wellington electricity

CO-FUNDED BY EECA

EV CONNECT CONSULTATION

DRAFT ROADMAP

Consultation close date: 15 July 2021

Released May 2021

CONTENTS

1. Introduction 3
2. Context 7
3. Roadmap objectives 11
4. Roadmap approach and actions 12
5. Building on EV Connect progress 17
6. Getting to the starting line 20

Acknowledgements

We acknowledge the input and engagement from our stakeholders through 2020-21 which have contributed to the scope and direction outlined in the roadmap and key actions within it. We also acknowledge the support of GreenSync – particularly Bridget Ryan - in helping us to write and refine this Draft Roadmap. Finally, we acknowledge the funding, support and engagement of EECA on the EV Connect project.

1. Introduction

As electric vehicle (EV) uptake increases, electricity networks will be required to manage the associated increase in demand for electricity. The increase will be significant – our studies show that a small EV will increase household electricity use by 35%. This can be supported most of the time but becomes challenging during peak demand periods (in the evenings) when the network is already busy.

Our job – as a utility – is to enable consumers to choose the vehicles they want and support the way they want to use them. To ensure our service remains affordable and the network remains reliable, customers may need support to target charging their EVs at lower demand times. Changes are required to provide this support.

There is a view that EV uptake will be gradual as people replace their current vehicles as they come to the end of their useful lives. This should provide sufficient time for the industry to develop the capability to manage EV demand and develop networks to accommodate EVs through the steps outlined in this document.

However, as underscored by the New Zealand Climate Change Commission's new targets for emissions reduction in light transport and recommendations for government incentives, the uptake of EV's could be faster than anticipated. We will therefore need to be prepared to respond more quickly. Consequently, we need to begin to take iterative steps now and be prepared to accelerate the programme if needed.

In New Zealand, electricity distribution is regulated. The Commerce Commission sets how much money an Electricity Distribution Business (EDB) has to build and operate their network, the services provided and the level of quality delivered. The Electricity Authority defines how EDBs interact with other industry participants and customers.

As such, there is a vital need for prompting government leadership to co-ordinate the industry wide changes need to accommodate EVs and provide supporting legislation, regulation and policy. Equally, the role and participation of EDBs and EV stakeholders including EV owners, electricity retailers, consumer advocates and technology / product manufacturers is critical in making the changes that are needed.

1.1. About EV Connect

To make headway in understanding the changes required and options available to drive those changes, Wellington Electricity Lines Ltd (WELL) started a conversation with stakeholders on EVs and energy demand. This discussion has focussed on how we could move energy use to less-congested times on the network. The purpose of doing this is to support EV adoption while maintaining network supply security, reliability and providing new benefits to consumers and across the electricity supply chain.

With funding from the Energy Efficiency & Conservation Authority (EECA), through the Low Emission Vehicle Contestable Fund, we have been working on the EV Connect project. The project has helped us to identify the steps and methods needed to allow consumers to connect their EVs.

EV Connect has enabled us to garner insights, test technologies and identify options to continue to equitably support EV-owning and non-EV-owning customers in our network alike.

This project has also allowed us to progress the conversation and to engage with consumers and the wider industry about how together, we can support EV adoption and unlock value while also maintaining network security.

Accelerated emissions reduction ambitions

There is even more reason now to address changes that support EVs with the release of the New Zealand Climate Change Commission (CCC) '2021 Draft Advice for Consultation'. The Draft Advice identifies priority areas of action needed to meet climate change targets including the electrification of light transport and transition from gas to electricity. This Advice if adopted into Government policy, provides increased impetus to accelerate the adoption of EVs to realise our emissions reduction ambitions.

Delivering on the emissions outcomes in the context of accelerated EV uptake, while also ensuring an affordable, reliable system is maintained, will require the actions outlined in this roadmap to be fast-tracked.

WELL's analysis of the new CCC targets indicates that:

1. Accommodating more EVs will have the largest impact on electricity demand while the change from gas to electric hot water heating will have a compounding impact on peak demand.
2. If demand is not shifted away from peak periods, networks will have to be rapidly upgraded to accommodate an estimated 80-100% increase in energy consumption[1].
3. If demand from EV charging and the shift from gas to electric hot water heating can be shifted to less congested times, this would allow an ordered planning approach, reduce the additional network capacity needed, and keep prices low.
4. There may be trade-offs between price and quality as the network's headroom (off-peak capacity) used for managing network security is squeezed. However, this is expected to balance out as the benefits of battery storage elements from EV's become realised.

1.2. About this document

This Draft Roadmap document is the penultimate output from the EV Connect project and builds on our 2020 stakeholder engagement activities. The Roadmap aims to articulate the steps required to support EV adoption and unlock value and utility while maintaining network security and equity to all consumers.

This Draft Roadmap is focussed on identifying and encouraging opportunities to minimise congestion by moving demand from EV charging to less congested times.

[1] For the Wellington network this increased build could cost NZ $1 billion. Source: WELL analysis (2021)

We outline the connected steps that need to be taken to deliver changes at least cost and with most benefit, and that ensure our community is brought along with us.

A number of the steps require government and policymakers to move towards allowing flexibility in the regulatory framework so that we can enable and support new services from and for EVs in New Zealand.

There is a vital role for government and industry leadership to work together to ensure a more efficient and effective network that supports and benefits EV stakeholders including EV owners, electricity retailers, consumer advocates and technology / product manufacturers.

For our part, WELL will look to support increasing demand, customer choice and a secure energy supply. Our focus is to ensure that we continue to support the uptake of EVs. Our approach is to progress new customer-oriented EV charging services, tariff arrangements and connection settings that will ensure our services remain affordable and reliable.

The Roadmap is summarised in Figure 1. This outlines the objectives and actions to be taken in collaboration with key stakeholders over the next five years to support the ongoing uptake and charging of EVs.

The Roadmap detail is articulated through the sections that follow Figure 1 on context, objectives, actions, work programme, leveraging progress to date through EV Connect and 'getting to the starting line'.

