

Cost structures and infrastructure spending by government needs to be redirected from supporting single occupancy car use to other lower emissions forms of transport. This would require a cultural change in behavioural patterns and the choices individuals make.

**Q11**

**What are the main opportunities and barriers to reducing emissions from the use of fossil fuels to generate energy in manufacturing?**

Fuel switching is a significant opportunity in manufacturing and industrial heat. This would involve moving from coal or other fossil fuels to electricity or bio-fuels, for example the electrification of boilers used in dairy processing. Moving industrial heat to electricity would produce significant emissions reductions given the high percentage of renewable electricity generation in New Zealand. Barriers include the lack of access to biofuels at scale without restricting land available for food production, and the higher cost of electricity relative to fossil fuels for heating purposes.

**Q12**

**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?**

New Zealand's electricity market arrangements are generally very good and have enabled us to get very close to our current target of 90% of generation from renewable sources without the use of subsidies (which many countries have resorted to at some cost). The International Energy Agency's 2017 *Review of New Zealand Energy Policy*<sup>4</sup> described New

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<sup>4</sup><https://www.iea.org/publications/freepublications/publication/EnergyPoliciesofIEACountriesNewZealand2017.pdf>

Zealand as “...a world leading example of a well-functioning electricity market, which continues to work effectively.”<sup>5</sup> It also says:<sup>6</sup>

*Among IEA member countries, NZ has highest penetration of geothermal and a significant contribution from hydro. Without any direct subsidies or public support their share in electricity and heat supply has grown in recent years, as a result of cost competitive geothermal and hydro and very good conditions for wind power. This performance is a world-class success story among IEA member countries.*

Meridian agrees with the Productivity Commission that “...the relative cost and efficiency of renewables, such as wind power, now make them a price competitive option.” Meridian’s current pipeline of future grid-scale generation development options consists largely of wind options. We discuss the relative costs of renewable and non-renewable generation options further below.

Meridian considers that New Zealand’s current market-based regulatory arrangements for the supply of electricity have (to date) proved more than adequate to the challenges posed by ‘dry-years’. Previous government ownership of generation solely for security of supply was not considered to be a success<sup>7</sup> and the Whirinaki power station was eventually sold to the private sector.

In Meridian’s view, New Zealand’s renewable generation can still be significantly increased from current levels without compromising reliability or security of supply. However, as the proportion of New Zealand’s electricity supply from renewable sources gets closer to 100% the challenges and costs of simultaneously maintaining current levels of reliability and security will inevitably increase. Given that electricity generation currently contributes only 5% of New Zealand’s GHG emissions, we believe that other sectors of the economy are likely to offer better options for New Zealand to significantly reduce its overall domestic greenhouse gas emissions while at the same time continuing to grow incomes and wellbeing. Overall Meridian considers that the Productivity Commission should be hesitant in recommending any fundamental changes to New Zealand’s regulatory, institutional and infrastructural arrangements for the electricity market. See also our response to question 14 below.

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<sup>5</sup> International Energy Agency, *Review of New Zealand Energy Policy*, at page 13

<sup>6</sup> International Energy Agency, *Review of New Zealand Energy Policy*, at page 13

