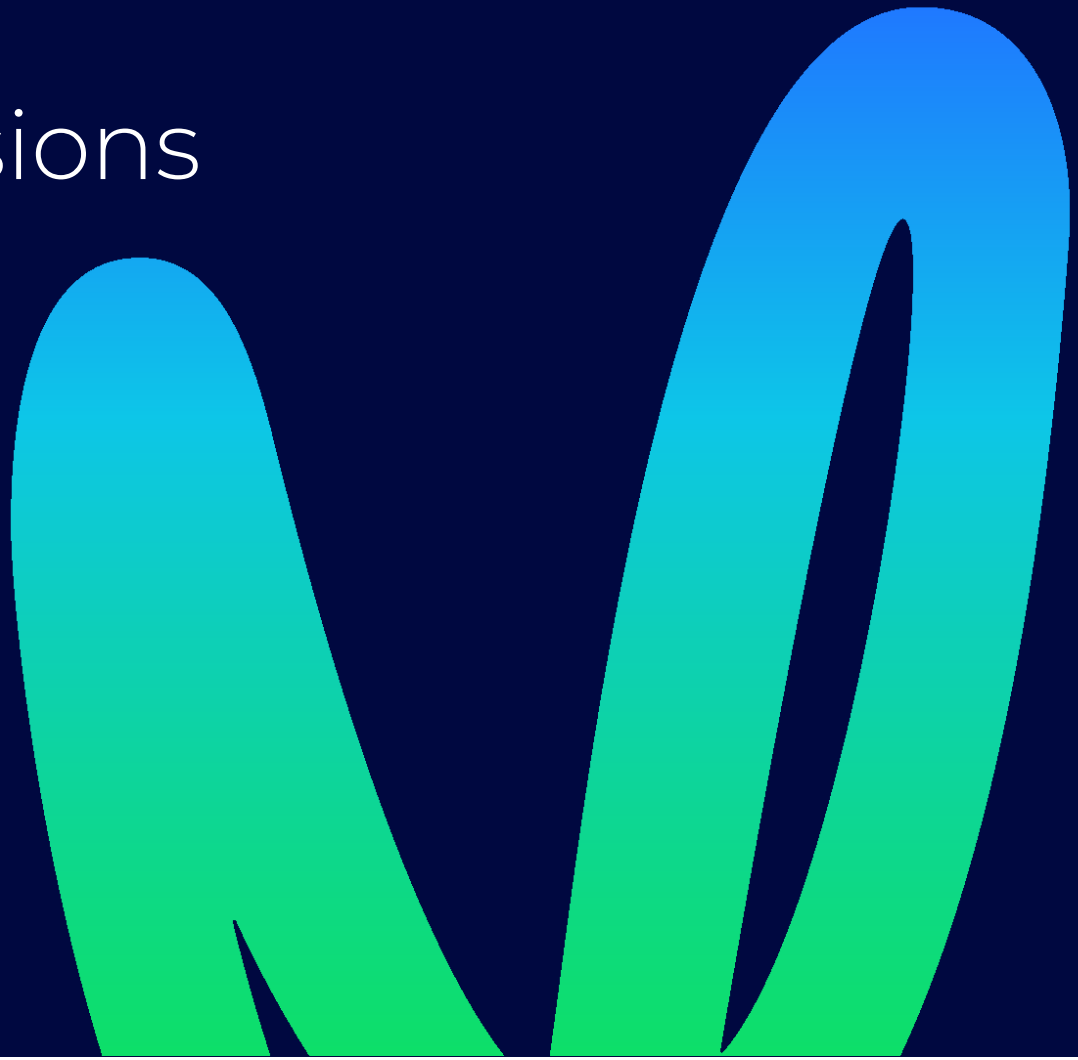
Interim Climate Change Commission call for evidence
November 2019

Vector response - Evidence to support emissions reductions budgets

we do not have any objection to the release of any information contained in, or attached with, this response



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Evidence referred 1

These documents are referred throughout and are either linked below, or provided to the ICCC with this submission:

- Concept Consulting report prepared for Orion, Unison, and Powerco *"Driving Change" – Issues and options to maximise the opportunities from large scale electric vehicle uptake in New Zealand*; 2018; http://www.concept.co.nz/uploads/2/5/5/4/25542442/ev_study_v1.0.pdf
- Energy Efficiency and Conservation Authority (EECA). *Energy Efficiency First: The Electricity Story, technical report*. 2019. https://www.eeca.govt.nz/assets/Resources-EECA/research-publications-resources/EECA-Energy-Efficiency-First-Technical-Report.pdf
- Intergovernmental Panel on Climate Change (IPCC); Special Report: *Global Warming of 1.5 degrees celsius;* 2018; https://www.ipcc.ch/sr15/chapter/spm/
- Interim Climate Change Commission (ICCC); *Accelerated Electrification;* April 2019; https://www.iccc.mfe.govt.nz/assets/PDF_Library/daed426432/FINAL_-ICCC-Electricity-report.pdf
- KPMG report prepared for the Energy Efficiency and Conservation Authority (EECA); *Electric Vehicle Charging Technology: New Zealand residential charging perspective;* August 2019; https://www.eeca.govt.nz/assets/Resources-EECA/EV-Charging-NZ.pdf
- Meade, Professor Richard; Cognitus Economics report prepared for Vector Limited, *"Issues presented by Emerging Technologies for New Zealand Electricity Sector Regulation – High-level overview"*, 2019. (attached).
- Vector Limited; *Asset Management Plan 2019-2029*; 2018 https://www.vector.co.nz/about-us/regulatory/disclosures-AMP
- Vector Limited; *Electricity Price Review submission responding to the EPR Options Paper*, (with a particular focus on section F1); March 2019; https://www.mbie.govt.nz/Vector_EPR submission
- Vector Limited; *EV Network Integration;* March 2018; https://www.vector.co.nz/articles/ev-network-integration

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Evidence referred 2

These documents are referred throughout and are either linked below or provided to the ICCC with this submission:

- Vector Limited; *Vector Submission for the Climate Change Response (Zero Carbon) Amendment Bill;* https://www.parliament.nz/resource/Vector Submission
- Vectors Limited; "Smart EV Charger trial put to the test in New Zealand First"; 2019; https://www.vector.co.nz/news/smart-ev-charging
- Vector Limited and EECA; Smart EV Charger Trial – Waiheke "Vector to help Waiheke Island become the world's firsts fully electrified island"; 2019; https://www.vector.co.nz/news/vector-to-help-waiheke
- Sandys, Laura; Dr Jeff Hardy, Dr Aidan Rhodes and Professor Richard Green; *Redesigning Regulation: Powering from the future;* 2018. http://www.challenging-ideas.com/wp-content/uploads/2018/12/ReDESIGNING_REGULATION-final-report.pdf

The following work is referred but does not yet include content which has been made publicly available:

Note that other trials referred above are also underway currently, and so there is still limited information which can be offered as to their findings at this time. We look forward to completing such work to contribute to the understanding of the role of demand management in supporting a low emissions future.

- Vector Limited; Circular Economy Paper; 2019. *This is to be launched on November 28th 2019.*
- Vector and Mercury have jointly run a peak time demand response program over winter of 2019. The trial is seeking to determine the responsiveness and consumer attractiveness of these types of products. International trials have shown that there is a degree of peak responsiveness to pricing signals and the peak time demand response program seeks to reward for reducing consumption rather than charging consumers increasing. The results are currently being analysed and no decisions have been made at this stage on whether the product type has a future role to play.

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Questions 1 and 2

1. *In your area of expertise or experience, what are the specific proven and emerging options to reduce emissions to 2035? What are the likely costs, benefits and wider impacts of these options? Please provide evidence and/or data to support your assessment?*

2. *In your areas of expertise or experience, what actions or interventions may be required by 2035 to prepare for meeting the 2050 target set out in the Bill? Please provide evidence and/or data to support your assessment.*

Electrification of transport and process heat has emerged as a key option to reduce emissions to 2035 and in support of the Zero Carbon Bill's 2050 target. Evidence strongly suggests that the costs of electrification will be significant without the smart integration of demand management technologies.