Appendices cover relevant case studies on hot water 'ripple control', South Australia's solar PV control requirements, a new standard for residential EV charging and network tariff approaches to EV charging management.

Next steps

Following the release of this Draft Roadmap, we will hold a stakeholder consultation session on 9 June 2021. We invite stakeholders to provide feedback on the Draft Roadmap at this session or via EV_Connect@welectricity.co.nz. Stakeholder feedback will contribute to the finalisation of the Roadmap.

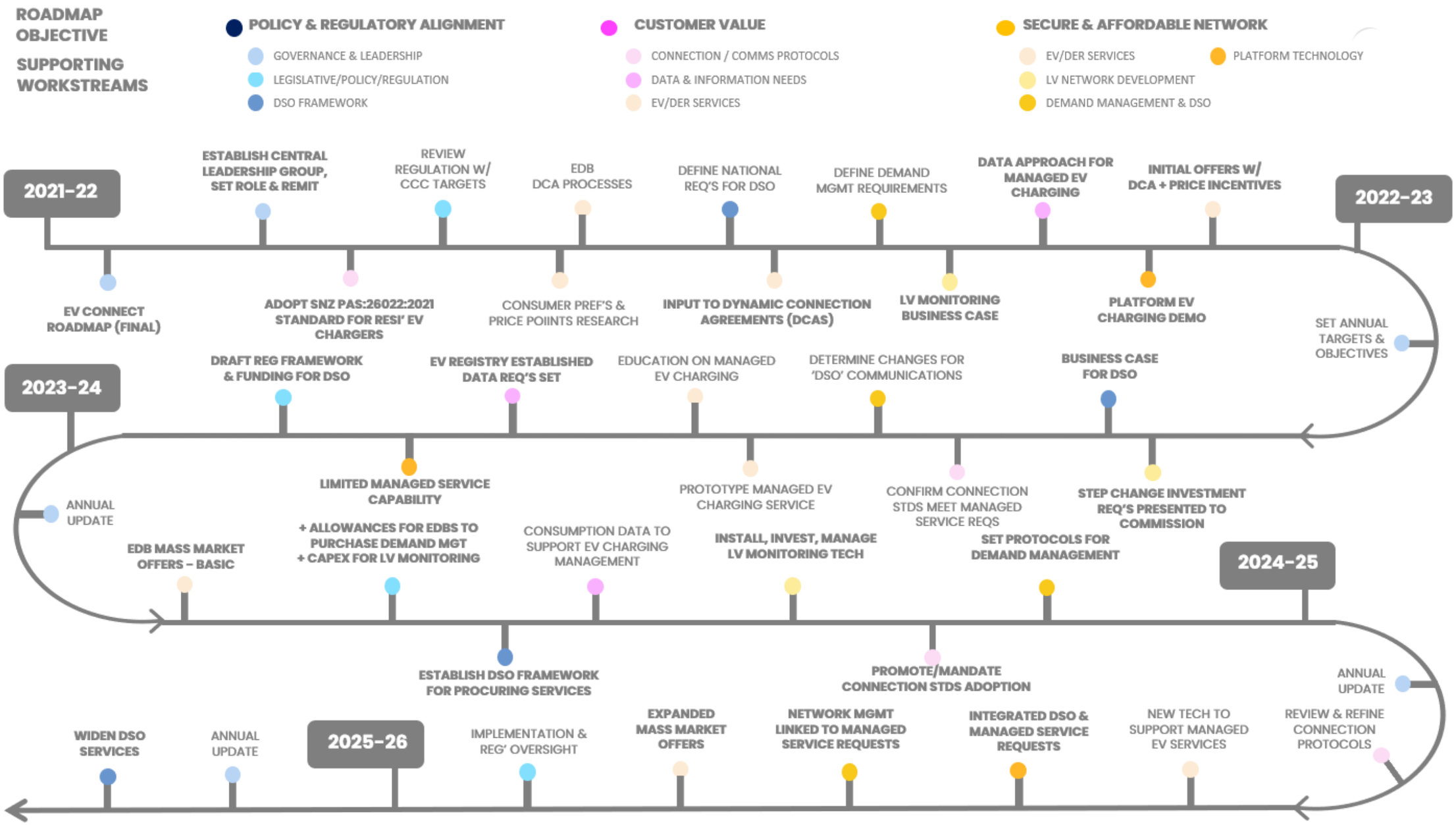
The closing date for feedback on this draft Roadmap is 15 July 2021.

We propose a work programme with elements led by key stakeholder groups.

We look forward to collaborating with stakeholders to drive this forward over the latter half of 2021 and beyond.

We aim to finalise and publish the Roadmap in the second half of 2021.

Figure 1: EV Connect Draft Roadmap – Summary



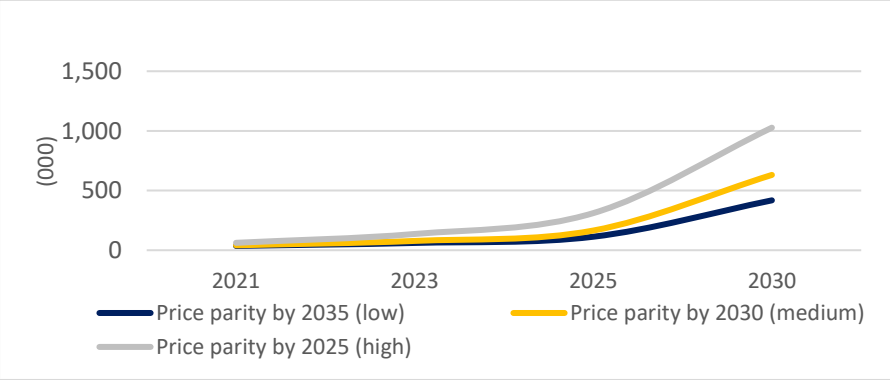
2. Context

The world's energy systems are changing at a rapid pace as consumer owned devices and distributed energy resources (DER) play an increasingly significant role in energy markets and general life. In particular, the electrification of transport fleets is occurring around the world and locally. EVs are being purchased by New Zealanders in growing numbers.