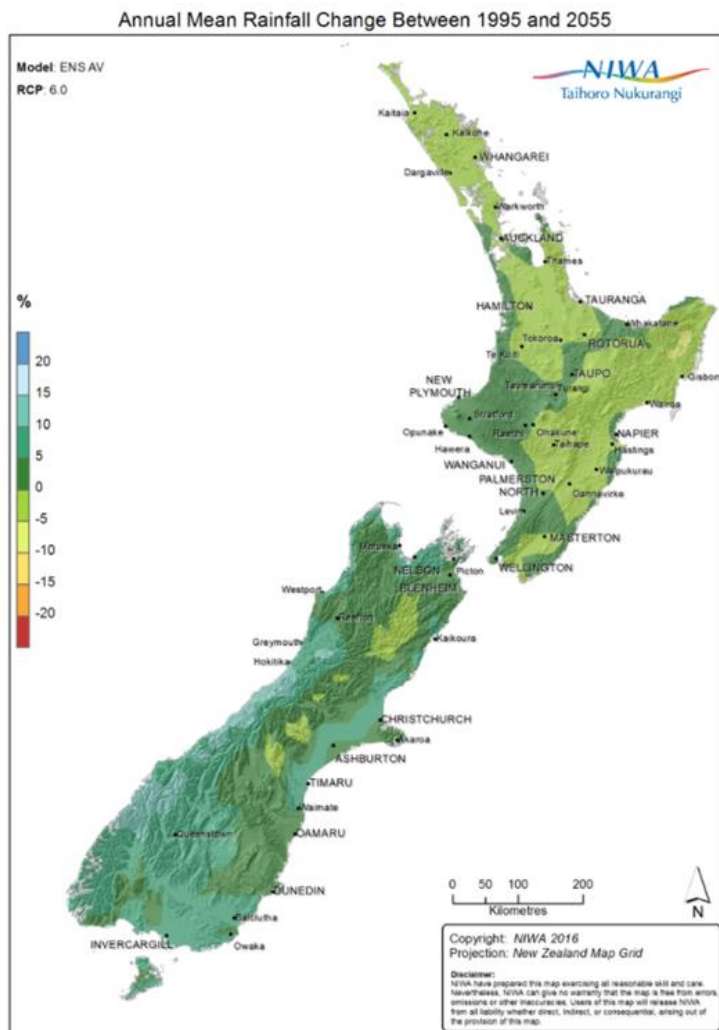
<sup>7</sup> It negatively impacted wholesale market operations (productive and allocative inefficiency) and long term investment decisions (dynamically inefficient).



*The effects of climate variability & change upon renewable electricity in New Zealand* by James Renwick, Philip Mladenov, Jennifer Purdie, Alistair McKerchar and Dennis Jamieson provides an overview of observed and potential impacts of climate variability and change on the electricity sector in New Zealand. In addition, *Climate Change Projections for New Zealand: Atmosphere Projections Based on Simulations from the IPCC Fifth Assessment*, published by the Ministry for the Environment in 2016 provides the latest assessment of regional impacts on climate in New Zealand. A brief overview of both is provided below:

- South Island hydro lakes are fed by precipitation spilling over the Southern Alps in westerly storm events. Snow melt is a key contributor to hydro inflows, contributing approximately half of summer lake inflows in our catchments.
- New Zealand's current wind energy resource is predominately from westerly winds, with the windiest season of the year being spring.
- The most notable influences on year to year variability in New Zealand's climate are:
  - The El Nino Southern Oscillation (ENSO) cycle, and
  - The Interdecadal Pacific Oscillation (IPO)
- The signal from global climate model projections is for an increase in westerly wind circulation over New Zealand, especially in the South Island and lower North Island.
- A warmer atmosphere and increase in windiness is projected to result in an increase in annual mean precipitation in western regions of New Zealand, and a decrease in rainfall in eastern regions.
- The following rainfall increases are projected in our catchments in the next 50 years:
  - Summer rainfall is forecast to increase 5-15%.
  - Winter rainfall is forecast to increase 15-25%.
- As a result of temperature and rainfall changes, reductions in the amount of snow storage in the Southern Alps are likely over the next 50-100 years.
- The net result of an increase in precipitation and decrease in snow storage would likely be a flattening of the annual cycle of flows and hydro generation capacity from the major South Island hydro lakes.
- This would result in a higher correlation of inflows with electricity demand, which currently peaks in winter (while hydro inflows in the South Island currently peak in summer).
- Wind generation is likely to increase.





