11 May 2023

Consultation – Charging Our Future
Te Manatū Waka Ministry of Transport
3 Queens Wharf
Wellington 6011

Via email evchargingstrategy@transport.govt.nz

Tēnā koutou,

An EV Charging Strategy with new actions to optimise the electricity network for decarbonisation

Forecast demand on Powerco's network from electric vehicle (EV) uptake is substantial. To ensure the NZ electricity system retains security and affordability, new initiatives are needed to integrate EV charging with our electricity supply and infrastructure system. Powerco is one of Aotearoa's largest gas and electricity distributors, providing essential services to around 340,000 (electricity) and 112,000 (gas) urban and rural homes and businesses in the North Island. These energy networks will be core to Aotearoa achieving a net-zero economy in 2050. An EV Charging Strategy with clear and appropriate actions is a priority for Aotearoa's decarbonisation. Our summary views are:

Electricity network capacity requires a system approach	• Aotearoa's EV charging needs to be integrated with our energy supply and infrastructure system, so it is affordable, reliable, secure and safe • The challenge of increasing peak demand from electrification (including EVs) is more critical than indicated in the discussion document • Regulation must provide for EDBs' optimal network investment across all decarbonisation needs and fair allocation of costs, with EV charging managed the same as other decarbonisation activity.
New actions are needed to manage demand	• The draft Strategy provides no new actions or timing commitments in work to 'minimise stress' on the electricity network to support an EV charging system • There is an immediate opportunity to standardised smart chargers and to standardise data sharing/interface to maximise options for both consumers and for future peak demand management. This should be a high priority action.

If you have any questions regarding this submission or would like to talk further on the points we have raised above, please contact Irene Clarke (Irene.Clarke@powerco.co.nz).

Nāku noa, nā,

Andrew Kerr
Head of Policy, Regulation, and Markets
POWERCO

Context – Powerco network and EV demand

Pure electric and hybrid electric vehicle uptake on Powerco's footprint increased by 59.5% over the period 2021 to 2022, now standing at a total of 3,920 registrations. The total number of EVs on our footprint is still relatively small and we do not yet see a material network impact on electricity demand. However, as penetration rises, we expect that vehicle charging will become one of the major contributors to increased electricity use and demand.

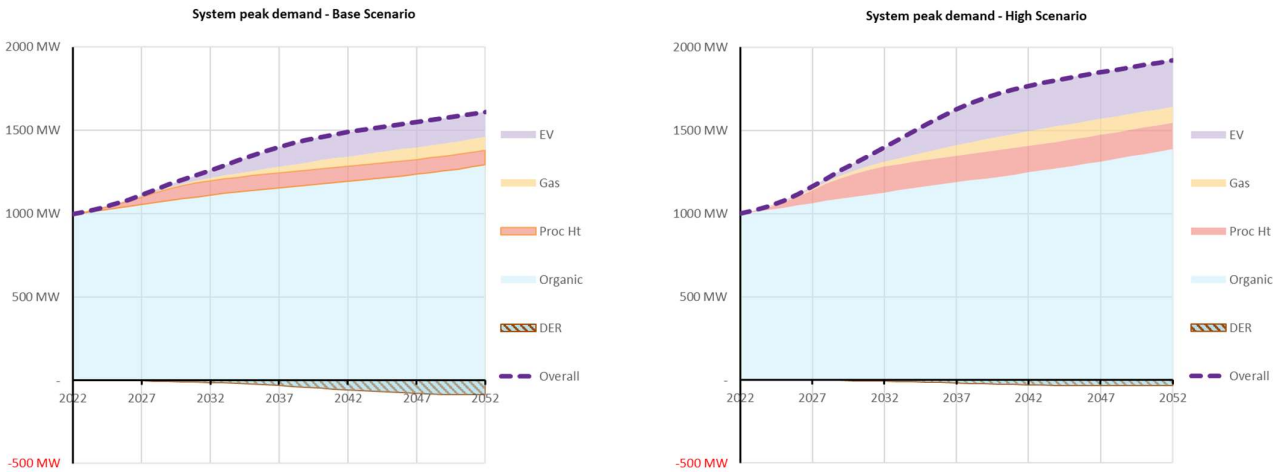
The impact of increasing numbers of EVs on electricity demand is subject to multiple factors, particularly:

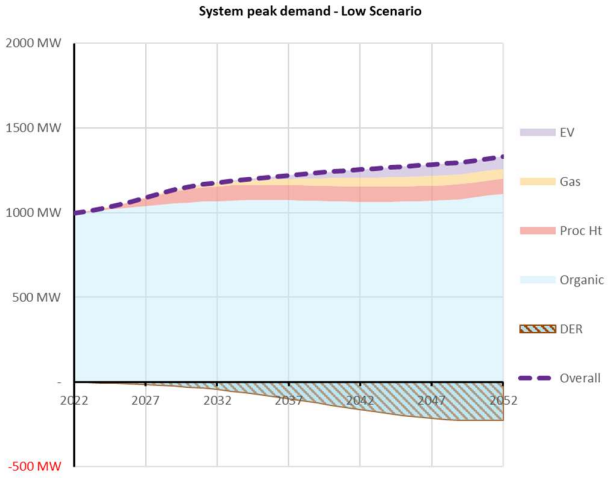
- Number of EVs in a network area
- Average distance travelled per day (which varies between regions) and daily recharge needed
- Time of charging as off-peak charging will have relatively little short term impact, but early evening charging will immediately add to total network demand
- Type of charging infrastructure used (public v residential charging have different network demands).