Key drivers

The numbers of EVs in New Zealand are increasing and forecast to grow significantly. The scenarios shown in Figure 2 (below) vary based on how fast the price of EVs reach price parity with internal combustion engine (ICE) vehicles. The speed at which this occurs will be influenced by factors like production/technology costs, government subsidies and incentives.[2]

Figure 2: Forecast EV uptake (New Zealand, national estimate)



The recently released CCC emissions targets for transport and energy will likely further accelerate the uptake of EVs and reduce reliance on fossil fuels.

BOX 1: Practicalities of building a larger network

If demand for EV charging is not controlled, we will have to build a larger network to deliver an 80% increase in energy use. This could cost $1b. Practically, building a network this large in the climate change timeframes may not be possible. For example, the Wellington distribution network has 3,000 residential transformers (each servicing about 50 homes). Each transformer takes about 6 weeks to upgrade. A single team of eight skilled workers would need 375 years to upgrade all 3,000 transformers. It would take 20 teams to complete the work in 20 years. This represents a doubling of WELL's current overall field work force and oversight functions. Furthermore, the replacement of residential transformers represents about 20% of the work programme needed to increase the network's overall capacity.

Question 1: Submissions from the first EV Connect consultation thought EV uptake would be slow and the industry would have time to develop the ability to accommodate new demand from EVs. Since then, the Climate Change Draft Advice has been released. What visibility of EV penetration onto networks or through fleet purchases & home charging is required to monitor network uptake rates?

[2] Energy Efficiency and Conservation Authority by KPMG, https://www.eeca.govt.nz/assets/EECA-Resources/Research-papers-guides/EV-Charging-NZ.pdf

Key risks

The 20th Century centrally oriented frameworks in which the electricity system was designed will be seriously challenged by the pace of change required and the types of interactions across systems.
There are key risks in terms of supply reliability and cost impacts:

- Infrastructure that is unable to support the rate of connections required and the charging demand, particularly at peak times, will affect supply reliability
- Investment in the network that is inefficient and/or unreasonably increases costs for consumers and industry would be unacceptable to the community and government.

2.1. Wellington Electricity perspectives

Wellington Electricity is concerned about the increased network load that the expected increase in EVs will have on network reliability and affordability.

As EV uptake accelerates, electricity networks will be required to manage the increase in demand. Without a planned approach, networks will not be able to absorb this increase in demand.

However, with planning, fit-for-purpose regulation, new technologies and collaboration, it is possible that adverse effects can be minimised or avoided altogether.

Indeed, we also believe such collaboration can enable a system that allows consumers and the wider industry to unlock the additional value that EV batteries and charging technology can provide which may ultimately be the best long-term solution to manage the increase in EVs.

Question 2: Are our observations about the Wellington network consistent with other regions or do they relate to urban rather than rural areas?

Discussion and actions under EV Connect

To build understanding and stakeholder interest we engaged in consultations under EV Connect. A key finding of the recent stakeholder engagement was that leadership is needed to coordinate the required work programmes and to increase the pace and momentum of the changes needed.

Stakeholder discussions also reinforced our view that the key to minimising the impact of EVs on the network is via reducing congestion or moving demand to less congested times and/or locations. To support this at a practical level and in a cost-effective way will require changes to the regulatory framework and adoption of new technology.

As part of EV Connect, we also tested GreenSync's deX platform and supporting solutions to assess if and how current technology can efficiently allow us to connect, see and manage EV charging. This solution delivers key tools for us to be able to use spare network capacity (see Figure 3).

Figure 3: EV Connect Technology Demonstration Structure

2.2. Added imperative – emissions reduction targets

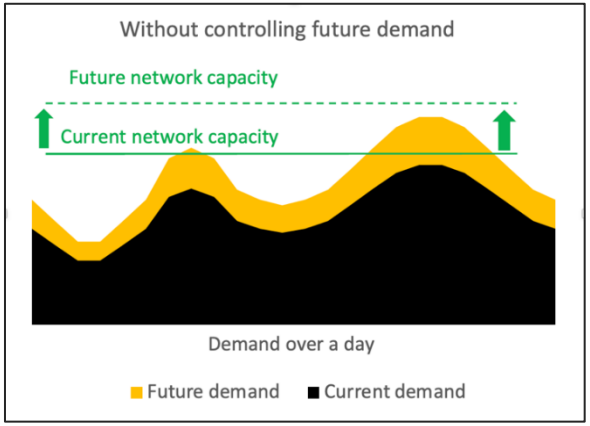
The New Zealand Climate Change Commission recently released emissions reduction targets for the transport and energy sectors which have added further impetus for the issues and actions we have addressed and progressed through EV Connect.

The size of an accelerated EV uptake challenge

We estimate the electrification of the transport fleet and the transition away from gas will increase energy consumption on the Wellington network by around 80% per annum by 2050.[3] If we cannot move this increased demand away from congested periods, the estimated additional network capacity required would cost around $1 billion to build, increasing prices to consumers by 80%.

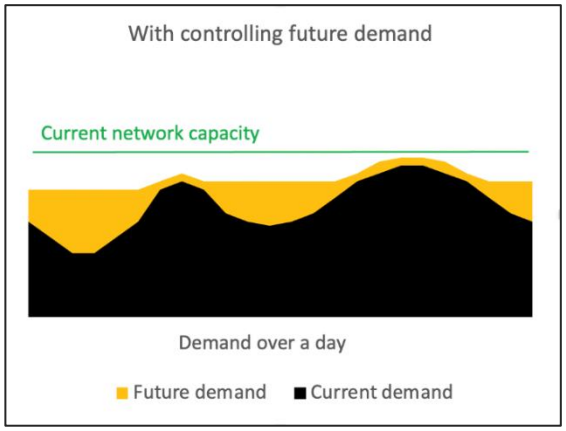
Figures 4 and 5 show that if the new demand from EVs is not controlled, more investment will be needed to build a larger network with more capacity. Conversely, if the new demand can be managed and shifted to less congested periods on the network (during low usage day and night periods), much of the new demand can be readily accommodated, delaying the need for new network investment.

