Submissions for Improving the performance of electric vehicle chargers pt. 2

A green paper seeking input on ways to improve the energy performance of electric vehicle chargers

EECA
TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY

Order of submissions

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Electricity Engineers' Association (EEA) Submission – EECA Green Paper "Improving the performance of electric vehicle chargers"

OVERVIEW

Thank you for the opportunity to provide comment on the EECA Green Paper - *"Improving the performance of electric vehicle chargers"*. The paper is an important insight into the issues and not all the questions raised can be addressed at the moment.

The discussion on the future structure of EV charging arrangements for the sector is timely and will need to be ongoing as policy and technology further evolve.

While aspirational policies are important in creating the new energy future, it is the timely implementation of them that is a key to their success – and EEA believes EVs requires comprehensive and ongoing technical/engineering engagement during the next two decades. The contribution of electrification of transport to the New Zealand decarbonisation strategy is significant and challenging as the technology will evolve quickly so it is important that regulatory frameworks or standardisation outcomes are responsive and enabling.

The EEA welcome the opportunity to be involved as we provide the power industry's largest collaborative forum in New Zealand, focused on delivering clarity on complex engineering/technical issues, practical support and solutions, and market intelligence to support our members and other industry stakeholders to deliver safe and reliable electricity supply within a low carbon policy framework.

EEA is keen to continue our collaboration with EECA, industry, and other stakeholders.

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The context of the EEA submission is that the EVs and charger technology and markets are still evolving globally, and NZ is a small part of a huge international supply market - so it is a technology taker. It will be important to engage and collaborate with stakeholders, research and monitor trends, and issues, align as appropriate with international best practice, and international standards (e.g., IEEE, IEC, ISO and AS/NZS), and have robust processes and regulatory framework that enables stakeholders to respond quickly to emerging technologies and market services. The EECA paper also highlights the importance of enabling data, monitoring and information.

BACKGROUND

Founded in 1927 the EEA is the national organisation for engineering, technical and health and safety matters within the New Zealand Electricity Supply Industry (ESI).

Our members include over 70 Corporate Members (companies) and 450 Individual Members from all engineering disciplines and sectors of the electricity supply industry including generation, electricity networks (transmission and distribution), contractors (operation/maintenance), engineering consultancies and equipment suppliers.

The EEA works collaboratively with industry, government, and other stakeholders to provide expertise, advice, and holds or contributes to significant bodies of knowledge on engineering/technical and safety issues relating to the electricity supply industry in New Zealand. All EEA guides and publications are publicly available.

Our functions include:

- Production and ongoing stewardship of 'bodies of knowledge' including engineering, technical, asset management and safety publications (e.g., guides, Standards, industry reports, and links to relevant legislation and international information).
- Representing the New Zealand electricity supply industry in national and international Standard development and facilitation of benchmarking in safety and asset management (e.g., IEC, AS/NZS, NZS Standards).
- Providing and supporting engineering and technical professional development forums, training, and competency for ESI engineers.
- Providing a web-based knowledge hub on safety, engineering, asset management, emerging technology and professional development including information services, notifications, newsletters, guidelines and support documents, events, and infrastructure engineering careers information.

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DISCUSSION PAPER QUESTIONS

Q1. 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?

EEA supports the characteristics of smart EV chargers as outlined in the paper.

We would also add 'safety outcomes' to the list. These assets are likely to be widespread in the community, so it is important to have a clear framework to deliver safety aspects of the product, installation, and its performance.

Q.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?

EEA supports the EECA view that 'open access' communication protocols are essential to optimise EVs contributions to demand response and EEA is currently working with industry and EECA to look at the implications of this for customers and networks.

As charger technology is evolving, specifications and the attributes to enable smart outcomes will change so specification need to be adaptive, interactive, and iterative.

The 'basic functions' and 'Default off-peak charging mode(s)' are two key functions and will need careful consideration.

'Default off peak' and 'default reduced charging at peak' modes have merit. Key issues are what would be an appropriate level of charging rate to reduce the charger to; and how the 'off peak' is determined and set. It may need to be network specific. As the use of electricity increases as we decarbonise energy, so load patterns will change, and the 'off peak period' may not remain static and what is an 'off peak' now, may be a 'peak' period in the future. Is a national 'default reduced charging at peak' mode an option and if so, what should be the minimum settings?

'Randomised delay function', is supported as that ramps the onset of charging session and will have benefit for more efficient HV network management by allowing time for the on-load tap changers to respond. Again, we would support some further research to look at an appropriate delay period(s).

Enabling 'V2G/V2I enablement' is a prudent but the technology is still evolving. The CCS port is now the pseudo standard in New Zealand but is not bi-directional but will likely be a future option that needs to be acknowledged.

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Q3. 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?

As noted above EEA is engaged with industry and EECA on a communications protocols project for smart EV chargers. Enabling a flexibility market to develop in NZ, will benefit consumers with the ability to easily switch flexibility suppliers to seek the most attractive benefits. This shouldn't preclude EV chargers having additional non open communication protocols such as IEEE 2030.5 to ensure optimal network management, safety and security.

As such, EEA support the mandating of open access communications protocols for smart EV chargers in NZ and agrees with the benefits of this as laid out in the consultation paper.

Cyber security is a speciality area and must be addressed to ensure security of communications protocol that control an appliance like EV chargers.

Q4. 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?

Linking the EV charger to an ICP will give greater visibility to map the units and overall demand and potential flexibility to the upstream assets within an electricity network. There is also the opportunity to better use consumption data. It could also help understand how the EV charger unit may impact on the capacity of a section of network and allow customer optimisation opportunities.

Key site information should also include charger capacity and the phases or phases that the charger is connected to.

Note that many EDBs, retailers and equipment owners already keep location data about DGs (e.g. PV and OV and Battery) and loads on water/heating ripple control. Should there be a broader discussion on the need for a data strategy across the technology and industry to enable greater understanding of potential market impacts and support 'informed' decisions.

With regards to the other questions on the scope of information, who else should have access to data (e.g., aggregators, equipment suppliers or other third parties), how it is transmitted and how data maximum security is enabled these are significant issues in their own right and warrant further research and discuss across stakeholders.

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Q5. 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?

See Q.4. Better answered following engagement with EV owners on what information they believe is valuable for them... and what data they would be happy to meet the cost of.

Q6. What are your thoughts on requiring mandated power quality and control settings for EV chargers?

In principle yes as it is essential to have a stable and reliable electricity supply. However, emerging technology for EVs and EV charging is changing rapidly.

If a regulatory approach is to be taken, the current regulatory process needs significant reform if they are to be responsive to these changes.

Incorporating these requirements into a Standard (e.g AS/NZS 4777.2) would only be appropriate if responsible regulators participated in the Standards process and made the Standard mandatory.

Current Electricity Safety Regulations are focused on voltage and frequency only but with other potential power quality issues coming from emerging technology (e.g harmonics) EEA would like to see further research undertaken in this area. If harmonics are to be included in power quality, any requirements should cover both the on-board charger and the wall mounted EV charge unit. New Zealand has world class researchers in this area so is well placed to contribute to the national and international debate in this area.