The time of charging an EV is particularly pertinent for a network provider as it is the only factor we can materially influence. Based on a relatively benign assumption of a 28% EV uptake by the end of our current Asset Management Plan (AMP) planning period (2033), we estimate that uncontrolled charging would add about 10% additional peak demand on our network. With relatively widespread smart control, shifting most charging to off-peak hours, this addition reduces to less than half that figure – about 4.5%.

For the 30 year horizon, the additional peak demand from uncontrolled EV charging is significant at approximately 300MW or 30%. The contribution of EVs and other main factors to our 30 year forecast demand are shown in Figure 1 below for three scenarios in our 2023 AMP forecasting. EVs are a key contributor to forecast demand and these figures show that managing EVs is one of the more critical issues we face in our network planning and decisions about network reinforcement and investment.

Figure 1: Contribution of main factors to forecast demand – three scenarios in Powerco Asset Management Plan 2023

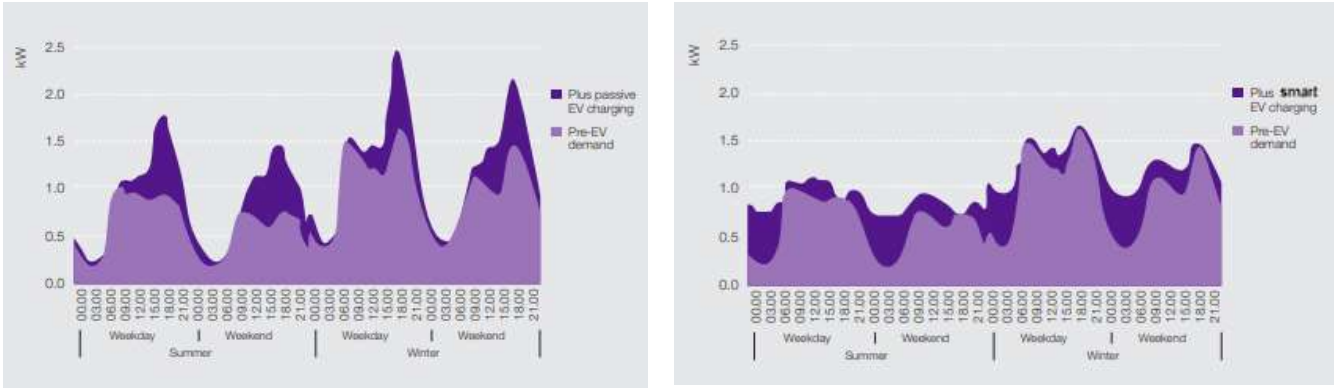




If not managed effectively, the EV peak demand impact could have serious implications on available network capacity and potentially lead to localised power quality issues, particularly on the Low Voltage network initially, but eventually extending to all parts of the network.

In 2018, we commissioned a study in collaboration with Unison and Orion to model the impact of EV charging on residential household demand. It showed that, without any form of control, the demand could increase significantly, as shown in Figure 2a. The study also showed that this increase in demand can be mitigated by the introduction of smart charging. Figure 2b shows how smart EV charging can influence the demand profile – shifting consumption away from current network peak demand times.

Figure 2: Impact of EV charging on an average household demand profile – passive charging v smart charging



In 2020, Powerco commenced a smart EV charging study[1], to improve understanding of EV charging behaviour and network planning assumptions. Initial results suggests a potentially lower individual demand impact compared to the 2018 study, however the study is ongoing and has a selective (early adopter) participant range,

[1] Powerco EV Charger Project: The main objective of the project is to predict the additional peak load that can be expected as EVs become more prominent on our network footprint. This project intends to understand where we may end up on the spectrum between the forecast demand scenarios.

hence we cannot yet draw firm conclusions from this data. The study provides valuable insights into charging behaviour and demand management tolerance, and this is discussed further below in response to Focus area 1a of the discussion document.

Response to discussion document

Efficient coordination to implement the Strategy

Powerco acknowledges that implementation of the Strategy will need to be joint between transport and energy government agencies. Charging infrastructure requires a coordinated approach across these policy portfolios which extends to coordination with other Crown entities including Commerce Commission, Electricity Authority, Te Waihanga, Waka Kotahi, EECA. Energy is the underlying driver and should lead this policy area.

We support an administrative arrangement that provides a clear lead, and for coordination as relevant. There are many areas of government policy and implementation with coordination structures such as interdepartmental boards or governance groups (as noted in Annex 2). A 'Zero Emissions Vehicles Unit' may be a suitable interim arrangement for fast-paced administration of government EV charging activities. However, as noted throughout our submission, EV charging is one of many demands on our electricity system, and one of many areas for coordination across organisations for decarbonisation. If a standalone unit is established, it will still need direct coordination with broader areas of energy and infrastructure and would not necessarily provide the efficiency and focus actually needed.