Figure 4: Network capacity without ability to control demand



[3] Wellington Electricity submission to New Zealand Climate Change Commission's Draft Advice for Consultation (2021). Page 5 of our submission.

Figure 5: Network capacity with ability to control demand



Question 3: What do you think will be other key drivers for managing peak demand apart from price signals and shifting EV charging to off peak periods?

2.3. Including the wider industry

Accommodating EV growth while maintaining a reliable and affordable network is not something that EDBs can do in isolation. We need others to collaborate with us in order to have, or be able to access:

- Technology that can communicate with our systems – directly or via platform technologies
- Consistent protocols and product standards
- Retailer & Customer engagement and buy-in
- Dynamic Connection Agreements
- Regulatory support

The electricity industry has been preparing for the transition from fossil fuels to electricity for some time. It is also important that we incorporate learnings and experience from other work programmes including:

- Concept Consulting's EV Study which identifies a set of coordinated actions to accelerate the transition to clean vehicles in a way that maximises economic and environmental benefits and minimises adverse social impacts.
- The Innovation and Participation Advisory Group (IPAG) which is focused on issues specifically related to new technologies and business models, and consumer participation.
- ENA's Smart Technology working group, which is developing connection standards for DER, a framework for monitoring new devices on the low voltage electricity distribution network and exploring what data is needed to manage network demand in the future.
- The ENA Network Transformation Roadmap which provides information, insights and recommended actions for EDBs to navigate the changes in the way electricity distribution networks will be used in the future.

Question 4: Could the proposed actions be combined with other industry programmes or should the EV programme remain independent?

Question 5: What is the best model and implementation plan for ensuring the actions are delivered?

3. Roadmap objectives

This EV Connect Roadmap is focussed on identifying and encouraging opportunities to enable increasing connection and charging of EVs on our network and across the country in the most efficient way possible.

The Roadmap has clear objectives to deliver (1) customer value, (2) a safe, resilient and affordable network and (3) policy/regulatory alignment to support the changes needed.

3.1. Customer value

For customers to benefit from their assets (EVs) at least cost requires:

- Smart charging technology
- Network incentives for managed charging
- Customer offers from retailers that support shared value
- Clear product requirements
- Streamlined (digital) processes for connection
- Incentives to catalyse uptake (government led or other entity)

3.2. A safe, resilient and affordable network

Arrangements for safe, efficient, flexible network infrastructure to support EV uptake, at an affordable price, requires:

- Smart technology and infrastructure (e.g. deX, LV asset monitors, advanced distribution management system software etc)
- Standards and processes for a safe and smart connection
- Data and information approaches to support stable LV operations, forecasting and (future) services
- EV / DER services and supporting processes
- A regulatory framework that provides the flexibility to allow EDBs to invest in LV monitoring and contract for services (demand management & DSO)

3.3. Policy and regulatory alignment

Ensuring that the above two objectives can be met requires the regulatory framework to be updated to enable flexibility, to allow stakeholders and industry participants to make the changes necessary and to keep regulatory costs low. We see this requiring:

- Leadership and targets to drive overall delivery
- Legislative/policy change to allow service procurement by EDBs and investment in LV monitoring
- Enablement of the Distribution System Operator (DSO) model, adding flexibility into how EDBs manage operating costs and future investments
- EV / DER services and supporting processes
- Demand management capabilities and development of the DSO business model.

Question 6: Have we captured the correct objectives within the roadmap?

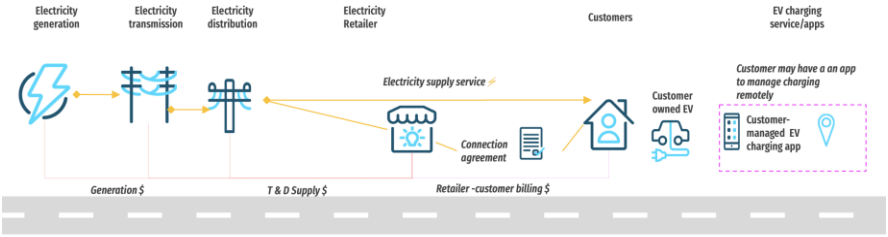
Question 7: Are there other deliverables we have missed or which need amending?

4. Roadmap approach and actions

This draft Roadmap provides a first-best plan to deliver on the objectives of customer value, network resilience at an affordable price and policy/regulatory alignment.

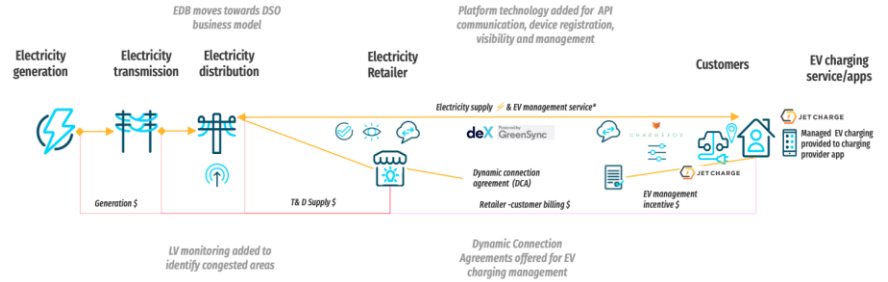
We see this roadmap driving change from where we are today:

Figure 6: How things work today



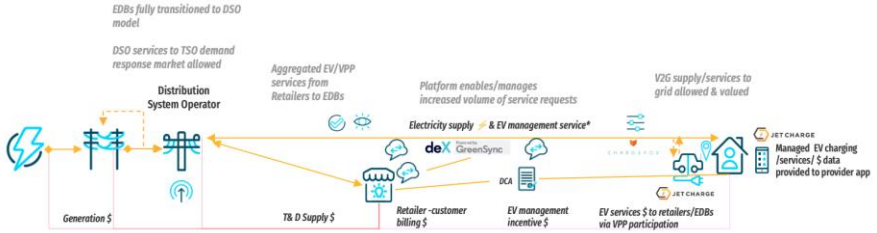
To an interim structure beginning in 2021/22, fully operating by 2023:

Figure 7: How things can work soon



And – potentially – to a modified operational model by 2025/26:

Figure 8: How things might work in the future



The ability to encourage EVs to charge during off-peak periods is essential. The more this is done, the easier and cheaper it will be for consumers. To accelerate and deliver this in the most efficient way requires stakeholders to work together on standards, procedures, network investments and demand management.

We have proposed a series of workstreams and actions under each objective and identified who is best placed among our stakeholders to lead and who is needed to support. The work streams and actions are summarised at Figure 9.

We organised this plan with policy and regulatory alignment at the top as our stakeholders emphasised the critical nature of direction and coordination of all other steps.

Timeframes are indicative, but each step is iterative and connected, building up to the objectives we outlined in Section 3.

4.1. Policy and regulatory alignment

Lead: Government, policymakers & regulators
Support needed from: EV stakeholders, Electricity Distribution Businesses

These actions are focused on accelerating alignment in the policy and regulatory area to deliver customer value and network resilience.

4.1.1. Leadership & targets

- Establish a central leadership group to drive objectives, set outcomes and report (annually) on progress
  - EDBs and EV stakeholders to co-lead and collaborate on directions to
    - Enable ongoing connection and support of EVs
    - Deliver affordable electricity supply, and
    - Reduce emissions.

Question 8: Feedback suggested a government lead or/co-lead work programme. What steps are needed to make sure this structure is effective?

Question 9: Do we need to get a government mandate to support/resource?

Question 10: If not, what path needs to be adopted?

4.1.2. Legislative/Policy/Regulation

- Review legislation, policy and considering the new CCC targets and initiatives
- Provide EDBs with the allowances they need to reliably and efficiently connect EVs and other DER
- Apply standards for safety connecting EVs to the electricity system
- Allow EDBs to invest in LV monitoring and to purchase demand management services
- Set the funding framework for the DSO model

4.1.3. DSO Framework

- Drive DSO Framework policy/regulatory changes including:
  - Definition of DSO requirements
  - DSO Funding framework (changes)
  - Set capabilities for service procurement for demand management/other network support services
  - Expand/extend capabilities for DSO services

4.2. Customer value

Lead: EV stakeholders – OEMs, Customers, Retailers, Consumer Advocates, EV dealers, EV charging tech
Support needed from: Government, policymakers & regulators; EDBs

These actions are focused on accelerating value and services to EV-owning customers and ensuring equity for customers who do not own EVs.

Question 11: We are cognisant that the roadmap has been assembled from an industry perspective. We also expect services offered to consumers with DER will evolve with time and consumer benefits will growth as new services are offered. Do you think the proposed actions will lead to consumers receiving the most value for their DER?

4.2.1. EV/DER services and technology

- Research consumer preferences and price points
- Provide input to EDB Dynamic Connection Agreement (DCA) developments

- Encourage evolution of offers for managed EV charging services
- Undertake education/awareness/promotion of new services
- Provide/sell/enable new technology to support customers with managed EV services

BOX 3: What's a DER?

Distributed Energy Resources (DER) commonly refers to all residential-scale assets that can generate, store or manage energy and interact with the low-voltage (LV) electricity system. DER include solar PV systems, battery storage systems, EVs and EV chargers.

DER may also be used to refer to larger assets at commercial/industrial sites that provide demand management, energy generation or energy storage services. A defining factor is that these assets are modular and geographically distributed.

Question 12: Digitalisation will allow just about any party, in future, to move demand. Are there situations or circumstances where a grid or network emergency requires one party to establish demand reduction rights over another?

4.2.2. Connection protocols

- Adopting the SNZ PAS 6011:2021 standard for residential EV chargers
- Confirm that connection standards will meet managed EV charging service requirements for customers and EDBs
- Promoting/mandating adoption of additional standards/protocols identified over time.

Question 13: The SNZ PAS 6011:2021 standard for residential EV chargers provides great advice and guidance for connecting EVs. How can we ensure consumers read and use the guidance?

BOX 4: What's a DCA?

A Dynamic Connection Agreement (DCA) is an innovation on the present approach to connection agreements for generation or storage assets that are connected to the electricity grid. A DCA is designed to provide flexibility for the owner of the asset and security for the network. This agreement adds in a **dynamic** ability for the network to manage an asset, with owner permissions, during times of network congestion. In exchange the owner receives a benefit of some form – tariff or incentive – to allow the network to manage this asset to maintain network availability.

4.2.3. Data and information needs

- Co-develop a data approach for managed EV charging
- Establish a national EV Registry and set related data requirements
- Secure source of real-time consumption data to support managed EV charging.

Question 14: We have been thinking about who should provide demand management services (flexibility services) – Is there a clear and obvious party to provide demand response services?

Question 15: Should this initially default to the EDB to ensure security of the LV network pending further market development?

Question 16: Who would provide the most value to consumers?

Question 17: As demand can only be shifted once, does there need to be an understanding of a hierarchy to prioritise demand response management so value is assigned correctly across the supply chain?

4.3. Network resilience

BOX 5: What's an OEM?

Original equipment manufacturers (OEMs) are the brands behind consumer-purchased products. In the case of EVs – Tesla, Volvo, GM, Nissan are all OEMs. In the case of EV chargers, these include Jetcharge, EV Box, Tesla.