New Zealand is a technology taker, so we need to be a faster responder if New Zealand is to maximise the opportunity from technology without compromising safety, stability or quality of the power system.

Under frequency response of EV chargers could be useful to ensure Grid stability for unplanned events on the Grid, as it would enable charging load to be shed or reduced rapidly for such an event. Voltage limits would also have benefit for managing Voltage issues on the LV network. AS/NZS 4777.2 has trigger levels for frequency and voltage events however they would need to be set at a different level for a load versus a DG.

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Q7. 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?

EEA believes this requires further research - to look at the efficiency of the on-board charger rather than create policy or decisions based on one study.

If these inefficiencies are substantiated, we would support a labelling requirement being developed for both EVs and EV charging units

Our feedback has been the charging efficiency of EV charging is as much to do with the battery chemistry i.e., churn losses, (charging and discharging the battery) as the losses from an on-board charger. Northpower has some data on the energy supplied to recharge an EV compared with the energy supplied to the electric motor under test driving conditions.

If New Zealand is going to require an efficiency rating for on-charging of EVs then if should be based on an international standard or recognised test methodology or both. The focus should be on both the on-board charger efficiency and battery churn losses as well. If the standard is set too high, then it may stop or reduce the supply of EVs into New Zealand both new and used imports.

EECA should note that technology is already changing with SAE J2954 wireless charging standard being released. The Standard enables half the charger (transmitting part) to be external and the other half (receiving part) is on-board the EV. Having a regulation that covers half a charger doesn't make sense.

Q8. What are your thoughts on labelling aftermarket AC EV chargers?

See Q.7 above. Our view is that there is no justification to exclude so aftermarket chargers should also be included.

Q9. What are your thoughts on whether charging cables which contain a 'smart' charging enabling device should be in scope for intervention?

Several questions should be addressed as part of this consideration.

What is the problem that needs to be addressed safety, quality, performance?

Is it implementable, affordable, and practical for the 'smart' elements of these charging cables to be tested; what test standards should apply; what requirements, including audits do test houses conform to; and do the requirements cover both onboard and aftermarket EV charging units?

Any labelling should be consistent with labelling of other home appliances.

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Q10. 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?

The 'do nothing' option is not optimal - but neither is a heavily regulated option as it may directly or indirectly 'picks' technology winners.

On balance, there may need to be both while the EV and flexibility markets evolve and mature.

If the regulatory framework is to be used, it should consider minimum requirements only, linked to supporting customer choice through common safety, quality and performance standards and outcomes.

The economic regulatory framework may also need to be reviewed to ensure investment and performance outcomes are addressed.

The challenge is that the regulatory framework must be more responsive and more robust, adaptive and agile than it currently is.

Q11. 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?

Information, education and labelling on EVs and EV chargers from a neutral third party is important to support adoption of the technology, but it may only have a limited effect on the uptake of smart EV chargers. A PAS on EV chargers may be a useful as a public educational tool.

Q12. 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?

Customer incentives for smart chargers may be a better option.

EV chargers may be a significant investment for residential installations if they are a high cost long life asset (10-15 years). This creates a 'ticking clock' legacy aspect of non-smart EV chargers being installed, which may support making a regulatory intervention to require smart EV chargers in NZ.

If as an incentive, the cost difference between a fully installed smart charger versus non-smart EV charger is negligible and the benefits of a smart charger are immediate for customers would this provide sufficient incentive for customers to select smart chargers?

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Q13. 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?

If the 'smartness' of EV chargers were regulated, would that stifle innovation; potentially leave NZ using old technology; and/or limit future customer market innovation?

UK have mandated smart chargers, so it is a model for EECA to assess to understand the short term and long-term implications of such an approach.

If EV chargers were to be regulated, the regulatory framework would need to be able to respond quickly to new charger technology/software (see Q.6).

Q14. 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?

A PAS is entirely voluntary, and while a useful source of information and education, is not a strong regulatory tool.

Q15. In what other ways might the energy performance of EV charging in New Zealand be improved, that do not require EECA's involvement?

Perhaps the EV charger suppliers, aggregators, flexibility providers and retailers will through their innovation promote the energy performance and capability of smart EV chargers in NZ the issue is whether there are strong enough incentive at the moment to start this change.

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CONCLUSION

Thank you for the opportunity to provide comment on the EECA Green Paper on improving the performance of electric vehicle chargers" and examining the opportunities, barriers and possible future role of EECA.

Others overseas are facing the same challenges so there an important opportunity for EECA and industry to learn from the global environment and be a 'fast follower'. It is also important for them to engage and collaborate with stakeholders, research & monitor trends, and issues, align with international best practice, and international standards (e.g., IEEE, IEC, ISO and AS/NZS), and have robust regulatory framework and processes as EVs and EV changer technology and impacts evolve.

If you have any queries regarding the EEA submission or would like to engage with EEA on our Members further on this topic, please contact the undersigned.

Yours sincerely

Peter Berry
Executive Director

Submission by

WORLD ENERGY COUNCIL | BusinessNZ Energy Council

to

Energy Efficiency & Conservation Authority

on the

Improving the performance of electric vehicle chargers green paper

5 September 2022

IMPROVING THE PERFORMANCE OF ELECTRIC VEHICLE CHARGERS GREEN PAPER – SUBMISSION BY BUSINESSNZ ENERGY COUNCIL

INTRODUCTION

1. BusinessNZ Energy Council[1] (BEC) welcomes the opportunity to provide feedback on the Energy Efficiency and Conservation Authority's Green Paper: *Improving the performance of electric vehicle chargers green paper* (referred to as 'the paper').

2. The paper outlines ways the energy performance of private electric vehicle chargers could potentially be improved. The paper identifies several interventions, most notably the introduction of smart charging standards.

3. In response to this paper, our submission explores the potential benefits and trade-offs associated with smart charging standards.

4. Overall, we think smart chargers are one important tool to help improve grid stability and reliability as we continue to electrify New Zealand's light vehicle fleet.

5. However, any possible regulations including standards must not be overly prescriptive. We voice the need for regulations to be simple and flexible. Yet such standards are not a 'silver bullet' in flattening peak demand and important trade-offs apply, such as losses to consumer freedom and additional barriers to EV uptake.

6. BEC Members have been consulted in preparing this submission. Given the diversity of our membership, some members have specific perspectives they wish to address in detail. We have encouraged our members to make their own submissions raising potential opportunities and concerns.

[1] The BusinessNZ Energy Council (BEC) is a group of New Zealand's peak energy sector organisations taking a leading role in creating a sustainable energy future. BEC is a division of BusinessNZ, New Zealand's largest business advocacy group. BEC is the New Zealand member committee of the World Energy Council (WEC). BEC members are a cross-section of leading energy sector businesses, government, and research organisations. Together with its members BEC is shaping the energy agenda for New Zealand.

GENERAL COMMENTS

TIMES-NZ Scenarios

7. Our TIMES-NZ model[2] shows that electrification – including the demand of EVs – could double network capacity requirements by 2050, if demand is not managed. EVs as a portion of all new vehicle sales have soared over the past year. The total number of EVs are expected to grow significantly over the next two decades – creating meaningful reductions in gross emissions from transportation.