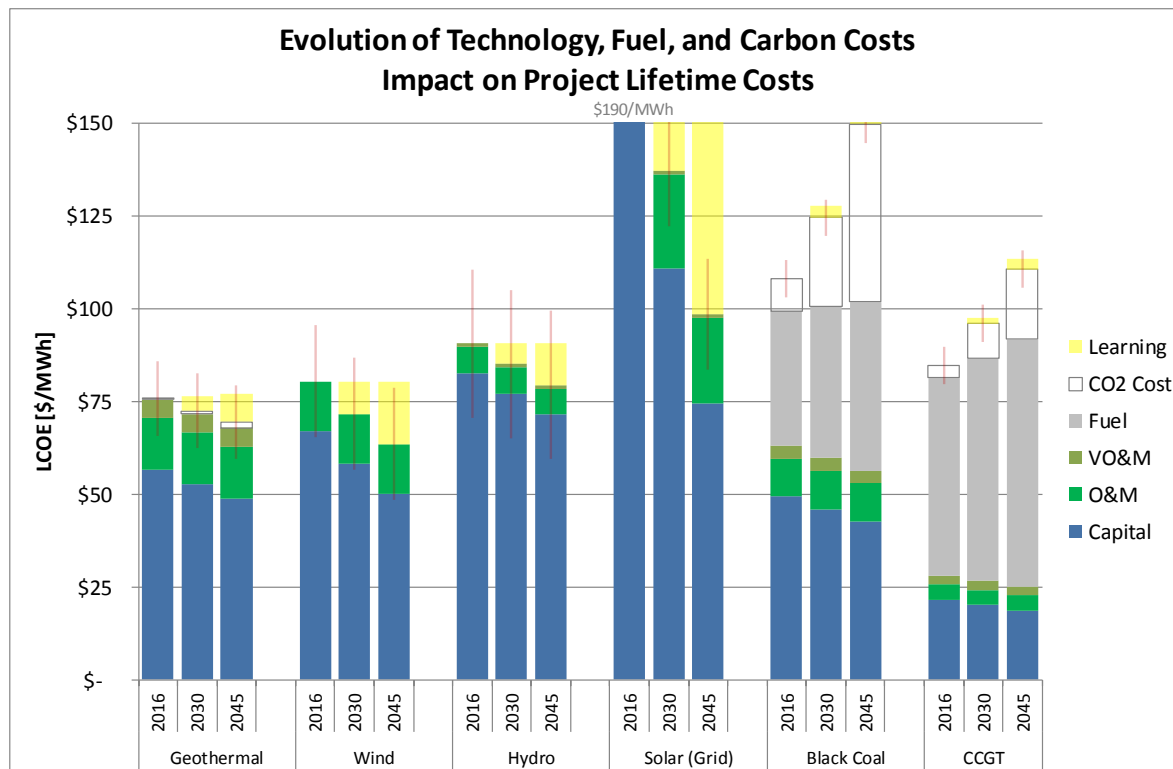
Q14

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

New Zealand is in a unique position globally with a range of competitive renewable generation options including wind, geothermal, and hydro that compete in an unsubsidised fashion with new gas generation. This is illustrated in the chart below which provides a view of the potential evolution of technologies, fuel and carbon costs across six different electricity generation types in New Zealand. It is worth noting that:

- there are a range of renewables generation options available at \$80-100/MWh; and
- with continued technology learning, costs are likely to fall.

From a developers' perspective, technology choices need to fit with a company's strategy, ability to secure finance, ability to secure public support and consents and to fit in the market.