As highlighted by Vector's submission for the Climate Change response (Zero Carbon) Amendment Bill (ZCB submission), emissions from transport is the single greatest driver of emissions from the energy sector and accounts for around 20 percent of New Zealand's overall emissions profile.

The work of the Intergovernmental Panel on Climate Change (IPCC) has also identified switching from fossil fuels to electricity in end-use sectors as a key characteristic of pathways to ensure that global warming does not exceed 1.5 degrees. As highlighted by the Interim Climate Change Commission's (ICCC) report *Accelerated Electrification,* the electrification of transport therefore emerges as a key option in reducing emissions to 2035 and beyond. As highlighted by Vector's ZCB submission, ensuring that the convergence of electricity and transport results in the environmentally and socially sustainable outcomes as intended, requires a holistic approach which takes into account a range of factors across the whole energy supply chain.

Vector has undertaken work to inform the sustainable treatment of second life and end of life batteries (Vector's Circular Economy paper will be released on November 28th) which outlines key issues and considerations to support the sustainable use, re-use, and processing of batteries to support this whole-of-supply chain approach across industries.

The contribution that electrification will make to emissions reductions is also contingent on the emissions produced by electricity generation. We note that New Zealand already has relatively low emissions from electricity generation. Ensuring that emissions produced by generation do not increase with a transition to greater reliance on electricity, requires adequate low carbon generation. We look forward to the Ministry of Business Innovation and Employment's (MBIE's) further work on a transition to greater renewable electricity – including the uptake of distributed energy resources (DER).

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Questions 1 and 2 continued

The uptake of these technologies will enable greater low carbon generation (we reinforce that renewable and low carbon are not the same) in customers' households and, as highlighted in Vector's Electricity Price Review (EPR) submission, will also play a role in reducing demand peaks from the network, reducing the need to make costly network investments. As noted in our Asset Management Plan (AMP), whilst overall demand for electricity decreased by around one percent per annum from 2009-2018, demand peaks have increased by around seven percent per annum.

Ensuring that this demand can be met and managed affordably requires the uptake and integration of demand management technology. In the absence of this technology EV uptake could increase pressure on the network significantly – on average one fast charger adds the equivalent load of around 8.8 households to the network. As Vector's *EV Network Integration paper* highlights, international and domestic trends suggest that uptake is likely to be geographically clustered, further concentrating the impact on the network. Around 43 percent of New Zealand's EV fleet is now in Auckland. The impact of EV uptake on the network is exacerbated by the pace and scale of population growth in Auckland. Our modelling has found that if customers started using 7Kw home chargers the load would surpass network capacity during evening peak at 20 percent EV penetration level in Auckland.

Vector undertook its own investment analysis to understand the investment requirements to integrate residential EV charging. If 7kW chargers are adopted, the level of investment that would be required to reinforce the local network could range between $100 million - $530 million, depending on penetration levels (Appendix 1 refers). As stated by the Energy Efficiency and Conservation Authority (EECA) report on residential EV charging, "The need for managed charging accelerates with higher EV adoption in order to maintain the stability of the electricity network".

As referred by analysis undertaken by Concept Consulting, a passive charging scenario is likely to result in an additional $6.1bn in distribution and transmission costs compared with a managed charging scenario by 2050. This analysis finds EV-linked peak demand in a managed charging scenario to be one sixth of that in a passive scenario by 2050.

As highlighted by the EECA report, distributed energy resource management system (DERMs) have a key role to play in providing coordination and stability for a managed charging ecosystem, and for the secure integration of DER. Vector has co developed a DERMs with an international software firm, mPrest, which supports the secure integration and interaction of DER and demand management technology.