Lead: EDBs
Support needed from: Government, policymakers & regulators; EV stakeholders – OEMs, Customers, Retailers, Consumer Advocates, EV dealers, EV charging management tech

The included actions are intended to drive alignment on delivering customer value and on improving network resilience

4.3.1. EV/DER services and technology

- Research on consumer preferences and price points to inform managed EV charging tariffs and other services
- Development of Dynamic Connection Agreement settings and supporting processes
- Engaging in the prototyping and evolution of offers for managed EV charging services
- Education and awareness programs for new services
- Developing the capability to observe and manage customer demand and to support the demand management function, including through LV network monitoring
- Development of demand management functions & DSO operating structures.
- Implementation of platform technology to support initial and future capabilities - EV charging management, customer DCAs, data to inform network operations, service contracting and demand management.

Question 18: We envisage that an EDBs demand management and DSO capability will evolve with time. What do you think are the core responsibilities of the DSO function?

Question 19: When will each of the core DSO responsibilities identified above be needed (i.e. what drivers/causes will require their delivery)?

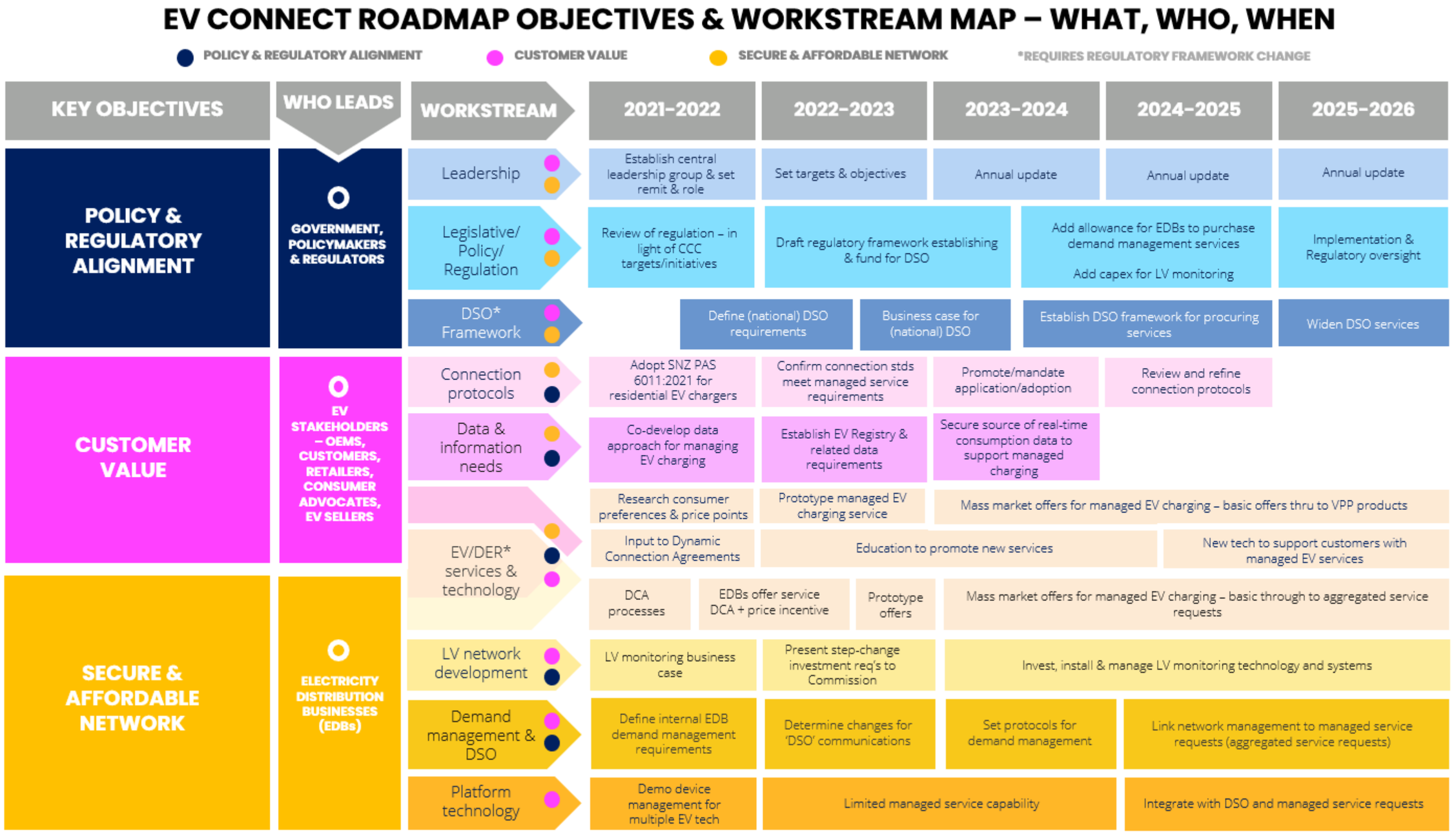
Question 20: Who is best placed to deliver the DSO function?

BOX 6: An evolution towards energy services and contracting

We believe a natural transition is underway towards EV charging management services being aggregated by third parties. This will enable EDBs to contract for those services at a price point which reflects the savings gained from avoiding long-term capital investment in infrastructure. Such contracting could occur at the same time as services are being provided to parties (e.g. retailers or aggregators) to support wholesale or demand response market opportunities.

The above is founded on our experience in managing demand from storage devices (electric hot water) for over 60 years. That capability has delivered cheap hot water to customers for decades

Figure 9: Draft Roadmap Workstreams & Actions



5. Building on EV Connect progress

With funding assistance from the Energy Efficiency & Conservation Authority (EECA), through the Low Emission Vehicle Contestable Fund, we have been working on the EV Connect project.

The EV Connect Project built on our earlier EV management research and pilots and enabled us to garner further insights, test technologies and identify options to equitably support both EV-owning and non-EV-owning customers on our network.

The project also allowed us to progress comprehensive stakeholder consultation and public policy engagement.