8. Collaborating with our stakeholders across the energy sector, BEC together with EECA has developed a New Zealand specific model – TIMES-NZ – to explore two possible future energy scenarios: Kea and Tui. Under Kea, climate change is priortitsed as the most pressing issue facing New Zealand. Under Tui, climate change is one pressing issue among others.

Figure 1: Kea – Total electricity generation (PJ)

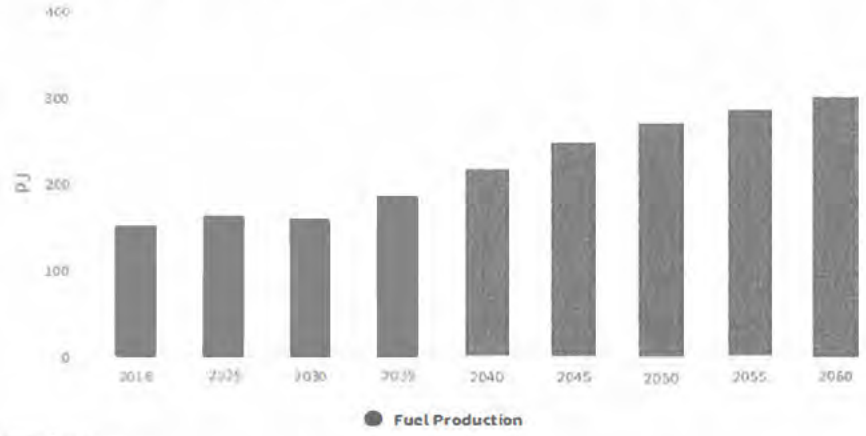
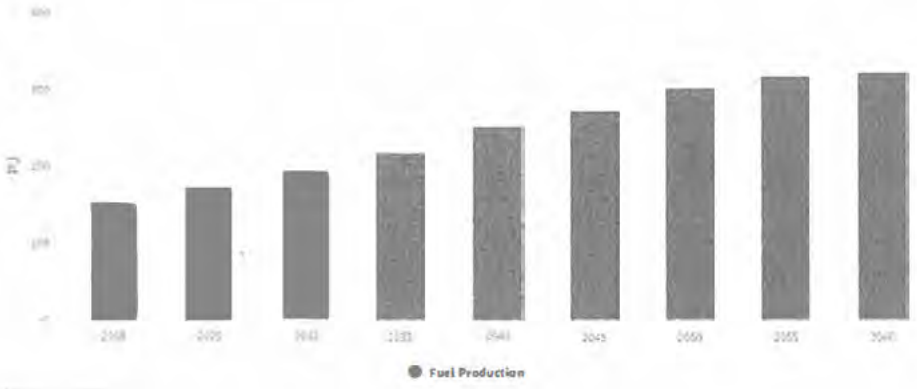


Figure 2: Tui – Total electricity generation (PJ)



9. In Tui, generation expands 108% by 2060. In Kea, generation expands 95% over the same period. Tui assumes charging technology remains basic, with motorists returning

[2] https://times.bec.org.nz/

home in the evening to plug in their EV using 'dumb' chargers. This increases the generation required to meet peak demand. Kea assumes a steady shift towards smart charging technology. Peak demand is flattened using controllable chargers. This reduces the need for building additional electricity infrastructure to meet the same number of BEVs.

10. Additional capacity requirements have been identified in other models. A scenario outlined in Transpower's Whakamana i Te Mauri report[3] shows electricity demand could be 90% higher in 2050 than in 2019, with 43% coming from vehicle electrification.

11. BEC members voice concern that EVs will increasingly place significant strain upon load balancing at home and upon the electricity grid. Furthermore, as the portion of BEVs with charging capabilities above 3.7kW rapidly increase in the future, the possibility of EV's overloading New Zealand's electricity system is increasingly likely if demand is not managed.

12. However, if standards are seriously considered by EECA, we believe that standards should be simple and limited.

13. As fast charging technology improves and becomes cheaper, the portion of EVs with such technology will increase in the future. Yet the distribution and electrical network was not designed to handle the relatively large electrical loads that come with widespread EV use. Without standards, chargers with basic characteristics could continue to be the most dominant charger in New Zealand.

14. Studies show that EV motorists plug in their charger once they return home, namely during peak-hours. Under the status quo scenario, with most EV owners using basic chargers without controllable and dynamic technology, the likelihood of consumers switching to off-peak hours due to basic price signals is possibly limited. Instead, chargers could be managed and controlled, automatically flexing depending on capacity, easing grid congestion, and reducing the likelihood of overload.

Smart charging standards: the benefits

15. Overall, we believe the widespread use of smart chargers will enhance New Zealand's energy trilemma: security, affordability, and sustainability. In the following, we voiced the benefits of smart charging standards around five main points, however, mention clear costs with intervening:

Flattening peak demand

16. Being dynamic, smart chargers flatten load, avoiding the expenditure needed to meet peak demand, improving the security and affordability of the entire power system. Smart chargers reduce the need for additional transmission, distribution, and generation infrastructure. The chargers' controllable technology enables moving EV charging to off-peak periods, reducing peak demand. In doing so, the need for significant infrastructure improvements.

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[3] https://www.transpower.co.nz/resources/whakamana-i-te-mauri-hiko-empowering-our-energy-future

17. Data provided by smart chargers could aide long-term network planning, identifying where improvements need to be made, and to what extent such improvements are necessary. This strengthens grid stability in the medium to long term.

Security and reliability

18. Overall, BEC agrees that standards need to ensure relevant energy and location data is transmitted to electricity network operator to better manage the grid. Smart chargers will mean EVs can 'talk back to the grid.' This tool is key to helping electricity network operators flatten peak demand by delaying charging to off-peak hours. As well as modulating charging speed depending on load and the availability of renewable generation.

19. For EVs to be able to respond to real-time signals for system security, they need to have smart functionality. Smart chargers with open communication protocols provide valuable information to electricity network operators, allowing them to observe what is connected to the grid and where it is located, and crucially, its impacts upon the grid. Open protocols allow chargers to be used dynamically: changing depending upon aggregate charging throughout the network, the grid's capacity, and the availability of renewable generation.

20. Observing the chargers' power levels, the time of charging, and the location of charging will enhance the security of New Zealand's electricity system. For instance, networks operators will know the areas with high EV concentration and therefore be able to manage the charging externally, mitigating the impacts upon low voltage networks.

21. With the growing uptake of Decentralised Energy Resources (DER), including EV and connected charging infrastructure, more data and access to data will be required to increase visibility. In the future, data will need to be more granular to observe the increasingly dynamic power system in the future. Open communication protocols ensure data is accessible and transparent.

22. Moreover, to ensure the emergence of competitive markets for flexibility services and DER aggregators, monitoring and receiving accurate data about voltage, frequency, and electrical power flow are crucial for a reliable power supply. This will help better decision-making when balancing supply and demand, namely asset overloading and voltage control. As a result, ensuring New Zealand's power system operates within secure limits. Standards that provide the capabilities to modulate charging speed up and down – rather than just on and off – will provide network stability.