Source: Meridian Energy

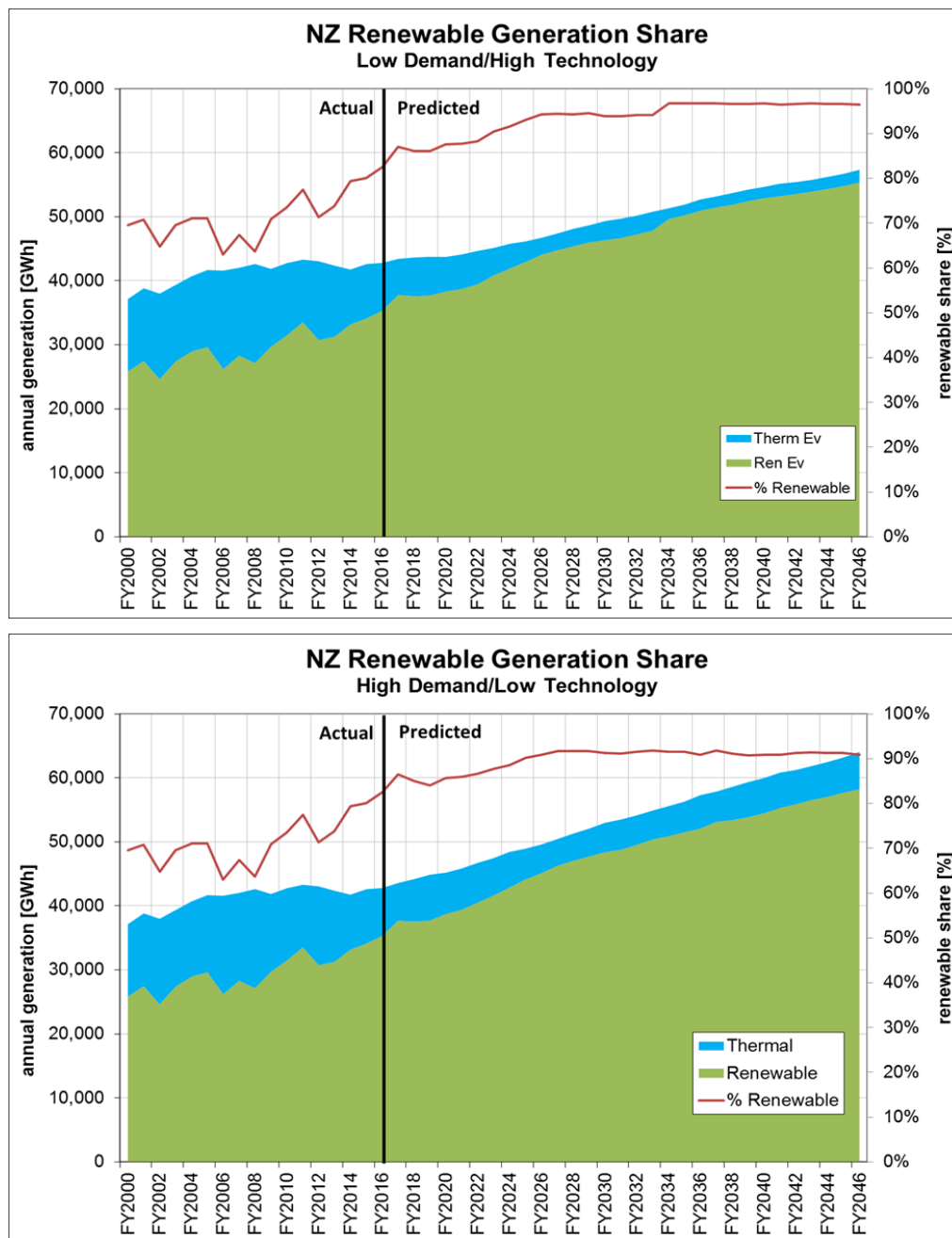
Meridian undertakes long term analysis of the fundamentals of the New Zealand wholesale electricity market. While this analysis is used for a number of purposes, in the context of this inquiry it provides a useful perspective on the volatile future environment.