What we have most recently learnt has reinforced the findings from our earlier projects. However, to leverage this work to its best effect will require engagement beyond our corporate boundaries.

5.1. Stakeholder engagement

To ensure our roadmap captured all the aspects needed to accommodate EVs on the electricity network, we incorporated consultation phases into the EV Connect Project, releasing a consultation paper [4]in September 2020.

Feedback was gathered from key organisations[5] via a half day workshop with 50 stakeholders on 20 October 2020 and from 13 written submissions received following the workshop. This input was summarised[6] and shared with stakeholders in early 2021.

This stakeholder feedback provided us with the foundation components of this Roadmap and gave us a clear incentive for proposing further collaboration to foster alignment and buy-in.

Through the EV Connect Project we also tested technologies that could provide options to equitably support EV-owning customers and non-EV-owning customers in our network.

5.2. EV Connect technology demonstration

Our EV Connect Project technology demonstration was developed with the input, participation, technology expertise and products from GreenSync, Chargefox, Jetcharge and GoodMeasure.

[4] EV Connect – Stakeholder Consultation Document: https://www.welectricity.co.nz/about-us/major-projects/ev-connect/document/230

[5] Stakeholders providing input to the EV Connect Consultations in 2020: Aurora Energy, Drive Electric, Orion, Our Energy, Vector, Unison Networks, Electra, Powerco, Network Tasman, Meridian, Flick, Independent Electrical Generators Association, Major Users Group, Transpower, Electricity Authority, Electricity Engineers Association, Electricity Networks Association, Commerce Commission, New Zealand Transport Authority, Energy Safety, Energy Efficiency & Conservation Authority

[6] EV Connect – Stakeholder Consultation Response Document - https://www.welectricity.co.nz/about-us/major-projects/ev-connect/document/229

Figure 10: EV Connect - Technology demonstration overview

As shown in Figure 10, WELL trialled GreenSync's deX platform to support EV charging management by:

- Using the deX software platform to communicate (via API integrations) to EV charging devices, feed information to us so that we can monitor network capacity and performance and be able to manage charging in line with the limits of the network.
- Working with smart EV charging technology providers – GoodMeasure, and Chargefox who completed API integrations to deX.
- Using the deX platform to:
  - See and manage the charging of our EV fleet via the deX platform communicating with GoodMeasure and/or Chargefox.
  - Develop a model for customers to utilise DCAs to allow charging management by us
  - Allow Retailer visibility of the active management of EVs.

What we demonstrated

- There are solutions available, today, to support EV charging being managed during peak demand periods by EDBs.
- The deX technology allows WELL to offer a new service-based arrangement for EV owners which will:
  - Ensure EV owners' vehicles are charged at least-cost
  - Allow us to manage charging within the network's capacity
  - Be provided for a lower price than standard distribution prices.
  - Enable WELL to stabilise the low voltage (LV) network by modulating the charge rate across many devices based on network capacity and supply quality at that point in time.

What we learnt

- Platform technology can underpin communication between different vendors and the network, ensuring consumer product choices are supported.
- Technology can be demonstrated even when things are changing.
- Customers will participate if the incentives and services work in with their lives.
- Managing EV charging is a key option that will deliver demand management, reduce emissions and mitigate network build costs.

What happens next

- Industry input and collaboration (encouraged via the Roadmap) is key to taking the learnings from this project and ensuring they provide benefit and value
- Engaging consumers directly and via partnerships with retailers and EV vendors
- Facilitating or supporting market research and trials to prototype managed EV connections and DCAs with retailer/EV vendor partners.

6. Getting to the starting line

This Draft Roadmap proposed the steps to deliver New Zealand's ambition to electrify its transportation. The Roadmap will only be effective if the implementation is by the collaboration of the industry stakeholders.

We invite stakeholders to engage with us to refine the approach we have put forward in this Draft Roadmap document.

6.1. Stakeholder consultations and input

Stakeholder engagement is important to us. We will hold a workshop and consultation for invited stakeholders on 9 June 2021. We invite any interested stakeholders to attend that session, and/or provide feedback in relation to the draft Roadmap via EV_Connect@welectricity.co.nz.

6.2. Roadmap finalisation

We aim to finalise the Roadmap in the second half of 2021. Finalisation of the document will be influenced by the upcoming stakeholder road map consultation and feedback.

6.3. Pursuing the (proposed) work programme

We hope that the Roadmap drives positive, progressive action. We look forward to collaborating with stakeholders to drive this forward over the latter half of 2021 and beyond.

We, as a leading EDB, have a role to play in educating, facilitating and putting words into action. We plan to leverage the EV Connect project via:

- Developing and refining DCAs
- Potentially including managed EV charging in our next tariff proposal to the Commerce Commission
- Advocating for government action to be taken on the elements included in this Draft Roadmap.

APPENDIX A: CASE STUDIES & INSIGHTS

1: RIPPLE CONTROL & OFF-PEAK HOT WATER SERVICE	
What is it?	• Ripple control is a technology solution from the 1960s which is still used, today, to move water heating to less congested periods of the day. • The electricity distribution company is able to manage 'load' via sending a signal to electric hot water systems to shift hot water heating into the over-night period, storing hot water for use the next day. • Consumers may know this as 'off-peak tariffs' for hot water heating.
Why is it relevant?	• Ripple control has allowed the electricity distribution network to be better utilised rather than trying to size the infrastructure to meet household demand all at once. ○ For example, ripple control provides WELL the ability to defer 45 MW of demand at peak periods and is used to support Transpower, New Zealand grid operator, provide grid level demand management • It has enabled consumers to take advantage of 'cheaper rates' without taking any manual action themselves.
What are the insights?	• Load management of customer-owned devices is already a part of the electricity distribution system. • The ability to manage hot water heating via ripple control shows that spreading load across the network to reduce congestion or demand peaks allows more capacity and improves security of supply for customers.
	• Cheaper rates and limited/no manual action • Easy for customers to understand and adopt.