23. Additionally, smart chargers protect household networks. Most household mains are 60amps. EVs place considerable load upon households' electricity network. Smart charges can dynamically modulate charging speed automatically depending upon load within the household – for instance, while using heating and cooking appliances – removing the risk of overloading the household fuse. Standards could reduce the need for wiring upgrades within New Zealand homes. Smart chargers turn off or down if voltage frequency drops below a pre-set threshold and restores when the frequency or voltage recovers.

Sustainability

24. Smart chargers that could help shifting charging to off-peak hours will not only flatten peak demand, but also reduce the need of building additional thermal peaking plants. This will reduce emissions and costs to consumers.

Energy storage

25. Smart chargers will play an important role in developing flexibility services. They aide the potential of using EVs as DER. Depending on the model, EV batteries can store 5 – 40KWh of electricity. Households could use this stored electricity to power other appliances (V2H) or return the electricity back to the grid (VG2). With VH2, at the aggregate level, these batteries together could act like a virtual power plant, relieving generation constraints during periods of dry year risk.

26. Without the widespread use of smart controllable chargers, the development of using EV batteries as capacity would be stunted. At a systems perspective, the gains of a VH2 model would be lost. Overall, smart chargers are important to progress of VH2 models in the future.

Affordability

27. Overtime, smart chargers save consumers costs that would otherwise be spent on their electricity bills, meaning consumers would benefit in the medium term. Managed smart chargers that shift charging to off-peak hours will reduce the price consumers pay for electricity. Price is among the most influential factor in purchasing an electric vehicle. All things being equal, lower charging costs will balance the price difference between EVs and ICEs, improving the attractiveness of switching to an electric vehicle.

28. As mentioned, smart chargers reduce the likelihood of networks disturbances and failures. Demand responses like smart chargers ensures New Zealand's grid is not strained. Consumers benefit from a power system that is secure and reliable.

29. Our TIMES-NZ model shows electrification – driven by the demand for EVs – could double network capacity by 2050, if demand is not managed. Additional infrastructure and significant improvements to New Zealand's electricity network would be needed.

30. According to a report by KPMG[4], growing transmission, and distribution costs – driven mostly by peak demand – could cost $6.1 billion by 2050. This cost would fall upon consumers with higher prices regardless of whether they own an EV. Smart chargers would flatten peak demand, improve network utilisation, and reduce the need to build new electricity capacity. This would flow through to consumers in lower electricity prices.

31. However, it is important to understand that initially consumer would face higher prices when purchasing a charger for their EV. Nevertheless, consumers could pay less for electricity due to more charging flexibility. In other words, despite higher initial capital costs of a smart charger, the chargers' smartness delivers a net savings. Vector and Frontier Economics estimates that a smart residential EV charger adds around $300NZD in net value per annum through avoided costs across the energy system.[5]

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[4] https://www.eeca.govt.nz/assets/EECA-Resources/Research-papers-guides/EV-Charging-NZ.pdf

[5] https://blob-static.vector.co.nz/blob/vector/media/vector2021/vector transitioning_to_low-emissions_climate-resilient_future_submission.pdf

Smart charging standards: the trade-offs

32. Smart charging has significant potential, providing meaningful improvements to New Zealand's power system. However, standards will also come with some trade-offs that need to be considered. The following provides several side-effects that must be thoughtfully considered.

Barrier to EV uptake

33. Despite smart chargers saving consumers in the medium term, standards could create extra barrier to EV adoption as they increase the upfront capital cost of an EV.

34. Smart chargers vary in price, depending on several characteristics. The average smart charger costs are around $600 to $800 more than the average basic non-smart charger. Standards would introduce a hard ban on the sale of basic non-smart chargers would increase EV prices and decreasing the attractiveness of purchasing an EV. This could persuade some to purchase internal combustion engine vehicles instead.

35. Subsequently counteracting the purpose of the Clean Car Discount introduced in 2021 aimed at reducing the price of EVs. Putting aside the efficiency and equity concerns caused by the Clean Car Discount, a smart charging standard would reduce the effectiveness of such discount. Together, both policies are inconsistent: one policy encourages uptake, the other provides a barrier.

Costs of compulsion

36. EECA should ensure that regulations are not prescriptive. Regulations that are prescriptive may limit available technology, considering New Zealand is a technology 'taker.' Potential regulations will also come with considerable losses to dynamic efficiency and significant impacts upon innovation in this highly dynamic area of technological change. If standards are introduced, they should be limited, not rigorous and onerous. EECA should follow a light-touch approach.

37. Consumer choice is important. Any potential standards should be pragmatic, ensuring consumer choice is not largely sacrificed in the name of efficiency. Yet, such freedom and cost differentiation between 'dumb' and 'smart' chargers falls upon the network as a public externality, with higher electricity prices for consumers who may not own an EV.

38. Consumers' data privacy needs to be considered. Private information could be misused or possibly fall into the purview of unauthorised actors, most notably hackers. Consumers need reassurance that any potential information collected by operators is protected. Despite protocols that provide cyber security for smart charger users, consumers may not consent to operators controlling their charger externally. Currently, we do not know the portion of potential EV buyers or current EV owners who would inevitably consent to operators having the capability to control their smart charger externally. To the knowledge of BEC, no substantive surveys have been done to observe consumer hesitancy of controllable chargers. There is a possibility a large segment may not consent to open access protocols outlined in this paper. In this case, at a network level, this would significantly limit the benefits of smart chargers.

Counterfactual and caveats

39. Assuming no action is taken, smart chargers will continue to be developed dramatically overtime. Technological development will mean better chargers at lower prices. This could provide sufficient signals for consumers to switch and purchase smart chargers without intervention. The technology of both EVs and smart chargers have developed significantly over the past 10 years. Predicting what will happen with smart charging technology in the next 10 to 20 years is difficult, if not impossible (consider the remarkable development of smart phones since 2010). Technology develops fast, its highly unpredictable and dynamic. The counterfactual ensures dynamic efficiency, while protecting consumer freedom to purchase the chargers they want.

40. Price signals should not be underestimated as a tool to shift charging behaviour. Several retailers have introduced tailored plans that offer lower prices for off-peak electricity usage. These plans have been successful in reducing load.

41. The uptake of EVs might be slower in the short term than anticipated due to the rapid cost increases in manufacturing EVs. According to the IEA, from the start of January 2021 to May 2022, the price of lithium has increased sevenfold, with cobalt and nickel prices both doubling.[6] EECA should consider these contextual changes if standards are to be adopted.

42. There is a possibility that network strain caused by EVs might be less than anticipated. Models depicting significant EV uptake are only projections based on several assumptions. Such assumptions could be wrong or potentially less impactful than anticipated. For instance, the uptake of PHEVs over this decade as a transition solution might be higher than current outlooks forecast. PHEVs usually have a maximum AC charging capacity of 3.7kW, with motorists' trickle charging their vehicle overnight. Depending on the distance traveled, the charge is sufficient for 2-3 days. The load of PHEVs fit within the main capacity of most homes, while placing less strain on the grid compared to EVs. PHEVs provide sizeable emission reductions without the need for additional network capacity.

