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Submission on *improving the performance of electric vehicle chargers* green paper

Submission to the Energy Efficiency and Conservation Authority

From the Electricity Networks Association

Contents

1. Introduction

The Electricity Networks Association (**ENA**) appreciates the opportunity to make a submission to the Energy Efficiency and Conservation Authority (EECA) on their green paper *Improving the performance of electric vehicle chargers*. The ENA represents the 27 electricity distribution businesses (EDBs) in New Zealand (see Appendix A) which provide local and regional electricity networks.

2. Executive Summary

ENA supports the use of EECA's powers to require that all residential, after market AC electric vehicle (EV) chargers sold in New Zealand have 'smart' capabilities. We consider that this will impose only a very modest additional cost to these units while unlocking significant potential for savings across the electricity supply industry as a whole through the support of flexibility services. In the medium to long term, this will ensure that electricity costs for residential consumers will be kept as low as possible while the sector transitions to a low-carbon electricity system.

The ENA's contact person for this submission is Richard Le Gros (richard@electricity.org.nz or 04 555 0075).

3. Consultation Questions

1.	What are your thoughts on EECA's suggested engagement principles for EV chargers? What would you add or take away? Is there anything you disagree with?

We agree with the engagement principles EECA has developed and have nothing further to add.

2.	What are your thoughts on the proposed specifications for 'smart' chargers in New Zealand? What do you see as most and least important? What functions would you add or exclude, if any, and why? What information could you supply to EECA to help inform our thinking about this issue?

Specifications for smart EV chargers must include functions which enable near real-time *dynamic* load shifting by an aggregator. This is so demand (or export) management can respond to dynamic factors relevant to the system's performance such as: the charging of other proximate vehicles (or demand of other energy using devices) and available network capacity. These functions can also enable load shifting which responds to temporal factors *through* the system – such as the availability of cheaper, renewable generation. With the right settings – such as to ensure dynamic and remote management – an aggregator could have a view of these factors and optimise charging in response to them.

This is recognised by one of EECA's three key performance factors for smart EV chargers - *Connectivity of EV chargers: including functions to enable signals to be sent to, and received from, an external party*. We support this strongly.

We consider that the 'basic functions' and 'Default off-peak charging mode' are the next most critical functions for a smart charger in the New Zealand context. We recommend that default off-peak charging mode – which we understand to mean that EV chargers would be capable of charging off-peak by default and would be pre-set to do this - is partnered with 'Randomised delay function', though some further investigation would need to be undertaken to develop an appropriate dither or delay period. A randomised delay function could help to smooth any secondary peaks when used in conjunction with default off-peak charging mode. That is – a risk of a static intervention (such as default off peak charging value) rather than a dynamic one – is that a secondary peak is created. This is by simply shifting rather than staggering charging, a localised peak still occurs on the network, especially the LV network – just at a different time. However, by starting the charging of vehicles at different times, randomised delay function can help smooth the ramp up to secondary peaks somewhat. This needs to be staggered appropriately to actually smooth the peak (potentially randomised delay of up to half an hour, though as noted above this will require further investigation to determine exactly).

We agree that simply preserving options around 'V2G/V2I enablement' at this stage is a prudent step, and no further requirements are needed. We are unfamiliar with the problem described under 'Default minimum charge mode' so make no comment on this particular characteristic.

We can foresee problems with the 'Default reduced charging at peak mode' – what would be an appropriate level of charging rate to reduce the charger to, and how does this relate to the network conditions where the charger will be installed and the vehicle to which it will be connected (e.g. battery size)? Given the 'basic functions' already allow for the rate of charge to be managed when needed, we don't think this adds anything useful beyond that, and would be difficult to choose appropriate default settings for in practice.

3. Do you support EV charging being open access, and why/why not? What information could you supply to EECA to help inform our thinking about this issue? Do you think that 'smart' chargers should address issues of cyber security? How would you suggest this is done?