APPENDIX A: CASE STUDIES & INSIGHTS

2: SOUTH AUSTRALIA – SOLAR PV REQUIREMENTS	
What is it?	• Over 30% of South Australian homes have solar PV systems installed. On some days, rooftop solar PV supplies most of the demand in the state. This creates serious challenge for the grid operator around minimum demand. • New regulations, applying from September 2020, require all newly installed solar PV systems to be capable of being remotely disconnected and reconnected. This capability can be called on by the market operator when minimum demand risks occur. ○ In 2021, this new requirement has already been used to respond to a system risk. • From 2022 systems must be additionally capable of responding to dynamic export limits that allow the distribution network to manage local constraints. • This will allow customers to join VPPs to maximise the use of their solar PV/battery within the physical limits of the system and pave the way to also provide local grid services as regulation and technology allows.

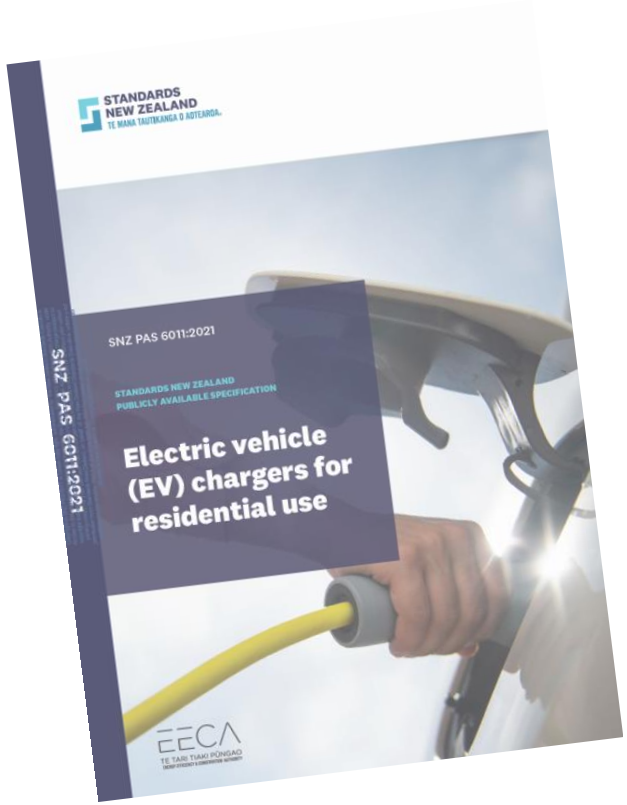
Why is it relevant?	• The uptake of EVs in New Zealand are forecast to be similar to the solar PV experience in Australia.
	• The Regulations show that there are technology and system solutions available to support:
	  ○ remote disconnect/reconnect requirements
	  ○ dynamic limit functions
	  ○ customer consent and device registration processes using digital systems.
	• However, the pace of the changes in South Australia placed significant pressure on technology and supply chains to meet the requirements.

• **What are the insights?**	• South Australia demonstrates that as DER installation hits a threshold risk, action needs to be taken – rapidly. • Establishing clear policy early on allows industry to respond in a measured way and ensures customer benefits can be maximised. • Technology is rapidly evolving to meet the challenges. These capabilities are largely transferable to EV grid integration

APPENDIX A: CASE STUDIES & INSIGHTS

3: EV CHARGER CONNECTION STANDARDS	
What is it?	• New Zealand will likely face a rapid increase in EVs in the near future. Standards New Zealand have released Publicly Available Specification "SNZ PAS" 6011:2021 Electric Vehicle (EV) chargers for residential use. • It is designed to provide consumers with clear and simple guidance on how to safely and cost efficiently charge an EV at home. • The Standard provides advice on how chargers can be safely installed and used. • Importantly, the Standard outlines the ideal size of charger for residential dwellings.
Why is it relevant?	• Most distribution networks can continue to operate securely as small, residential chargers are installed and used. • However, the installation of moderate to larger chargers could exceed the tolerance of the network and lead to failure of the network. • Network operators have no visibility of where chargers are installed and has no ability to protect other users for outrages caused by chargers being installed or used inappropriately.

What are the insights?	• The Standard provides a great foundation for managing the connection of EV chargers.
	• It should be possible to build on this standard to:
	  ○ ensure chargers – at all sizes – can be installed without impacting network reliability
	  ○ provide EDBs visibility and ability to approve the installation of large chargers (as is the case for large solar generation systems)
	• As EV chargers become more common and the size of the chargers increase with new models of EVs there may come a point at which the standards are mandated.



APPENDIX A: CASE STUDIES & INSIGHTS

4: EV AND DEMAND MANAGEMENT TARIFFS	

What is it?	• Tariffs are an important component of any demand management service offered to consumers
	• The incentives and savings provided by tariffs can encourage consumers to choose to use a specific service
	  ○ Peak demand tariffs encourage consumers to shift their energy use away from congested periods on the network
	  ○ Managed service tariffs (like controlling how an EV charges) provide savings if consumers let EDBs control their EV chargers in response to network demand approaching the networks capacity.

Why is it relevant?	• Research, stakeholder feedback and our own experience tells us that prices alone do not result in strong customer participation.
	  ○ The ENA's pricing guidance paper[7] shows that price combined with technology to help consumers use energy efficiently are 4x more effective at shifting consumer demand away from peak periods
	  ○ Feedback at the EV Connect Workshop from retailers and EDBs said that consumers response to pricing signals improved when combined with education and awareness programmes
	  ○ WELL's EV trial showed that most consumers are happy for their devices to be managed

What are the insights?	• Consumers prefer demand management products that are easy to use and don't require constant monitoring and awareness. • Managed EV charging using a DCA agreement which ensures consumers can still use their EVs as they want appears to be a good solution. • Including a technology and education workstream to encourage consumer uptake of services is critical to successful uptake.

[7] Guidance Paper for Electricity Distribution on new pricing options (www.ena.org.nz/resources/publications)