The charts that follow explore two scenarios – high demand/low new technology uptake; and low demand/high new technology uptake. The technology uptake assumptions in the charts are first described in the table below.<sup>8</sup>

	<b><i>Low technology uptake: Steady but modest increase from today</i></b>	<b><i>High technology uptake: persistent &amp; strong increase from today</i></b>	<b><i>Steady cost decline expected</i></b>
<i>Solar (residential)</i>	125,000	1,500,000	<i>falling from 30c to &lt;12c/kWh</i>
<i>EV (passenger)</i>	150,000	1,000,000	<i>falling from \$60K to &lt;\$25K</i>
<i>Domestic batteries</i>	50,000	250,000	<i>falling to &lt;\$100/MWh</i>

<sup>8</sup> Other assumptions are also required, for example, generation plant retirements and commissioning, regional demand growth.

### New Zealand renewable generation share: Two scenarios

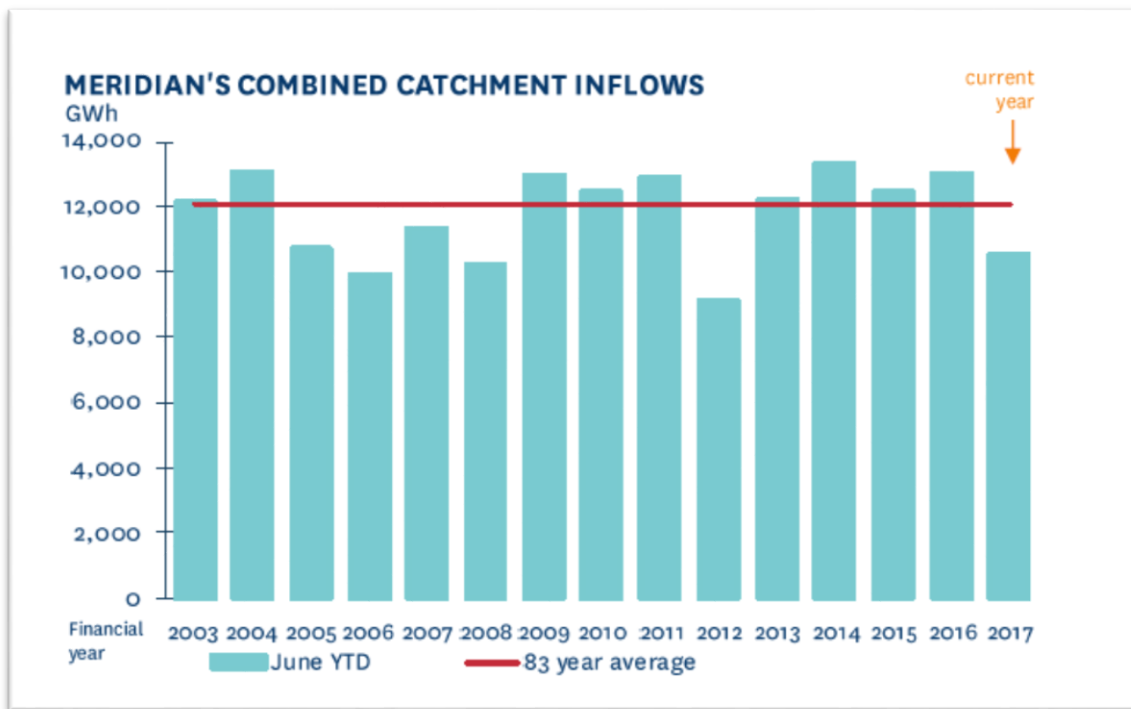


Source: Meridian Energy

Meridian's analysis indicates that under these two scenarios the renewable share of generation could rise to more than 90% from ~2025 under the low technology uptake scenario, and from ~2022 under the high technology uptake scenario (both assume mean hydrological inflows).

The question of whether 100% renewables can be achieved in New Zealand is often asked. In practice, it requires a trade-off to be made between the cost and security of supply.