Beyond standards

43. The question now turns to what complimentary measures could be implemented that encourage the uptake of smart charging technology.

Information

44. Information that compares efficiency between different products, in this case smart chargers, is valuable. Providing information on EECAs website related to smart chargers would educate some consumers. This is a low-cost option and falls directly within the mandate of EECA. Information about smart chargers could influence the decision making of consumers, encouraging the purchase of a smart charger. However, this assumes that consumers make decisions based on efficiency, not price, convenience, privacy, and other factors.

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[6] https://iea.blob.core.windows.net/assets/4eb8c252-76b1-4710-8f5e-867e751c8dda/GlobalSupplyChainsofEVBatteries.pdf

Incentives

45. We suggest incentives should be given by industry, rather than relying on further EV subsidies, in this case smart charger subsidies. Market solutions can encourage incentives. Meridian and Mercury already provide incentives through dedicated EV plans, with consumers paying less for charging outside of peak demand hours.

46. Subsidising smart chargers create significant equity concerns. EV purchasers are predominately high-income households. Subsidies for smart chargers would disproportionately benefit these households the most. Consumers who currently cannot feasibly purchase an EV – i.e., households in rural areas and low-income households, would not gain from this subsidy, and yet inevitably will contribute to this subsidy through general taxation.

47. Learning-by-doing and further technological developments will likely reduce the market price of smart-chargers overtime. Further subsidies will create unnecessary distortions, and notably higher costs upon general taxpayers.

Further considerations

48. If standards are introduced, EECA should align New Zealand's rules with key jurisdictions where charging innovation and development is largely occurring, namely the United States, Europe, the United Kingdom, China, and Japan. This will secure additional choices for New Zealand consumers. We should not 'chart-our-own-course' when drafting regulations, as New Zealand is primarily a 'technology taker.'

49. Smart chargers are just one part of the solution, they are not the solution. We still need to ensure smart charging integrates within a wider flexibility market.

50. EECA, wider government agencies and industry would benefit from greater coordination. Members voice the need for a possible industry-wide workshop. Coordination would ensure decision makers do not duplicate effort.

APPENDIX ONE – BACKGROUND INFORMATION ON THE BUSINESSNZ ENERGY COUNCIL

The BusinessNZ Energy Council (BEC) is a group of New Zealand's peak energy sector organisations taking a leading role in creating a sustainable energy future. BEC is a division of BusinessNZ, New Zealand's largest business advocacy group. BEC is a member of the World Energy Council (WEC). BEC members are a cross-section of leading energy sector businesses, government, and research organisations. Together with its members BEC is shaping the energy agenda for New Zealand.

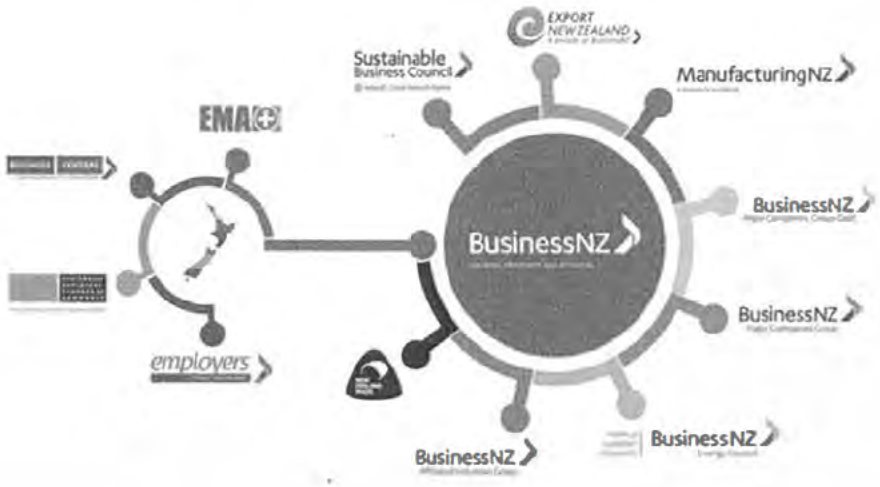
Our vision is to support New Zealand's economic wellbeing through the active promotion of the sustainable development and use of energy, domestically and globally. With that goal in mind, BEC is shaping the debate through leadership, influence and advocacy.

BusinessNZ is New Zealand's largest business advocacy body, representing:

- Regional business groups EMA, Business Central, Canterbury Employers' Chamber of Commerce, and Employers Otago Southland
- Major Companies Group of New Zealand's largest businesses
- Gold Group of medium sized businesses
- Affiliated Industries Group of national industry associations
- ExportNZ representing New Zealand exporting enterprises
- ManufacturingNZ representing New Zealand manufacturing enterprises
- Sustainable Business Council of enterprises leading sustainable business practice
- BusinessNZ Energy Council of enterprises leading sustainable energy production and use
- Buy NZ Made representing producers, retailers and consumers of New Zealand-made goods

BusinessNZ is able to tap into the views of over 76,000 employers and businesses, ranging from the smallest to the largest and reflecting the make-up of the New Zealand economy.

In addition to advocacy and services for enterprise, BusinessNZ contributes to Government, tripartite working parties and international bodies including the International Labour Organisation (ILO), the International Organisation of Employers (IOE) and the Business and Industry Advisory Council (BIAC) to the Organisation for Economic Cooperation and Development (OECD).



IMPROVING THE PERFORMANCE OF ELECTRONIC VEHICLE CHARGERS

A SUBMISSION ON BEHALF OF THE BODY CORPORATE CHAIRS GROUP INC (BCCG)

Introduction

1 This submission is made on behalf of the BCCG. This Association is a membership organisation of body corporate chairs, committee members and various parties associated with the unit title/body corporate industry. BCCG represents over 300 bodies corporate throughout New Zealand which translates to somewhere between 20,000 and 30,000.00 units. These are predominantly residential units where people have their home, either as owner occupiers or as tenants.

2 Many of the apartment buildings that contain bodies corporate have internal garages for owners' vehicles.

3 BCCG has been interested in EV charging for apartment buildings over the last four or five years. We have engaged with Energy Efficiency and Conservation Authority (EECA) in the recent past together with MBIE and its private charging network group. Included in that group is the Ministry of Transport with whom we have shared our recent membership survey on EV charging.

4 Results of that survey have been supplied to the Ministry of Transport and we are analysing that information. We had over 400 responses to our survey. Many of the respondents expressed frustration and concerns about the lack of any pathway to retrofitting EV charging units in existing apartment buildings. This issue is seen by BCCG as a significant roadblock to the continued uptake of the purchase of EVs by apartment owners. Given that BCCG represents many unit owners our membership is a smaller fraction of a large number of apartment buildings and unit title developments throughout New Zealand.

5 Therefore, BCCG is acutely aware of the issues and is very interested in participating in this and any future consultation and discussions around EV charging in apartment buildings and residential dwellings.

What are your thoughts on EECA's suggestion of engaging principles for EV charging?