There is a risk that a focus on set up of government structures will be at the cost of spending that effort on actions, with the latter being more pressing in the short-term. Rather than an additional unit or agency, we encourage streamlining of existing government units or agencies and effective coordination to support the concerted effort required across energy issues.

The private sector has a pivotal role in both charging equipment, stations, network connections and ongoing delivery. Advice and coordination with the private sector could be managed through advisory groups and/or industry organisations as is already happening in related policy areas.

Electricity network capacity is a key driver for an EV Charging Strategy

A key driver which is not included (page 7 – 8), is the electricity network capacity, investment timing (vs timing of EV uptake), and the need to be coordinated in responding to growing peak demand from decarbonisation uses, such as EVs. The Strategy needs to provide direction about EV charging in the context of other demands on the electricity system to ensure it retains security and affordability. This link between the network and EV charging is identified elsewhere in the document and should be recognised as one of the key elements for a strategic approach to, and actions for, EV charging.

A fast changing state of charging infrastructure

An aspect not identified in the description of the baseline, is how quickly technology has developed between the early charging options and newer charging options, particularly in hub charging. The fast-charging technology, managed demand technology, and the number of pedestals per hub has changed significantly in just a few years. Original charging installations involved 50 kW charger capacity, but this has changed over the last 3 years to typical installations seeking 200 to 300 kW capacity, and some recent applications for journey hubs over 1 MW. There is also a critical link with consumer behaviour, which is also changing quickly.

The pace of change will have a significant impact on how often EVs are charged, how long it takes, and how many charging stations are required. The assumptions on technology need to be clearly stated in the Strategy's target setting, as well as a clear expectation that demand will drive private sector investment in charging infrastructure and networks.

A system wide vision for EV charging

Powerco supports a system-wide vision. EV charging is part of an energy system. There is need for balance between accessibility, affordability, convenience, security and reliability that will require a range of coordinated responses.

Outcome 1: 'Aotearoa's EV charging system is underpinned by affordable, reliable, secure and safe power supply and infrastructure'

Power supply and infrastructure is critical

Outcome 1 is considered the most critical as it drives some of the other outcomes (Outcome 2 and 5), and is strongly connected to the other outcomes (Outcome 3 and 4). Outcome 1 could be clearer. As worded, it suggests that the intended outcome is that the EV charging system drives power supply and infrastructure. We do not expect this is the intent, nor would that be appropriate. EV charging is an integrated part of the power supply and infrastructure system. We suggest rewording the outcome as "*Aotearoa's EV charging is integrated with our energy supply and infrastructure system so it is affordable, reliable, secure and safe*". The perspective of the overall energy system is required in considering the best approach for EV charging as part of that system.

The challenge for electricity demand peaks with unmanaged EV charging, and the opportunity with managed peak demand, is understated in the discussion document (page 16). Electricity networks are largely built to manage peak flows and the system needs to have the capacity to provide peak demand.

Modelling by Transpower estimates gross electricity demand increase of 20% by 2030 and 68% by 2050 and a similar estimate of 71% by 2050 was modelled in the BCG report with 37% of that attributed to vehicle electrification[2]. BCG also modelled that peak demand would increase by 28% by 2030 and 93% by 2050. The

[2] BCG, The Future is Electric, 2022 (page 45)

impact of unmanaged EV growth on Powerco network peak demand is shown in Figure 1 above (Asset Management Plan 2023). Meeting this increasing peak by only installing more assets will result in a significant cost increase for consumers. For Powerco, unmanaged charging could potentially add 30% or 300MW of peak demand on our network. We estimate meeting a 300MW increase with additional network investment could represent around $1.5 billion of additional capex.

Optimising the electricity network through action (Focus area 1a)

Given the potential implications for network capacity, investment, and opportunity to minimise this, Powerco supports in intent of Focus Area 1a to "minimise stress on the electricity network". We note that 'minimise' and 'stress' are not typically the concepts applied to electricity networks. The focus area could be better identified as 'Optimising the electricity network for decarbonisation'.

We acknowledge that there are a number of existing government work programmes related to electricity networks generally (as listed on page 17). Most of these are not specifically focused on EV charging, with the exception of the EECA work on performance of chargers, but many will contribute to a regulatory framework that is fit for our future energy settings. The MBIE Energy Strategy work is also expected to provide relevant guidance on actions to optimise the electricity network.