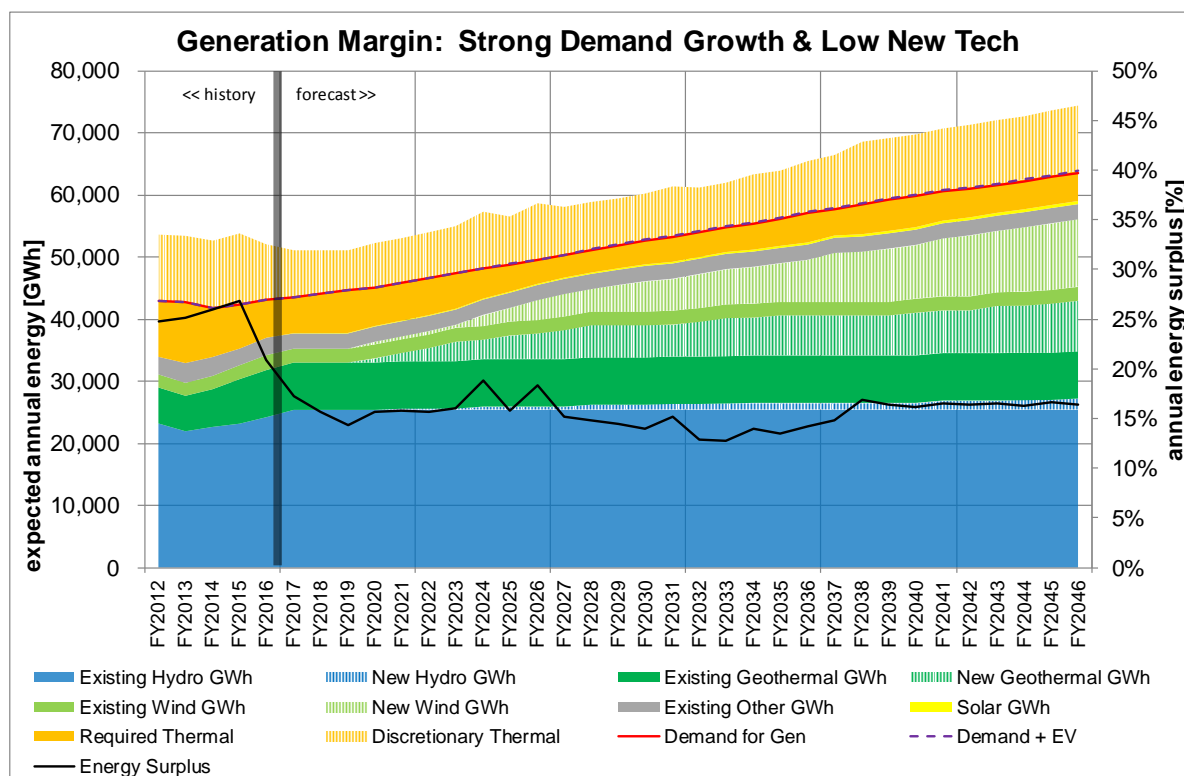
Renewable sources of energy in New Zealand are sensitive to climate influences, which can result in significant variation in hydrological inflows (+/- 5000 GWh swing between a dry hydrological sequence and a wet one). Building sufficient renewable generation to manage this hydrological swing would impose substantial costs on the New Zealand economy. To illustrate this hydrological swing further, see chart below which shows inflows into Meridian's catchments over the period 2003 - 2017, and the average received over the last 83 years.



Source: Meridian Energy

The Royal Society of New Zealand has suggested that “relying on fossil fuels to meet infrequent peak ‘dry year’ loads in a system supplied primarily from renewable sources may become commercially unviable or require payments to hold peak generating capacity”.<sup>9</sup> The long term fundamentals analysis undertaken by Meridian is driven by an appropriate return (WACC+) on investment for all new generation technologies including new peaking generation capacity. The investment or revenue adequacy constraint assumed is consistent with a 15-17% annual energy margin (see below chart).