6 BCCG would like to make the point that the reference to homes in the green paper ignores the fact that unit title apartments are homes but are uniquely different from a home in the suburbs of our towns and cities in New Zealand. Many apartment buildings have garages. Therefore, retrofitting apartment buildings for EV charging will capture and facilitate the installation of charging for a large number of homes in a very efficient manner provided there is a clear pathway made available by organisations like EECA for retrofitting apartments. We consider that EECA should address apartment buildings as a special case because: -

6.1 Power infrastructure is brought into the building at one point and then services all units in the building; and

6.2 The power infrastructure is owned by Body Corporate and EECA can deal with one entity for all units ; and

6.3 Because the BC owns the infrastructure it can mandate what owners can and cannot do with installing EV charging for is EVs and which chargers are to be used; and

6.4 EECA or whichever organisation is dealing with this issue will deal with one governance entity (the committee of the BC) to sort out issues for all in the building.

7 The paper fails to appreciate the importance of addressing apartment buildings separately from the average home for the installation of EV charges.

8 Apartment buildings under the Unit Titles Act have a community of interest. Therefore, there is the ability to deal with a large number of homeowners (?) efficiently and effectively. BCCG's submission is that there should be a subset of EECA's initiative aimed specifically at apartment buildings.

What are your thoughts on the proposed specification for car charges in New Zealand?

9 In our view, the installation of smart charges in apartment buildings requires there to be consistency with the type of smart charger being used. With apartments being run through the body corporate and its committee it is possible to mandate that those owners connecting a smart charger to the electricity infrastructure for the building use one particular type of charger.

10 Otherwise, BCCG has no particular view on the specifications having no specific expertise in this area other than to suggest that the chargers should be at the higher level of specification available in the market at any one time.

Do you support EV charging being open access and why/why not?

11 BCCG believes that EV charging should have open access. In that way, the owners could then select different types of chargers rather than being mandated to use only one type as set out above.

What are your thoughts on EV charges transmitting information on their location and use and the suggested scope of information to be provided?

12 BCCG has no particular views on this matter other than to suggest that the matter of privacy of individual owners' information is paramount at all times. If EV owners felt that the charger was providing personal information about power usage or otherwise then this would be a disincentive to using smart EV chargers.

What are your thoughts on a requirement for EV chargers to monitor and record electricity consumption and/or exported during EV charging, and for this information to be made available to EV owners?

13 BCCG has been making enquiries through various smart charging commercial providers for some time. It has the view that information collected by chargers that monitor and record electricity consumption provided to EV owners is essential.

14 The more information owners can be provided with on the rate of charge, the cost of charging and the length of time that charging will be needed for their particular vehicle the better it will be for owners and the more efficient it will be in terms of drawing of power from the network.

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

15 This question can also be answered in terms of the need for regulation concerning EV chargers. BCCG believes that the EV charging industry is in its infancy. EECA should be setting

the highest standards possible for EV smart chargers and which will have the benefit of ensuring the best outcome in terms of load sharing, use at various low peak times and the ability to provide both the power supplier and the consumer with information about their power usage and cost.

What are your thoughts on regulating the energy efficiency of onboard EV charges?

16 BCCG has no particular views on this matter. This is a very technical question but the answer might lie to some degree in the various EVs brought into the country and their internal chargers. Consideration should be given to regulating the import of vehicles with the appropriate energy efficiency onboard chargers.

What are your thoughts on labelling after marketing AC EV chargers?

17 BCCG has no particular view on this matter.

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

18 BCCG is of the view that such cables should only be used in apartment buildings if they are to be used in conjunction with the best and most effective smart EV chargers.

What are your thoughts on the do-nothing option for EV chargers in New Zealand?

19 BCCG believes that EECA should not adopt the do-nothing option. This whole initiative demands action concerning the regulation and implementation of EV charging for homes and apartment buildings in particular.

20 Given the infancy of the industry, it would be a mistake to do nothing. There should be Government intervention in the form of regulation and oversight to ensure that New Zealand has the most effective and efficient domestic home charging network in the world to demonstrate that New Zealand can continue to maintain the best and highest standards of energy efficiency.

What are your thoughts on the likely effectiveness of information, education and labelling to improve the uptake of smart EV chargers?

21 To improve the uptake of smart EV chargers a multi-pronged approach of which the provision of information, education and labelling is essential. BCCG from its survey of members became aware that there is a significant lack of understanding and education around EV charging per se. Therefore, EECA must implement education and information for the wider public and apartment dwellers in particular.

What are your thoughts on the use of incentives to encourage the uptake of smart EV chargers?

22 BCCG's view is that aligned with the incentives to purchase EVs should be an incentive to install smart EV charging. However, BCCG's view is that apartment buildings are a special case.

23 Incentives should be provided to the body corporate to investigate, implement and install EV charging infrastructure including load data logging, system design, installation of distribution sub-boards and main cabling so that owners can instal their smart EV charger in each of their carparks.

24 As well as the above BCCG supports the idea of providing financial incentives to owners to purchase a particular specification of a smart EV charger.

25 Therefore, BCCG sees the incentive as two-pronged for apartment owners. First, in the installation of the infrastructure into the building itself and secondly the purchase of the smart EV chargers by individual owners.

What are your thoughts on regulating the smartness of EV chargers in New Zealand?

26 BCCG supports the regulation of smart chargers and the specifications of those smart chargers. Without regulation, the industry will lack the ability to meet the purpose of this whole initiative. The EV smart charger should be able to carry out all of the functions that have been agreed to in the green paper as well as providing efficiency of charging within itself. Without an overlay of regulation, it is unlikely that the industry will meet the standards required.

What are your thoughts on using PAS for residential EV chargers to underpin regulations/incentives?

27 BCCG has no particular view on this matter other than to say that the PAS may well be but a starting point for regulation.

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

28 BCCG has no particular view on this other than to say that in its view EECA and Government involvement are going to be required to provide a pathway for the industry to ensure that as many domestic dwellings as possible and apartment buildings, in particular, have installed smart chargers. In that way, the overall objective of the project will be achieved and without that, it is unlikely to be achieved to any significant degree.

BCCG thanks EECA for the opportunity to make these submissions on this green paper and look forward to being involved in further discussions and dialogue on this issue.

T A Jones
National President BCCG
5 September 2022

Major Electricity Users' Group

5 September 2022

Andrew Caseley
Chief Executive
Energy Efficiency and Conservation Authority
By email to STAR@eeca.govt.nz

Dear Andrew

Improving the performance of electric vehicle chargers

1. This is a submission from the Major Electricity Users' Group (MEUG) on the Energy Efficiency and Conservation green paper "Improving the performance of electric vehicle chargers" published 18 August 2022.[1] MEUG members have been consulted in the preparation of this submission. This submission is not confidential. Members may lodge separate submissions.

2. From reading the paper there seems to be two policy issues within the remit of EECA:

   a) Possible safety issues.[2]

   b) Information asymmetry for buyers on pros and cons of smart EV chargers.

   Options to address these can be considered by EECA now without legislative changes.

3. Other policy issues such as barriers to realising co-ordination of EV chargers to lower network costs are governed by the Electricity Authority and the Commerce Commission.