We are disappointed the list of "further actions which could help" are not committed actions nor is the analysis behind them provided. The five further actions listed and our response are:

- **Use vehicle and electricity supply data to identify and plan for electricity network requirements** – It is not clear what type of data this refers to. We already have detailed processes and requirements for data driven forecasting and reporting in planning our network and reinforcement of the network. A source of reliable data on forecast EV numbers/locations would be valuable. Vehicle charging data will provide valuable planning and operating data as charging behaviour develops, assuming that smart chargers are mandated and data on charging profile/control is shared. This is an area where the Strategy could usefully provide direction. We comment on this further below.
- **Publish detailed electricity network capacity data** – Powerco now has DG hosting data available on our website, and we are currently working on more load hosting information to be available soon[3]. Publishing this data is a forthcoming requirement from Electricity Authority in the work on EDB settings for distributed energy resources.
- **Investigate emerging technologies that can prevent the need for additional power generation, with the aim of encouraging innovative technologies** – it is not clear what technologies this is referring to separate from the other listed actions. There is a need to be specific about the potential for new technology to be required by regulation or if it is to be 'encouraged' then clarity on what, how and by who. If this is about scientific research, then the energy sector needs to understand options being investigated to ensure research is invested in the highest priorities. We comment below on sharing of data, and high priorities in technology for data management.

[3] Powerco Large Scale DG Hosting Capacity (arcgis.com)

- **Promote the benefits and support the uptake of smart chargers for EVs** – Smart chargers are already promoted and supported but this is proving inadequate. There is a critical opportunity now to mandate smart chargers. We comment further on this key action below.
- **Work with lines companies to identify opportunities, mitigate risks, and clarify responsibilities in developing EV charging infrastructure** – there is no explanation of the risks, opportunities and responsibilities of interest to government. This needs to be very clear so the highest priority actions can be progressed. We comment further on opportunities and risks below.

Sharing of data to manage and plan capacity

Smart chargers provide the ability to monitor and collect actual data. There are many variables in uptake of EVs, charging behaviour, vehicle charging requirements, peak demand impact and responses. We support as much sharing of data as possible to support innovation, optimal network capacity, avoidable network reinforcement, anticipated market changes, customer knowledge, and timeliness of managed responses. Data access is expected to involve the customer, charger infrastructure provider, energy retailer and network provider, and to be in the case of both public charging hubs and private chargers. A high level of data sharing will ensure that the customer is the focus in providing positive energy outcomes.

Load data alongside interface for communications and controls, would enable dynamic management for load reduction only when required, and by the distributor or another party as agreed by the customer. Whoever does the charging will need information on a charger's capacity and capability as a minimum. With more specific dynamic or real-time data at the ICP, more targeted management will be possible. This data would include charging status, session timing/length/flexibility, voltage/current, override use. If an EDB is carrying out this control to manage network requirements, it will be covered under the Input Methodologies (for regulated EDBs).

The communication systems and protocols for managing EV charger data will need to provide cyber security, privacy, and be operable in the event of a power outage. A standard for smart EV chargers would be expected to address these requirements.

The Strategy could provide useful direction or a specific action for quicker progress on data sharing such as standards for charger interfaces, standardisation of demand flexibility communication protocols (eg Open ADR), visibility of charger flex capacity (eg dynamic operating envelopes / flex capacity).

Enabling EDB access to data may also require regulatory confirmation, which could occur through the Electricity Authority work on EDB regulatory settings.

The Strategy could also commit to government leading in sharing reliable data and analysis on forecast EV numbers/locations and the demand for both private and public charging facilities.

Mandating smart chargers to support reliability and affordability

Based on a relatively benign assumption of a 28% EV uptake by the end of the Powerco Asset Management Plan planning period (2033), we estimate that uncontrolled charging would add about 10% additional peak demand on the Powerco network, and with shifting most charging to off-peak hours, this addition reduces to less than half that increased peak demand – about 4.5%. Over a 30 year horizon to 2050, these figures are 30% additional (uncontrolled) peak demand or less than 10% with maximum demand management.
Smart chargers enable opportunity for managing demand, while providing customers with choice for their charging pattern.. With smart chargers in place, EDBs will have the opportunity to facilitate the right balance of charge control based on congestion (from all sources including EVs) and cost implications, and customers will also have choice and ability to influence price of their charging.

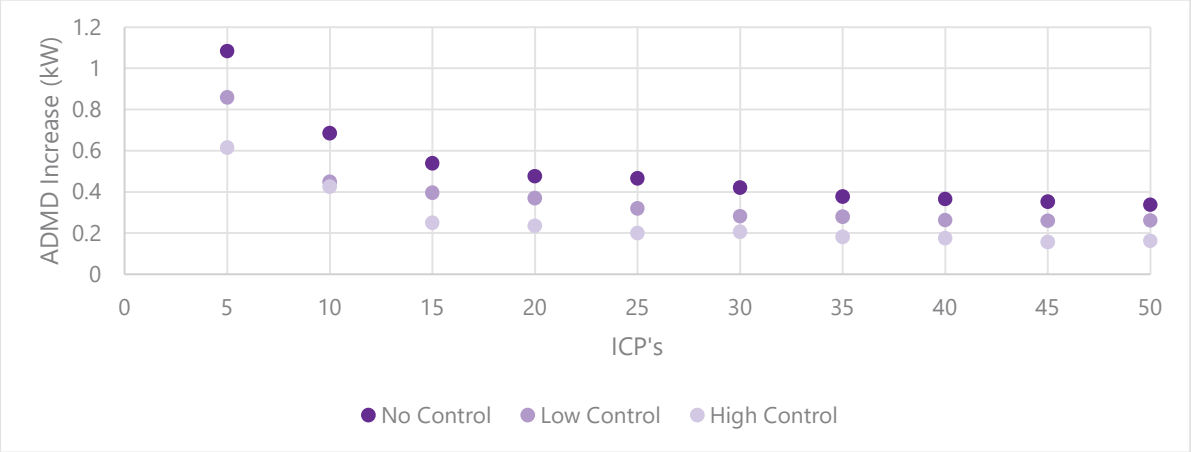
The discussion document notes the significant investment involved in providing additional generation capacity. BCG also find that the generation capacity saved with smart charging and time-of-use pricing (potentially 1.9 GW in 2035), could save close to $3 billion by 2035.[4]