Questions 1 and 2 continued

The critical role of demand response in supporting emissions reductions is supported by the work of the IPCC. This found that as well as transitioning from fossil fuels to electricity in end-use sectors, greater mitigation efforts on the demand side is also a key characteristic of pathways to reduce global temperature increases in line with the Paris Agreement – demand side mitigation efforts includes smart demand management and energy efficiency technology. Vector is exploring the impact of smart demand management technology further through our trial of smart EV chargers, launched on the 4th of October 2019. This will develop the evidence base for the impact of optimising charging schedules on demand peaks. The trial is lasting 18 months and includes 120 participants currently. Early stage findings from this trial are expected in about six months. To understand the benefits of demand response technology further, Vector has undertaken a trial of hot water load control technology at Te Atatū, a suburb in Auckland. This has found that if deployed at scale, this technology could defer investment in the Te Atatū substation (Appendix 2 refers). Further information on the value of distribution deferral is provided in Vector's EPR submission. Vector has also partnered with Mercury to understand the potential role of peak time pricing in managing demand. This trial was designed to determine the responsiveness and customer attractiveness of peak time demand response products.

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Question 3

3. *In your areas of expertise or experience, what potential is there for changes in consumer, individual or household behaviour to deliver emissions reductions to 2035? Please provide evidence and/or data to support your assessment.*

***There is strong potential for customer, individual, or household behaviour to support emissions reductions to 2035 through greater energy efficiency*.**

We believe that energy efficiency is a key opportunity for consumer, individual or household level change to help reduce emissions to 2035. Our analysis has found wealthy households have reduced energy consumption at a rate which is four times faster than lower income households (Appendix 3 refers). We reached this finding by overlaying University of Auckland data (which uses the latest available census data as an input to show deprivation by area), with our consumption data. We believe that this finding points to greater access to energy efficiency technology, as well as better housing quality. This disparity shows the potential reduction in consumption that can be achieved through greater energy efficiency technology – as well as the importance of ensuring that the benefits of energy efficiency are shared equally to support a fair transition to a low emissions future.

As highlighted by the IPCC, demand side mitigation, including energy efficiency, has a key role to play in reducing emissions from the energy sector. This is supported by the 'Energy Efficiency First: The Electricity Story' modelling undertaken by EECA which finds that energy efficiency is a key action to meet renewable energy goals.

Questions 6-8

6. *What sector-specific policies do you think the proposed Commission should consider to help meet the first emissions budgets from 2022-35? What evidence is there to suggest they would be effective?*

7. *What cross-sector policies do you think the proposed Commission should consider to help meet the first emissions budgets from 2022-35? What evidence is there to suggest they would be effective?*

8. *What policies (sector-specific or cross-sector) do you think are needed now to prepare for meeting budgets beyond 2035? What evidence supports your answer?*

We support policies (and regulations), which strengthen a coordinated approach in addressing the interdependent issues of emissions reductions and electricity affordability; and which enables the uptake of technology and innovation which can support affordable electrification

As described above, analysis undertaken (and being undertaken) by ourselves and across the wider sector supports the role of demand response (including smart demand management, energy efficiency, DER, and the strategic deployment of battery storage) in enabling New Zealand's emissions reduction targets to be met. This is because these enablers reduce the potential costs of electrification which would otherwise be borne by customers. As noted in our AMP, we have found that proactively supporting the integration of new technology and innovation into our network as a primary asset strategy, would save $78m in system growth expenditure for the period of 2019-2028. This can partially be attributed to slower demand growth due to the emphasis that our approach places on demand management at a customer level. As noted in our EPR submission, this technology tends to cut across different segments of the energy market having benefits for both networks and customers – this is because innovation is designed around new customer needs, not old regulatory business models and silos. This also gives energy companies which own network businesses a clear incentive to support the uptake of this technology. Enabling uptake therefore requires coordination across different segments of the market; and, as with all innovation and new technology, business certainty to support investment, and incentive alignment. This requires the right regulatory framework. We note the analysis of Laura Sandys, Dr Jeff Hardy, Professor Richard Green and Dr Rhodes in *Redesigning regulation: powering from the future* which notes that "the decarbonisation journey is not just driving clean energy but is reshaping the whole market design".