<sup>9</sup> <https://royalsociety.org.nz/assets/Uploads/Report-Transition-to-Low-Carbon-Economy-for-NZ.pdf>



Source: Meridian Energy

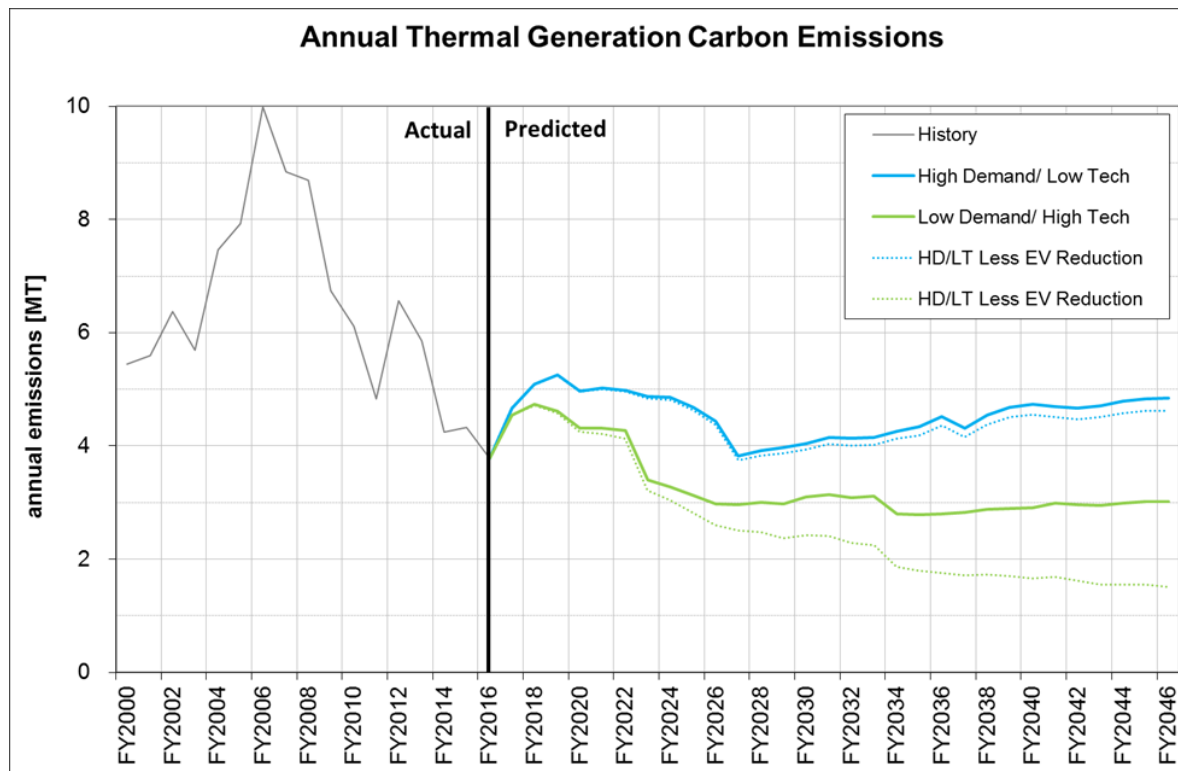
While the scenarios shown here indicate a transition towards 95% renewables is possible, it may be more helpful to talk in terms of increasing the amount of renewable energy in terms of GWh through the conversion of the transport fleet or to set a goal of reducing New Zealand's emissions from the combined electricity and transport sector by a percentage or volume of carbon.

To provide an indication of the extent to which renewable energy could increase, if New Zealand's entire passenger fleet (as at 2016) was converted to electric vehicles then an additional 7000 GWh would be added to NZ electricity demand.

Under the low demand/high technology uptake scenario, modelled generation from renewable sources increases by ~22,000GWh over the period to 2046, and by ~20,000GWh under the high demand/low technology uptake scenario.

The impact of converting the vehicle fleet on carbon emissions from the electricity sector is illustrated below. This chart shows carbon emissions under the two scenarios described above (low demand/high technology and high demand/low technology) with emissions falling with the retirement of large thermal plant, and being able to fall further under the low demand/high technology uptake scenario. The lighter dotted lines illustrate the additional

reduction in emissions that occurs from the electric vehicles, i.e. these emissions are currently recorded against the transport sector. Under the low demand/high technology scenario introduction of EVs by the end of the period reduces carbon emissions by an additional 1.5MtCO<sub>2</sub>.