To fully unlock the flexibility within networks to manage peak demand, significant investment is required in smart technologies, over the coming decades. While the EV uptake grows, now is the time to mandate this smart technology as part of the EV charging system, while we have an opportunity to get ahead of mass EV uptake. BCG modelling estimates that by 2030, 50% of EV charging load may need to be deferred at peak times to manage NZ's peak demand, as part of the demand-response approach needed in NZ's electrification[5]. BCG identified mandatory smart EV charging as one of 10 high priority actions in its recommendations to achieve the roadmap for electrification[6].

Powerco's EV charger study[7], provides Initial results of managed vs unmanaged demand impact (Figure 3). The demand curve changes for increasing levels of ICPs on a transformer. During the trial, satisfaction was shown to be marginally higher in the low control periods of the trial, but overall satisfaction during the trial was consistently positive. Tolerance to managed charging is subject to further testing with trial participants. However, if we infer tolerance from how many times participants chose to override their charging profile using the 'override button' in the app, then overall tolerance remains relatively high, with only 16% of participants using override more than once a week in a time of high charging control.

[4] BCG page 92
[5] BCG, page 128
[6] BCG recommendations section 3.6. Recommendation 4 (Enable a smart electricity system) includes the high priority action to 'mandate default off-peak EV charging'.
[7] Powerco EV Charger Project: This project installed Evnex chargers in 80 Powerco customer homes and monitors demand, control tolerance and customer satisfaction. The main objective of the project is to predict the additional peak load that can be expected as EVs become more prominent on our network footprint.

Figure 3: Powerco EV Charging trial: ADMD (design peak) increase curve for managed vs unmanaged



Managed EV charging not only provides critical system flexibility for managing peaks, but also provides the opportunity for significant security and resilience back up as a distributed energy resource across networks, for example in times of emergency.

Working with lines companies on opportunities, risks and responsibilities in EV charging infrastructure

The existing actions listed in the discussion document respond to identified opportunities, risks and responsibilities relevant to networks. For example the Commerce Commission review of input methodologies, and the Electricity Authority review of EDB settings for distributed energy, and EECA review of charger standards.

The key risk and opportunity already identified and needing action, relates to smart EV chargers and the opportunity to mandate standardised smart chargers to future proof options for both consumers and electricity operators.

An area for clarity is the link between connection process, cost, and network capacity. The Electricity Authority and Commerce Commission set pricing principles for EDBs. As all networks (and parts of networks) are different, pricing and timing for connection differs too. Sometimes a new connection will require network reinforcement or capacity work and how this cost is attributable relates to the reasons for works and who benefits. The principle of cost-reflective pricing is sound, with costs borne by those who create the need rather than a wider group of consumers.

Powerco received 12,770 applications for customer initiated works in the year ended 31 March 2023. The value of connection jobs submitted in the financial year was $146.5 million. Public charging hubs are just one example of the type of customer connection requests that Powerco receives, with large scale industrial enquiries being dominant (including for decarbonisation projects such as process heat conversion). The principle of equity is important. We endorse the treatment of new load from EV charging hub connections in the same way as other new load connections. This enables EDBs to manage risk and deliver reliable and affordable power supply to all consumers as NZ grows and decarbonises across many sectors.

Many of our large customers do not have flexibility in the location of their demand and connection request, eg an industrial site. New EV charging hubs however, may have some flexibility in the location chosen to establish the hub. Capacity available and reinforcement works required can differ greatly within a short distance, so there is opportunity for charging providers to work with EDBs to understand the options and their implications. It is also a common experience that the capacity requested in a connection application is not always needed (especially in the short term), or the applicant is not transparent about their long-term plans in order to influence up-front cost. Again, there is important opportunity for charging providers to work with the EDB on the demand profile and options. As noted above, Powerco's website has an interactive map of our DG hosting capacity and will soon have a interactive map of all network capacity, followed later by maps of current/future congestion.

The low capacity in some locations, the extent of works required to provide the necessary upgrades, and the time required for the works, may be a risk in locating new charging hubs in some locations. We are always willing to work with customers on energy solutions to design the best outcome available for the customer (including cost and time). An overview of the connection process is **attached**. We have a team of specialists working with customers who understand the challenges, the need for certainty and timeliness, and will develop solutions to suit each customer's circumstances. We comment further on connection process and cost under Outcome 4 below.