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Questions 6-8 continued

We note proposed regulations which are currently under consideration of the UK Parliament which would require electric vehicle chargepoints sold or installed in the UK have smart charging functionality included. We believe that such regulation would similarly strengthen New Zealand's managed charging ecosystem, supporting affordable electrification and New Zealand's progress in meeting our emissions budgets. We agree with the statement made by ICCC further to the release of *Accelerated electrification,* that "accelerated electrification will not happen if electricity is too expensive". We appreciate the need for regulatory flexibility which allows the regulator to respond to new technology and innovation – however this needs to be balanced with adequate certainty for businesses to invest in technology and innovation – which, as stated above, will be key in supporting New Zealand's emission reductions. We also believe, as mentioned in our EPR submission, that coordination, rather than siloing, in the market is required to support the uptake of this technology. The regulatory requirements to support customer benefit from the uptake of new technology and innovation is further explored by the work of Professor Richard Meade in "Issues presented by Emerging Technologies for New Zealand Electricity Sector Regulation – A high-level overview" which highlights the need to re assess the role and shape of regulation to support the uptake of new technology in an electricity market impacted by new pressures and opportunities – such as decarbonisation.

The EPR recommendations show clearly the interdependencies between key issues facing the energy sector – including energy affordability, and decarbonisation. We therefore support the action further to the EPR to undertake a review of policy and regulatory settings to strengthen coordination in addressing these issues facing the energy sector. As noted in our EPR submission we support a Ministry of Energy to strengthen this coordination.

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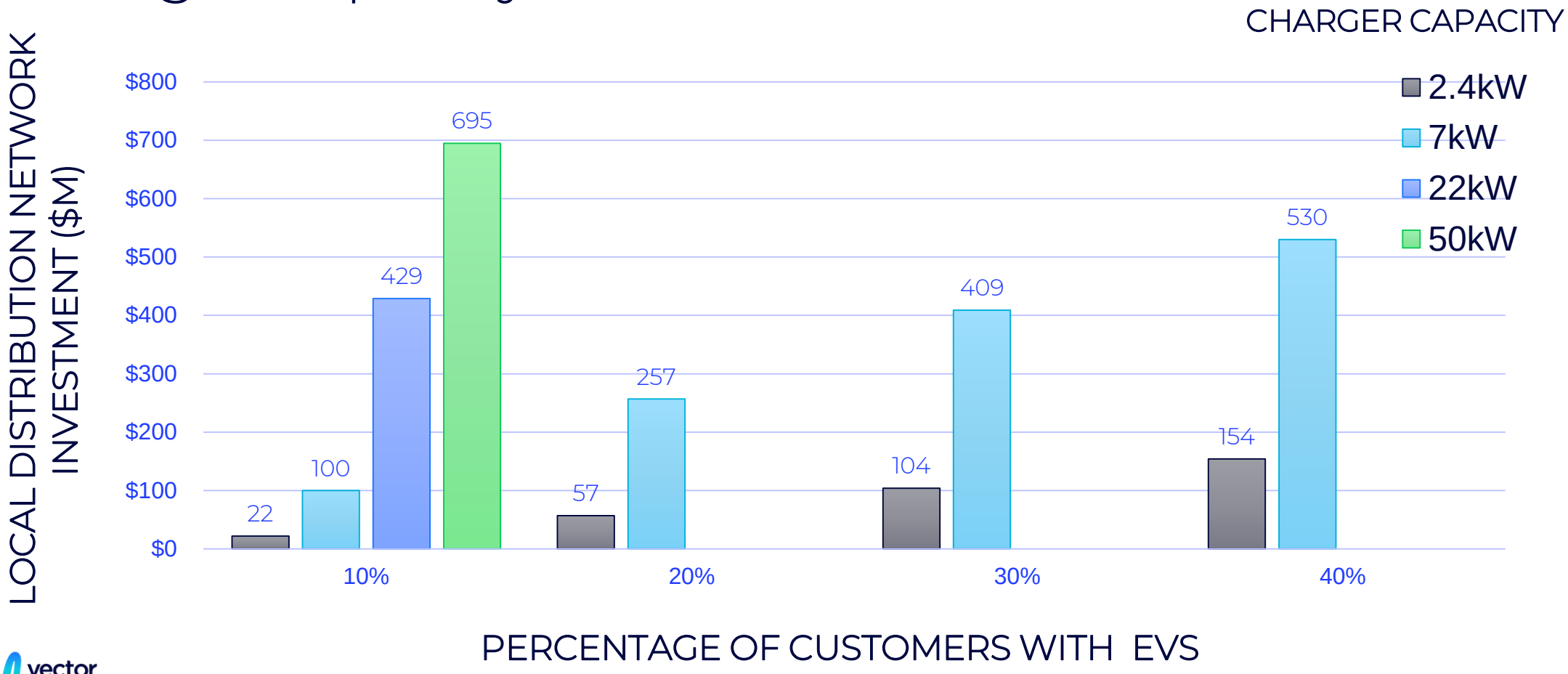
Appendix 1: Network investment required to support EV charging by level of customer uptake and charger capacity