We support the mandating of open communications protocols for smart EV chargers. We agree with the benefits of this as laid out in the consultation paper – that this would enable a flexibility market to develop, which will ultimately benefit consumers with the ability to easily switch flexibility suppliers to seek the most attractive benefits.

Open access protocols, however, are distinct from open communications protocols and have significant implications for cyber security. Communications protocols and cyber security need to be considered in parallel at least at a process level. In particular, it is important that there is a process through which flexibility providers / aggregators are authorised to offer EV management services. There are a number of ways this could happen and whilst we acknowledge that EECA is seeking to address cyber security separately, we recommend that this is considered now and in parallel to the provisions for an EV smart charging standard.

We agree with EECA that it is critical that the ability to communicate with and control EV chargers is highly secure.

In partnership with the right processes, we have no reason to believe that the use of open communications protocols should be necessarily any more or less secure than any other type of communication protocol that could be used.

Finally, mandating open access should not *preclude* EV chargers having additional non-open access communication protocols, such as IEEE 2030.5

4. What are your thoughts on EV chargers having to transmit information on their location and use, and the suggested scope of information to be provided? Who should be able to access this information? In what form should it be transmitted? What processes should be in place to safeguard the data? Is there any other way this data might be captured?

For EDBs, the most critical information is to understand where on their electricity network the EV charging unit is connected. The obvious way to do this is to associate each individual EV charging unit (the unit) to the Installation Control Point (ICP) it receives its supply from. In this way, EDBs will be able to map the unit's demand (and potential flexibility) to the upstream assets within their electricity networks and understand how the unit could impact on the capacity of that section of network. Geographic information (e.g., street address) is less useful to EDBs as this would ultimately need to be mapped to ICP and then onto the network assets to be of use. This introduces a potential source of error and also wouldn't necessarily account for things like phase-connectivity, which will become increasingly important.

In order for the unit to be able to transmit this information it would obviously need to be loaded into the unit at some point – presumably during installation. It doesn't seem necessary that the unit be able to transmit this information on request. Instead, some register that is updated at the time of installation with the ICP to unit mapping would seem sufficient for this purpose – it is unlikely that the ICP or unit identifier would change for the lifetime of the unit. In addition, maximum output (and therefore demand) of the unit could be recorded in the same place at the same time. This seems to us to be a simple, low-cost way to capture both the location information and potential maximum demand of the unit. Note that this information is critical to the effective operation of the electricity distribution networks, and so should be provided without the option for the unit owner to opt out.

We note that there are existing processes for a distributed generation (DG) asset to be registered by ICP to a network which could be widened to include EV charging installations.

When a solar photovoltaic system or V2G is installed a requirement exists under Part 6 of the Electricity Industry Participation Code (the Code) to register this installation with a network business – see excerpt below:

Section 9A

> *3) The distributed generator must also give the distributor the following information as soon as it is available, but no later than 10 business days after the approval of the application:*
>
> > *(a) a copy of the Certificate of Compliance issued under the Electricity (Safety) Regulations 2010 that relates to the distributed generation:*
> >
> > *(b) the ICP identifier of the ICP at which the distributed generation is connected or is proposed to be connected, if one exists.*

This is executed through a Certificate of Compliance being completed by an electrician and provided to a network. Whilst Part 6 applies to distributed generation (including V2G technology – which is captured by Part 6 as it injects power into the network) this pathway could be expanded to include the registration of all EV charging installations (indeed including EV charging installations on the existing registry administered by the Electricity Authority is something we have been seeking for some time). We do not propose that the application process in its entirety apply to all EV charging installations – but that the requirement in Section 9A 3) does.