The link between new connections (for example for EV charging projects) and network capacity, illustrates the importance of EDB planning and investment to facilitate decarbonisation. Current Electricity Authority and Commerce Commission reviews noted in the discussion document must improve current settings to enable investment and capacity improvements ahead of need and ahead of connection requests. Increased peak demand is a given. Our regulatory frameworks need to facilitate network investment in a way that was not required when the current frameworks were established. There is an opportunity for this Strategy to support the network planning and investment approach needed for decarbonisation.

Outcome 1 focus and priorities – summary of recommendations

- Outcome 1 is the most critical and needs to clearly integrate EV charging with the power supply and infrastructure system. Rewording is recommended *Aotearoa's EV charging is integrated with our energy supply and infrastructure system so it is affordable, reliable, secure and safe*
- The challenge of increasing peak demand, and the opportunity with managed demand is understated.
- Further, specific, actions are needed. A key action which is a high priority is to mandate standardised smart chargers. This should be implemented as soon as possible before EV ownership ramps up further,
- A high level of data sharing will ensure that the customer is the focus in providing positive energy outcomes. Smart charger data interface can facilitate the right balance of charge control and cost for customers. To support this, we recommend progress with:
    - Data interface standards
    - Demand management technologies
    - Endorsing EDB data access in regulatory settings.

- We endorse equity and consistent processes for new customer connections which enable EDBs to manage risk and deliver reliable and affordable power supply to all consumers. There is a risk in treating EV charging hub customers differently from other large customers who are also seeking additional capacity for their new and existing businesses, industrial sites, learning facilities, housing developments, many for decarbonisation projects.
- To support new customer connections, Powerco has recommended to the Commerce Commission that:
    - customer connection capex be *excluded* from the regulatory incentive regime (called IRIS) so that the difficulty for networks (and new customers) to forecast their need is not an impediment to connection costs. EDB's that are not regulated[8] eg Northpower, do not face this same constraint
    - Regulatory allowances use historical data selectively, rather than exclusively. This EV charging discussion documents is an evidence point of how things can change within the 5-year regulatory period.

Outcome 2: All EV users can safely access and use EV charging when and where needed

In setting targets, we observe that the pace of technology change even in the last few years may mean that targets set in 2023 quickly become outdated. Different targets for types of charging and varying locations is logical, however the analysis behind the target numbers (page 21) is not provided. The objective of comprehensive coverage is sound. We endorse involving EDBs, particularly in the proposed research on regional requirements and options[9].

Outcome 3: Aotearoa's EV charging system is underpinned by integrated and streamlined cross-sectoral planning and standards

We have commented on sharing of data under Outcome 1 above. We support a high level of data sharing from public and private chargers for the benefit of the customer and the energy system. Improved data and understanding of charging trends will support our planning and forecasting for network development. We anticipate EV chargers being part of a demand response market in future which will be reliant on data driven systems, hence importance of cross-sectoral planning.

Improving standardisation and interoperability in EV charging infrastructure is a priority to streamline customer use and to avoid a situation where EDBs are interfacing with numerous different proprietary communication systems and protocols.

Outcome 4: Aotearoa's EV charging market functions effectively, can adapt and evolve over time, and is attractive to users, operators and investors

We encourage government to focus attention on identifying and removing barriers, supporting charging infrastructure providers, and promoting competition. A useful reference point is the integration of wind farms to

[8] https://comcom.govt.nz/regulated-industries/electricity-lines/our-role-in-electricity-lines/consumer-owned-electricity-distribution-businesses

[9] Further research is proposed on page 21 and this is assumed to cover a number of the actions identified on page 22.

the wholesale marker over the last 20 years or so. The largely predictable and unchanged market design and connection process meant that competitors could assess and connect wind farm projects based on their comparative advantage (location, resource) to each other and against alternatives. The EV charging market is in a similar embryonic state.

As noted in our comments on Outcome 1, we emphasise there is already a comprehensive regulatory system for the electricity sector, and pricing principles set by the regulators around pricing reflecting long run costs, enabling customers to make price/quality trade-offs, and equity for new connections. We strongly endorse a principle of equity and consistency in working with EV charging providers, as well as many other customers supporting New Zealand's decarbonisation with electrification projects.

Powerco's process for customer connections, how the regulatory principles are applied, and how contributions are calculated are set out in a guide available on our website[10]. An overview of the connection process is also **attached**. There are a number of factors in determining the customer contribution and the Powerco contribution such as new revenue, new ongoing costs, value in deferring costs for replacement of existing assets, incremental upstream cost allocation. We can also re-allocate costs when subsequent connections or works are needed. Operating in a principle-based regulatory environment does create processes and requirements for both EDBs and customers. However, we do not consider these to be barriers. Nor do we consider there to be any 'significant first-mover disadvantage' . In our experience, there can often be first mover *advantage* with available network headroom. There is also opportunity with EV charging providers who will have a number of installations, to plan ahead with the EDB on options for efficiency (eg equipment availability).

The Commerce Commission review of price-quality regulation for EDBs is considering electrification barriers and ensuring the regulation optimises timely network investment across all needs (including EVs). Providing for accelerated investment, ahead of need, will support timely development of EV charging hubs and fair allocation of costs.