Source: Meridian Energy

In respect of resource management policy, Meridian seeks stronger national policy direction to facilitate greater reliance on renewable sources of electricity.

Increasing new renewable electricity generation in New Zealand means finding the appropriate balance in the assessment of resource consent application between activities falling within the National Policy Statement for Renewable Electricity Generation (NPSREG) and the resulting adverse effects. In a recent example, local amenity considerations were considered to outweigh the matters of national significance set out the NPSREG.<sup>10</sup> In particular in that case the Environment Court applied more weight to adverse effects on general landscape and rural amenity values than renewable energy generation. Furthermore the Court's interpretation of the NPSREG in the *Blueskin* case seems to highlight that the NPSREG does not require renewable electricity generation activities per se but instead needs to only recognise the activity as being nationally significant. That is,

<sup>10</sup> See *Blueskin Energy Limited v Dunedin City Council* [2017] NZEnvC 150

the *Blueskin* decision outlines that there is no requirement for more weight to be given to the benefits of renewable electricity generation over other matters.

Despite the REGNPS being the only policy instrument that is capable of directing decision makers on nationally significant issues, including as to competing considerations of national significance or importance under Part 2 of the Resource Management Act 1991, its policy direction is silent on the appropriate outcome. While in Meridian's experience the overt statement of national importance of existing and new renewable energy generation is helpful, in our view it needs to be strengthened and improved. In order to facilitate greater reliance on renewable sources of electricity there needs to be stronger policy direction from central government to reflect any change in direction.

An effective NPSREG which protects, permits, and enables existing and future renewable electricity generation projects is required. The NPSREG needs to give proper direction to decision makers as to the importance of renewable generation (existing and new). Accordingly, additional national direction would increase investment certainty and help to enable the achievement of the Government's 90% renewable target while maintaining security of supply. Further national direction would also help to enable renewable electricity generation in excess of the current 90% target. This is particularly important for existing hydro generation and brownfields geothermal which are critical to New Zealand's renewable electricity supply; yet unlike most other forms of infrastructure face review pursuant to planning provisions and re-consenting.

Q27

**What approaches, such as regulatory frameworks or policy settings, would help embed wide support among New Zealanders for effective reduction of domestic greenhouse gas emissions?**

Meridian strongly supports the recent report and recommendations from the Parliamentary Commissioner for the Environment (PCE), *Stepping stones to Paris and beyond: Climate change, progress, and predictability*. The report outlines opportunities to strengthen New Zealand's action on climate change and provides a set of ideas that would assist in embedding support for reductions in domestic greenhouse gas emissions. In particular the report advocates for the country's Paris Agreement targets to be passed into law, and the establishment of interim carbon budgets to transparently track progress towards the targets over time and provide long-term certainty to business.



Meridian considers the PCE's recommendations to be worthy of careful consideration as they would assist in establishing a budget and work plan to reduce carbon in a way that is transparent and meaningful for the general public and would also give a clear message and direction for businesses.

**Q28**

**Is New Zealand's current statutory framework to deal with climate change adequate? What other types of legislation might be needed to effectively transition towards a low-emissions economy?**

**Q29**

**Does New Zealand need an independent body to oversee New Zealand's domestic and international climate change commitments? What overseas examples offer useful models for New Zealand to consider?**

As already noted, Meridian considers the recommendations of the PCE to be worthy of careful consideration. The PCE recommends establishing a model very similar to the UK's Climate Change Act in New Zealand. The Commissioner highlights the importance of having:

- emissions targets in law;
- carbon budgets;
- an independent expert commission on climate change; and
- a requirement for the Government to develop policies that enable budgets to be met.

Please contact me if you have any questions regarding this submission.

Yours sincerely



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