There are also some important changes that would need to be made to ensure that this process is viable to provide locational data of EV chargers to networks:

1. The requirement to register the installation should be placed on the installer rather than the customer. The Code currently imposes an obligation on a consumer (understood as a distributed generator for the purposes of Part 6) to provide the location of the installation. However, as above, this is generally performed in practice by an electrician or installer and when this data is not provided (as is true for around 14% of installations for some networks), following up with the installer rather than the consumer is more fruitful. We recommend that the Code is aligned so that the obligation to register the installation with the network rests with the installer. Having this clarity could increase consistency across installer practices and introducing this responsibility for installers now would be timely alongside the introduction of an EV charger standard for chargers sold and installed in New Zealand.
2. Introducing penalties for non compliance. Currently the only recourse available to a network in the instances of non compliance with this registration requirement is cutting the asset off from the network. This is not consumer centric, to the point where we virtually never do this. This also penalises a consumer when, as above, we believe that the responsibility should rest with the installer. In addition to 1 there is a need for a viable non compliance penalty on installers to enforce registration requirements. The burden of registering an installation for Code compliance is much less than the burden on a network business following up 14% of installations to gain the registration data. This burden on networks would only increase if the registration requirement were widened without the right enforcement levers.
3. The EA's registry needs to be amended so that registered assets can be 'tagged' as an EV. This currently does not exist, even for V2G – for which the registration requirement already exists. For this process to be viable in providing networks with data on the location of EVs these additional categories would need to be added (that is for 'V2G' and 'EV charger') so that the type of asset is identified with its registration.

Requiring the unit to be able to transmit their energy consumption/export data, while interesting, is also not strictly necessary for EDB purposes. Provided EDBs have reliable and ongoing access to consumption and generation data from the smart meter installed at the premise, knowing the portion of this that is attributable to the unit is less critical. If EDBs are unable to access smart meter consumption data in a reliable and ongoing way, then this capability would be much more useful however.

5. What are your thoughts on a requirement for EV chargers to monitor and record electricity consumed and/or exported during EV charging, and for this information to be made available to the EV owner? What other information may be valuable to the EV owner? What format should be used for this information if this requirement is adopted?

We don't see a compelling reason to require that the EV chargers monitor and record electricity consumption and export. If this is something that consumers will value in these products then presumably manufacturers and suppliers will have a natural incentive to make this functionality available.

6. What are your thoughts on requiring mandated power quality and control settings for EV chargers?

We support the requirement for mandated power quality and control settings to be included in EV chargers, where the capacity of the charging unit makes it useful. We note that if these requirements are intended to be analogous to those contained in AS/NZS 4777.2:2000, if may be sensible in future revisions of that standard to broaden the scope to include EV charging units, rather than have a separate requirement through MEPS for example

In addition, having an under frequency response could be very useful for the wider electricity system as it would enable charging load to be shed rapidly for an under frequency event. Voltage limits would also have benefit for managing issues on the LV network. However the trigger level would need to be different for a load (such as an EV charging unit) versus a DG. This additional functionality may be difficult to regulate in practice, due to the challenges of imposing New Zealand-specific functions on international product manufacturers.

7. What are your thoughts on regulating the energy efficiency of onboard EV chargers? What information could you supply to EECA to inform this issue? What challenges, if any, do you see in regulating in this area?

If the research cited by EECA in the preamble to this question is accurate – that there can be energy losses between 15-40% from onboard EV chargers – then we would support further work being done to better understand this issue. If these inefficiencies are substantiated, we would support a labelling requirement being developed for both EVs and EV charging units to make these inefficiencies more apparent to consumers at the time of purchase.

We do not think it would be practicable or desirable for EECA to seek to directly regulate any aspect of the charging equipment built into the EVs themselves, as this would require regulating offshore vehicle manufacturers.

8. What are your thoughts on labelling aftermarket AC EV chargers?

If the decision is made to label the energy efficiency of onboard EV chargers, as per the question above, it seems logical to extend this requirement to aftermarket AC EV chargers. We do note, however that the losses in an aftermarket AC EV charging unit may be very small when compared against losses in onboard EV chargers. Some consideration should be given to the overall materiality of losses when considering whether to impose labelling requirements.