4. Finally, an observation that the global market for EV chargers has been on a fast-track of innovative technology discovery and commercialisation and that will likely continue. That global market, including the regulatory practices of large economies, will improve charger interoperability and connectivity. The New Zealand EV market should be left to be a fast adopter, subject to immediately addressing the two policy issues in paragraph 2 above. In a submission to Wellington Electricity Lines Ltd on an EV Connect paper in 2020 we made the same point; noting the similarity with how market led organic growth in smart meters has worked well compared to other jurisdictions that regulated smart meter deployment.[3]

Yours sincerely

Ralph Matthes
Executive Director

[1] https://www.eeca.govt.nz/assets/EECA-Resources/Consultation-Papers/EV-charging-Green-Paper-8-August-2022.pdf
[2] EECA green paper p16, section titled "Charging cables."
[3] http://www.meug.co.nz/node/1102

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5 September 2022

Energy Efficiency & Conservation Authority
PO Box 388
Wellington 6140
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Improving the performance of electric vehicle chargers

Please find below the MIA's submission on EECA's green paper: *Improving the performance of electric vehicle chargers*.

The Motor Industry Association (MIA) is a voluntary trade association set up to represent the interests of the new vehicle industry specifically the official representatives of overseas vehicle manufacturers. The Association has over 44 members (official distributors appointed by vehicle manufacturers) covering 82 different marques. Members account for over 98% of all new vehicles imported and sold in New Zealand across the passenger car, light and heavy commercial vehicle and motorcycle (including on and off road). Our members who import battery electric and plug-in hybrid electric vehicles also supply associated EV charging equipment.

Executive summary

The MIA recognises that there needs to be planning to ensure that the electricity distribution network can meet future demand, considering the projected future growth of EVs and the fact that currently, 80% of EVs are charged at home.

The MIA supports that wall chargers should be "smart" and that policies are needed to enable this. Overall, MIA members endorse adopting a staged approach similar to the UK; introducing targeted incentives to accelerate the uptake of smart chargers, and then phasing them out and introducing regulations later.

EECAs approach to managing EV charging in NZ

Q1. The MIA endorses the suggested engagement principles.

Potential characteristics of 'smart' EV chargers

Q2. The MIA endorses the proposed characteristics of smart EV chargers as being desirable to manage electricity demand and mitigate the impact of EV charging on the network.

Q3. The MIA support EV chargers being open access, however protocols will need to be put in place to manage risks to cyber security, and to provide assurance to consumers so they are not discouraged from purchasing (or using) smart chargers. If the chargers have open access, who is liable for any costs that might be incurred following a breach of cyber security – the EV charger supplier or electricity supplier? These questions will need to be resolved and explained to consumers as part of their purchase agreements (with the EV charger supplier or electricity provider).

Q4. The monitoring data that EECA suggests should be provided is reasonable, and MIA endorses the principle that providing this data should be at the explicit permission of the data owner i.e. it should be an 'opt in' process. The data owner (consumer) can be encouraged to opt-in by their electricity provider due to the cost savings they could receive from the smart charger automatically activating at lower-priced off-peak times.

Q5. MIA members who supply EV chargers advise that the capability to record electricity consumption data already exists with current charger models and is available to users.

Q6. No comment

Q7. We note the Danish research is now some 6 years old and charger technology is rapidly evolving. The MIA thinks New Zealand market data is needed to establish whether variation of energy efficiency of chargers is an issue. Subject to the outcome of that research, a labelling regime may be worth investigating.

Q8. No comment

Q9. The MIA agrees charging cables with 'smart' charging capability should be included in the scope and low-amp charging cables excluded from any policies for smart chargers.

Options to support 'smart' and energy-efficient chargers

Q10 14. The MIA is supportive of some intervention to increase the uptake of smart EV chargers rather than the status quo. There is a role for information and education, including energy efficiency rating labelling for chargers. Education will help consumers understand the collective benefits of smart chargers shifting charging to off-peak times, as well as the cost savings in energy bills from doing so, compared to using a cheaper 'dumb' charger.

However, the MIA also supports temporary incentives to reduce the upfront price of smart chargers, not unlike the Clean Car Discount (CCD) which has helped reduce the price of electric (and low emissions) vehicles sales of electrified cars have doubled in the past year since the CCD was introduced to comprise 15% of new vehicle sales. Such an incentive scheme could be modelled on the UK Electric Vehicle Homecharge Scheme, perhaps funded from a budget allocation (as is the CCD initially), or from ETS revenue, or by the electricity sector since it is the primary benefactor. These incentives could be withdrawn once smart chargers dominate market share like they do in the UK.

Subject to monitoring of the uptake of smart EV chargers after implementing incentives and education campaigns, regulation could be considered later if 'dumb' chargers still comprise a reasonable market share, and the Standards NZ publicly available specification could be the basis for that.

Q15. No comment.

Regards,

Mark Stockdale
Principal Technical Advisor
[redacted]

Date:
5 September 2022
Name of submitter:
Electricity Networks Association
Industry/area of interest:
Utilities/infrastructure
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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

"Improving the performance of electric vehicle chargers"

Submission by Aa Ake Monday 5th October 2022

Who is Ara Ake?

Ara Ake is New Zealand's new energy development centre. Ara Ake was launched by the Government in September 2020 and is an independent limited liability company with its own board, funded and reporting to MBIE.

Our mandate is to reduce the time, cost and risk associated with the development and commercialisation of energy innovation in Aotearoa by fostering a new energy ecosystem and leveraging national and global knowledge, as New Zealand transitions to a low emissions future.

Ara Ake wishes to comment on the green paper presented by EECA titled "Improving the performance of electric vehicle chargers."

Q1. 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 support the engagement principles that EECA have presented. We agree that smart and efficient chargers will have a system wide benefit. • We understand the balance EECA is seeking to find for EV charging load to be shifted to off peak hours, and the societal benefits this will create. • We support the use of EV charging smart technology that can enable shifting its load to off-peak, lower cost times to support electricity security and affordability and can envisage that this can be achieved in a seamless manner. • We agree that smart chargers having an 'opt out' choice is in keeping with the principle of "intervening to the minimum extent necessary" subject to the owner retaining the ability to manually override the default mode. We believe that the default setting of off peak charging should be clearly communicated and steps to 'opt-out' likewise be clearly communicated. • We believe that the control function of a smart charger should take into account the location, the state of the battery charge and also the customers preference when their vehicle needs to be charged. A default off-peak mode could create a new network peak if not managed properly.

	• It is important to understand who and when smart charging will benefit, because there will be instances where there may be a conflict between the interests of approved parties such as EDB's, retailers and Transpower, for example.
Q2. 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?	• Smart EV chargers should as a minimum have the 'common set of functions' and 'basic functions' presented by EECA. • Most EV's have their own battery control system to manage their low and high charging thresholds. • As long as the smart chargers have open communication protocols, third parties would be able to offer 'randomised delay function', 'default off-peak charging modes', 'default reduced charging at peak' modes.
Q3. 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 believe that open communication protocols should be used. We support the development of a dynamic demand response market in New Zealand and believe that open protocols will stimulate innovation, access and competition to the benefit of the market and the consumer. • The smart EV charging communication protocols are currently being discussed as part of the EEA demand response common communication protocols. • We agree that cyber security is essential for the economic security of New Zealand and recognise that this is an economic opportunity for New Zealand innovators which we support.