Powerco is engaged with and largely endorses the Commerce Commission review of Information Disclosure (ID) requirements. This ID review makes changes from 2023 including information related to quality of service (eg customer connection practices), description of planning new network loads as a result of decarbonisation. As noted under Outcome 1, Powerco already provides network export capacity information for larger scale generation connections[11] and is working to provide more. Our capital contributions guide (see preceding paragraph) provides information on our connection pricing and process. Our website provides information on process and timeframes for different types of large scale connection requests and number/stage of enquiries currently being addressed[12]. The Powerco Asset Management Plan provides comprehensive description and forecasts about network capacity, forecast expenditure, and capital projects[13].

[10] Electricity capital contributions policy (powerco.co.nz)
[11] https://www.powerco.co.nz/get-connected/utility-scale-generation
[12] Commercial and industrial electricity (powerco.co.nz)
[13] 2023-electricity-asset-management-plan.pdf (powerco.co.nz)

Improved data access and sharing is also relevant from EV charging providers to EDBs. As outlined under Outcome 1, we work with customers seeking new connections to confirm demand, capacity and location options. This requires transparency from the customer about their plans too. Data sharing enables optimal network planning for all customers. There is a risk that perceptions about allocation of costs inhibit full data sharing in order for a customer to try and avoid capital costs.

Outcome 5: Our national EV charging system supports the transition to, and use of, low- and low-emissions transport modes across the wider transport system

Upgrades to electricity networks necessary to support depot charging infrastructure are similar to other electricity network outcomes and actions discussed in other parts of the discussion document. Our comments above are also relevant here, particularly in relation to smart charging, data, customer connection process, and customer contribution costs.

EDBs can have different approaches to new connections based on a range of factors affecting their business, including the assessment of the riskiness of the customer. If they exit early, then other customers will pay the residual costs. We are aware of some EDBs that require the customer to pay the entire cost up front. The discussion document does not reflect Powerco's typical practice'(it does depend on the circumstances):

- The document does not align with our practice: (page 31) where it states: 'companies whose investment in EV charging at their depots requires electricity distribution businesses (EDBs) to invest in network upgrades (for example, higher-capacity transformers) would currently be required to pay for these investments regardless of whether they need all of the additional capacity'.
- Page 37 also states that 'costs are placed solely on the party requesting the upgrade'. This is not the case. As outlined above, our capital contributions policy does not require 100% of the upgrade to be paid by the customer, rather the customer contribution and the Powerco contribution are calculated based on a range of factors, including which costs are directly and indirectly attributable to the customer's request and broader growth assumptions. At the extreme end, if no growth is reasonably assumed, then the comment on p37 seems reasonable. Conversely, if considerable growth is expected, then there is likely to be lower attribution of costs.

The suggestion to 'reform of the approach for cost-recovery of local network upgrades triggered by investment in public and private chargers' would benefit from a review phase to confirm whether there is a problem with the approach, and what underpins it. As a simple thought experiment: if the investment in chargers were connecting to the transmission grid, would reform of the transmission pricing methodology be needed? Reform would touch many parts of the way EDBs are regulated (and perhaps apply to those who aren't). It could mean, for example, that the Commerce Commission approves every EV related infrastructure upgrade as a ring-fenced process from normal planning, funding approval, and redress for business failure. Current disclosure regulation requires EDBs to have a capital contributions policy to define the approach to contributions, is underpinned by robust principles, and needs to apply consistently to all new connection requests. Introducing a different approach just for network investment triggered by EV chargers would create inequity and there is no analysis in the document to suggest that this part of the investment in NZ's decarbonisation should take a new approach, but not others.

A further action is stated for 'reforms in electricity pricing consider the needs of EV charging'. We support any analysis of pricing and how it meets customer needs, whether it be EV charging businesses or vulnerable consumers. This will vary by network because their network characteristics will differ across a range of dimensions – this is a key focus of the Electricity Authority when they review pricing methodologies. In essence, the factors affecting cost and deliverability will be different between Buller and Auckland. Some progress has been made on analysis, though the insights can be conflicting. For example, Concept Consulting's analysis[14] suggests consumers on an EDBs network take on the risk of accommodating EV charging businesses so they don't pay a share of network costs. Concept have also said[15] that "*Shifting some network cost allocation away from residential to business consumers would increase business consumers' bills*" which would mean EV businesses paying marginally more.

The most useful next step would be to get some clarity on the exact problems that reform activity might address. An assessment is needed of the issues, materiality, and potential outcomes, positive and negative, for both EV charging and other customers in the electricity system. Reform may not be the answer – fast and more effective solutions could be preferable. Under Outcome 1 and Outcome 4, we have endorsed existing electricity regulation reviews to ensure the regulation optimises timely network investment across all needs (including EVs and other decarbonisation activity). Providing for accelerated investment, ahead of need, will support capacity availability and an allocation of costs to encourage the use of that electricity. If the commercial success of public charging is the problem, there are many alternatives to address that eg tax settings, EECA subsidies, financing.