9. What are your thoughts on whether charging cables which contain a 'smart' charging enabling device should be in scope for intervention?

As there is a capacity limit on the amount of demand an EV charging via one of these charging cables can place on the wider electricity network, which is only a fraction of what charging via an aftermarket charging unit can impose, it would be reasonable to exclude charging cables from these requirements as they are not capable of significant demand.

10. What are your thoughts on the 'do nothing' option for EV chargers in New Zealand? Do you think the market can adequately address this issue without the need for government intervention? What information could you provide to EECA to inform this issue?

We think that the 'do nothing' option will likely lead to a sub-optimal outcome for New Zealand as a whole, meaning that there is not a sufficient deployment of smart EV chargers for the maximum benefit from these technologies to be realised. We also think that the relative risks between 'do nothing' and making an intervention (i.e., regulating smart EV chargers) are asymmetric. The downside of regulating – potentially a very modest increase in price of EV charging units – is vastly outweighed by the missed opportunity of much more efficient and effective use of the electricity system, which in turn will help to constrain increases in the price of electricity.

Thinking a bit more deeply, the thriving market for flexibility services – which is what is needed to help manage increases in peak demand driven by domestic EV charging – is a classic 'chicken and egg' scenario. In order to establish a FDSP from aggregated control of smart EV chargers, there needs to be sufficient smart EV chargers available to recruit for the service to be functionality viable. Ideally, market forces would provide an incentive for those purchasing EV charging units to opt for the smart variety, in the knowledge that they will then be able to sell their flexibility to FDSPs. However, the FDSP business cannot become established, and therefore able to offer a clear and sustainable price signal to those EV charging unit purchasers, until there is already a sufficient number of smart EV charging units available to make the FDSP business viable – a catch-22.

In addition, a key market for the flexibility services that FDSP may offer are electricity distribution businesses (EDBs). In order to offer a compelling service to the EDBs, the FDSP will need to be able to offer a flexible response in a relatively large geographic coverage of the EDB network. This is somewhat different to the kind of service that Transpower or an electricity retailer may want, where the specific geographic location of where the flexibility is sourced is not as important. Transpower, for example, may need a flexibility response in Auckland, and whether that comes from predominantly the North Shore, West Auckland, the CBD, etc is largely irrelevant. In contrast, an EDB may need a flexibility response in Northcote, and if the preponderance of smart EV chargers are in Remuera then the offering of the FDSP is less attractive, as it won't resolve capacity constraints in other parts of the network.

For these reasons, we think the regulation of smart EV chargers is the best way to overcome some of these 'chicken and egg' issues, at only a marginal increase in costs, which will deliver value and utility in the long term – both for the EV owner and the wider electricity system. Given the likelihood that EV charging units will not be replaced for the lifetime of the unit (perhaps 10-15 years), every unit sold without smart capability is a lost opportunity for at least a decade and likely longer.

11. What are your thoughts on the likely effectiveness of information, education and labelling to improve the uptake of 'smart' EV chargers? What information could you provide to support your position?

Given the 'chicken and egg' nature of the problems facing establishment of a thriving flexibility market (see our response to question 10), we think that information, education and labelling can only have a limited effect on the uptake of smart EV chargers. In addition, the ability of FDSPs, EDBs, electricity retailers, etc, to offer EV owners compelling and attractive benefits is constrained by the uptake of smart EV chargers. If there is not a sufficient penetration of these devices across the network, then it is more difficult to develop a business case to tailor incentives to these groups for use of flexibility. Information provision can only inform EV owners about the incentives that are available now, not the incentives that may become available in the future.

12. What are your thoughts on the use of incentives to encourage the uptake of 'smart' EV chargers? What incentives do you think would be effective and who should provide these? What other incentives might be valuable beyond financial incentives?