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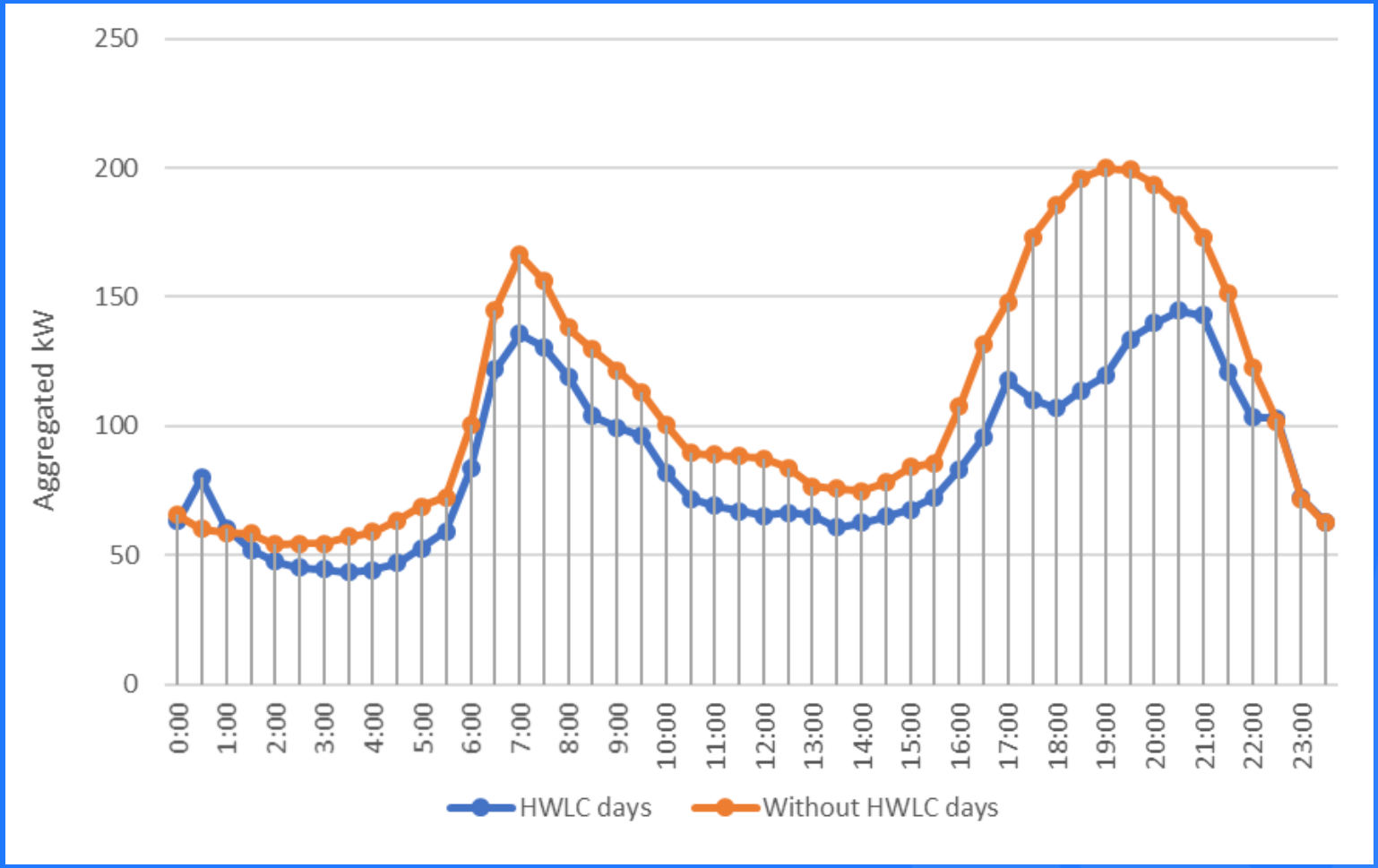
Appendix 2: Te Atatū hot water load management