Heavy vehicle charging has the potential to add very significant load to the electricity network at very localised locations eg bus depots or airports, and is generally not accounted for in current modelling. We support an action to research and plan to optimise colocation, and carefully plan this network across heavy vehicle sectors focusing on a smaller number of key locations. These locations are an example where non-network solutions may play a valuable part in providing capacity.

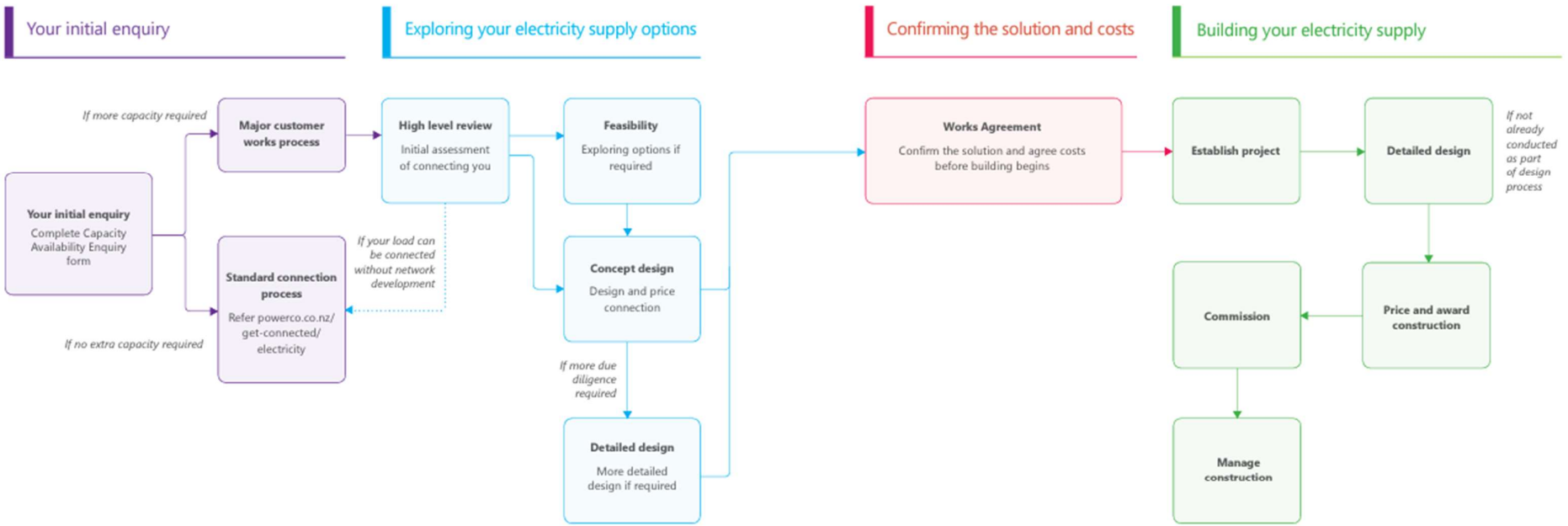
[14] P31, https://www.concept.co.nz/uploads/1/2/8/3/128396759/ev_study_report_3.pdf
[15] P34, https://www.mbie.govt.nz/dmsdocument/26415-quantitative-analysis-and-compendium-on-past-statistics-on-energy-hardship-pdf

Attachment – Powerco connection process

Tiro Whānui

Overview

This section provides an overview process you'll follow to connect your site to our electricity network.



Your initial enquiry

The first step is to determine whether there's sufficient existing capacity on the network in your location to connect you, or whether network development will be required to meet your needs.

We'll then confirm whether you will proceed with our standard connection process, or with the major customer works process outlined in this document.

Exploring your electricity supply options

If you're proceeding with the major customer work process, you'll go through a design phase either with us, or with a Powerco-approved electrical design contractor supported by our team.

As part of the design process we'll consider all options to optimise our existing infrastructure, reduce costs, and/or enable us to connect you more quickly. The risks and trade-offs associated with these options will also be considered.

Cost estimation, capital contribution (if any), land access and easement requirements, distribution supply pricing and risks form part of the design process, giving you a full picture of your project before you commit to proceeding.

Depending on the size and complexity of your project there may be preference, either from us or from you, to conduct detailed design work to mitigate risk by completing more due diligence before committing to build work.of network development required, and your supply requirements.

Confirming the solution and costs

Before we start network development we'll agree the scope of work and your capital contribution to our costs in the form of a Works Agreement with you.

Building your electricity supply

Once the Works Agreement is signed, the project is handed over to a Powerco project manager to oversee the build work.

The construction contract will go out to market to our Powerco-approved contractors, and your Powerco project manager will oversee the construction phase/s with them.

Work may be conducted in stages, and/or broken down into a series of smaller projects depending on the level of network development required, and your supply requirements.

We'll keep you informed on how this work is proceeding, as you progress with your own on-site electrical works, including the design and installation of your service connection to our network.

When network development work is complete, your Powerco project manager in collaboration with the construction contractor will liaise with you to commission the supply and liven your site.