As we've noted in our response to the question above, we consider that the incentives from the electricity system currently available to EV owners to encourage the purchase of smart EV chargers are relatively weak, in comparison to what they could be, should a thriving flexibility market develop. For that reason, and because of the 'ticking clock' aspect of non-smart EV chargers being installed, we think the government is justified in making a regulatory intervention to require smart EV chargers. We understand from earlier work commissioned by EECA from KPMG (*Electric Vehicle Charging Technology – A New Zealand Residential Perspective*) that the marginal cost of a smart versus non-smart EV charger is minimal, to the point of being immaterial. Should smart EV chargers be mandated by the government we would expect that this cost differential would become even less significant.

Through the flexibility that smart EV chargers can offer to the electricity industry; efficiencies will be gained at a systems level that will deliver cost reductions for all electricity consumers. This is why smart EV charging regulations are important for an equitable energy transition. Whilst some incentive options are currently being offered by retailers (which we support) these are relatively few and it is unlikely that they are adequate in tilting consumer purchasing decisions in favour of smart charging currently, in the absence of regulations. Once a passive charger is installed a consumer is unable to subscribe to a smart EV charging pricing product or incentive (unless they retrofit the charger) potentially restricting the market for such incentive products. Smart EV charging regulations and incentives are not mutually exclusive – they hinge on one another.

13. What are your thoughts on regulating the 'smartness' of EV chargers in New Zealand? What do you think of New Zealand adopting the approach being undertaken in the UK? What information could you provide to support your position?

ENA supports the use of regulation to require that all EV chargers sold for domestic use in New Zealand have smart capabilities. The approach taken in UK appears sensible to us and this would be a model for EECA to look at, adapting as appropriate to take advantage of our local regulatory settings (e.g. MEPS).

We also note that South Australia have recently implemented smart EV charging regulations:

From 1 July 2024, Electric Vehicle Supply Equipment (EVSEs) in the state:

- must meet one of these communication protocols: OCPP1.6 V2 or ANSI/CTA 2045-B;
- will have a 'deemed to comply' option for EVSE that do not meet these protocols – which will enable suppliers to demonstrate that the EVSE has been tested and meets a set of demand response criteria; and
- need to meet some demand response functionality from the AS 4755 (Demand Response Standard) framework.

14. What are your thoughts on using the PAS for residential EV chargers to underpin regulation/incentives? What parts would you exclude or change? Does the PAS cover all the important issues? What other resources may be useful for New Zealand?

We're not sure what the best mechanism available to EECA is to introduce the regulated requirement for smart EV charging, but it would be desirable to keep this very narrowly targeted and focussed only on domestic EV chargers and only those elements that need to be mandated. We do not think that using the PAS for this purpose would achieve this, and may make it less clear and obvious as to what is required.

15. In what other ways might the energy performance of EV charging in New Zealand be improved, that do not require EECA's involvement?

Over time, as a mature market for both EV charging units and an informed customer base emerges, consumers will presumably consider energy performance as part of their purchasing decisions as they would with any other energy intensive appliance. Other than the labelling discussed under Q11 (which would be delivered by EECA), we see no obvious role for other parties to promote the energy performance of EV chargers, other than perhaps the EV charger suppliers and retailers.

We note that individual EDBs, as part of their efforts to reduce energy costs for their communities, may have initiatives to promote energy efficient appliances more generally.

4. Appendix A

The Electricity Networks Association makes this submission along with the support of its members, listed below.

Alpine Energy

Aurora Energy

Buller Electricity

Centralines

Counties Energy

Eastland Network

Electra

EA Networks

Horizon Energy Distribution

MainPower NZ

Marlborough Lines

Nelson Electricity

Network Tasman

Network Waitaki

Northpower

Orion New Zealand

Powerco

PowerNet

Scanpower

The Lines Company

Top Energy

Unison Networks

Vector

Waipa Networks

WEL Networks

Wellington Electricity Lines

Westpower