Aggregated (#104 ICPs) average load reduction 0.79kW (down 25 % ADMD)



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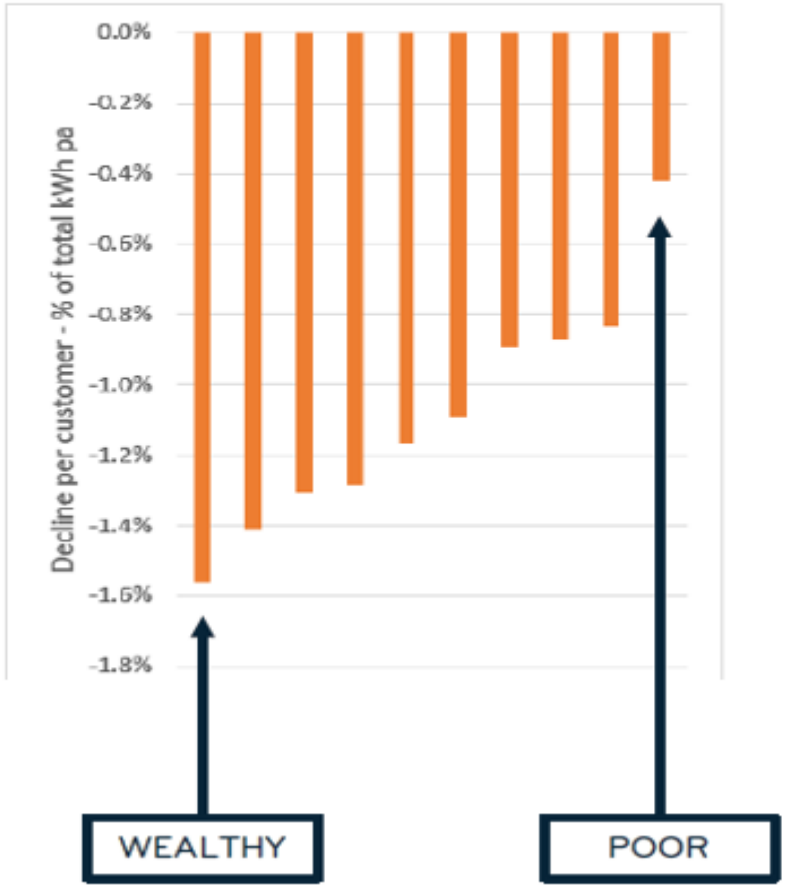
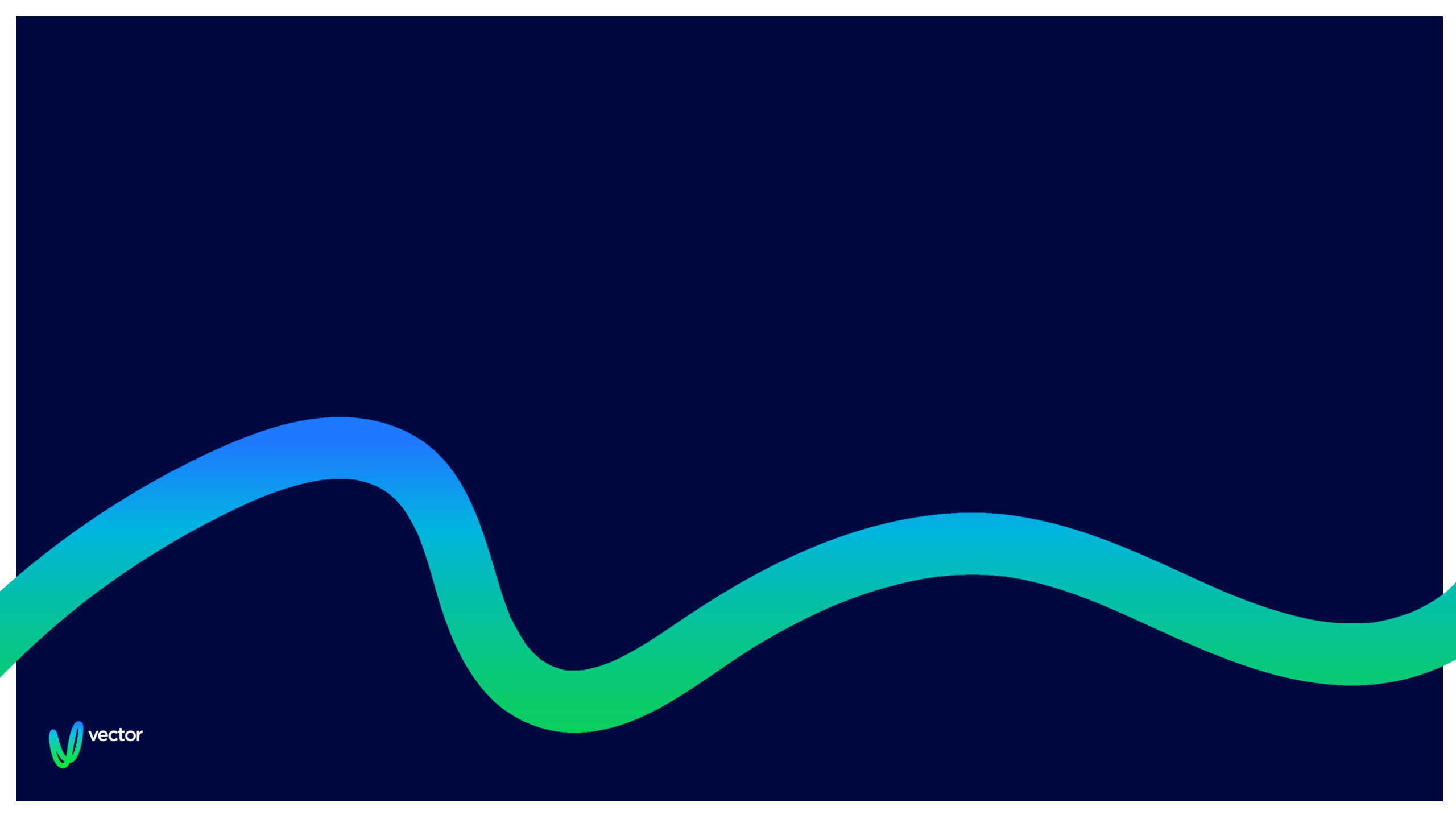
Appendix 3: Electricity consumption by deprivation

GRAPH A:
LIKE FOR LIKE PER FLOOR AREA PER CUSTOMER

GRAPH B:
CONSUMPTION % CHANGE BY DEPRIVATION



Vector analysis based on deprivation data from the University of Auckland: New Zealand data zones developed by Zhao and Exeter 2016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