Q4. 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	• As the project designer and project leader of the "Multiple Trader Relationships" pilot, Ara Ake strongly supports EECA's statement which says: "The development of Multiple Trader Relationships (MTRs) or Peer to Peer trading (P2P) would likely require each EV charger to contain its own electricity consumption and generation measurement, and on-demand remote reading capability. Placing these recommendations in a Standard (that is either widely trusted and/or regulated) would future-proof users' investment for potential electricity market development." • We also recommend changes to the Code to include Multiple Trading Relationships.
Q5. 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 believe that this information would be useful to the EV owner to see the load their charging places on the system, particularly at peak times.
Q6. What are your thoughts on requiring mandated power quality and control settings for EV chargers?	• In New Zealand there aren't that many EV chargers which offer power quality settings and therefore we don't believe that this functionality should be a barrier to a wider roll-out of smart EV chargers in NZ.
Q7. What are your thoughts on regulating the energy efficiency of onboard EV chargers?	• There would be mutual benefit to both consumers and electricity providers if the energy efficiency of onboard EV chargers was high, or noted on the charger through an energy efficiency label.

What information could you supply to EECA to inform this issue? What challenges, if any, do you see in regulating in this area?	
Q8. What are your thoughts on labelling aftermarket AC EV chargers?	• We support the setting of minimum efficiency standards of EV Chargers and for chargers to have notification stickers identifying their efficiency.
Q9. What are your thoughts on whether charging cables which contain a 'smart' charging enabling device should be in scope for intervention?	• Our recommendation is for the 'smart' functionality to be within the charger, not within the cable 'built-in device'.
Q10. 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?	• A 'do nothing' approach will still see lower cost 'dumb' chargers be in-market. Without smart charging functionality the transition to a low emissions future could potentially be more costly. We do not support a 'do nothing' approach.
Q11. 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?	• We support information and education through an energy rating label as the pre requisite for chargers to enter the NZ market. We would recommend an official QR Code on the energy rating label for a specific model of EV charger could take the consumer to some relevant and concise information on the charger. • We support an 'endorsement' label being affixed to an EV smart charger.
Q12. What are your thoughts on the use of incentives to encourage the uptake of 'smart' EV chargers?	• We support a financial incentive incorporated in the Clean Car Discount regime to support the purchase of a smart charger that offers efficiency to the network at the time of purchasing an EV.

What incentives do you think would be effective and who should provide these? What other incentives might be valuable beyond financial incentives?	• We support the significant opportunity smart chargers offer the transitioning electricity system and believe that a mixture of education and incentives is critical to maintain stability of the system, but to also make the best of the opportunity. • We support EECA's finings that incentives may be needed to attract consumers to the benefits smart charging offers the electricity system as a whole.
Q13. 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?	• We support the 'key requirements' as minimum functionality in smart charging. • We support the Government's efforts to encourage EV owners to purchase smart chargers.
Q14. 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 support EECA using the publicly available specification (PAS) to underpin any educational campaign and/or regulations regarding smart EV chargers, being mindful of the price to ensure cost does not create a disincentive.
Q15. In what other ways might the energy performance of EV charging in New Zealand be improved, that do not require EECA's involvement?	• Though this would imply EECA's continued involvement, we would recommend that EECA also collaborates with ARA AKE in regard to their Multiple Trading Relationships pilot, as mentioned in Question 3.

energy for good

Improving lives & environments

To: the Energy Efficiency and Conservation Authority (EECA)

STAR@eeca.govt.nz

Submission on EECA Green Paper 'Improving the performance of electric vehicle chargers'

Energy for Good Limited thanks the Energy Efficiency and Conservation Authority (EECA) for the opportunity to provide comments on the Green Paper entitled Improving the performance of electric vehicle chargers.[1]

Energy for Good is working to improve human, social and environmental outcomes through the application of energy technologies. Specific objectives are achieved by energy professionals willing to gift their time, knowledge, and experience to improve the lives of others. More information can be found at energyforgood.co.nz.

The author of this submission is Bill Heaps, Energy for Good's Founding Director. Bill has extensive experience in the energy industry including leadership roles in the development of markets for demand response and ancillary services. Bill is an independent director of the Community Energy Network (CEN); this organisation grows leadership in the energy and healthy homes sectors using community energy to empower an equitable transition. More information on CEN can be found at communityenergy.org.nz.

Resilient, sustainable and affordable energy must also be delivered through a just transition.

To ensure a just transition, it is essential that 'community' is adopted as the central point when energy related policy, strategy, regulation, and rules are being developed. The Green Paper tends towards a conventional energy industry centric approach, (e.g., the primary objective is presented as avoiding the need to invest in network capacity). Ensuring that communities have resilient, sustainable, and affordable energy supplies must be the primary objective when responding to climate change and other risks.

From a community energy perspective, EV charging/discharging management systems support community based energy exchange. By this, we mean that electricity generated and stored anywhere within the community must be able to be exchanged seamlessly and easily. Achieving this will support community resilience and sustainability, and also be affordable.

Well functioning community energy exchanges reduce the need for electricity network capacity investment and support electricity supply quality.

When considering potential mandatory EV charger functions, specifications, or standards it will be important to consider the sensitivity to range of potential EV adoption scenarios. For example, some communities may adopt car pooling systems rather than individual ownership. Lower income communities are likely to own secondhand or lower cost EVs with shorter range capabilites, whereas individuals from higher income communities may own newer EVs with long range capabilities. The ability to respond, and the consequences of responding to charging controls, will be quite different across communities and individuals.

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[1] Energy Efficiency and Conservation Authority, (2022), Improving the performance of electric vehicle chargers, Wellington, New Zealand, a green paper by the Energy Efficiency and Conservation Authority.

It would be an unjust transition if lower income families had to reduce demand, or pay a penalty, to accommodate rapid EV charging for wealthy owners of high performance EVs. This would also be the case if network investment to support EV charging was passed through to those who had not contributed to the need for network investment.

Standard protocols for communication of information to and from EV chargers will be needed to support local inter-community energy exchanges. To ensure innovation and choice, the platforms must be open access with required data and system security protection. Care will be needed to ensure that the standardisation applied to smart chargers do not unnecessarily increase costs and/or create other barriers to local community energy initiatives.

These issues indicate that the development of regulated or market pricing for EV charging must be synchronised with the development of charger specifications and standards. The Green Paper indicates that potential market and pricing systems are being developed by agencies other than EECA. Whilst this may be logical from an agency role perspective, it holds inherant risks if it is not well coordinated.

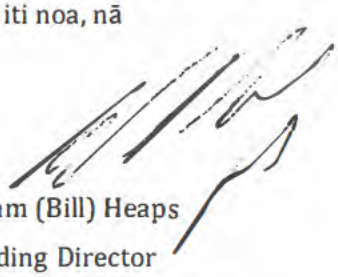
Energy for Good supports the points made by CEN and Trust Horizon in their submissions to EECA on the Green Paper. We consider that both these organisations have strong community based experience; Trust Horizon CEO Derek Caudwell has specific technical EV knowledge, and experience that will be invaluable to EECA as it works through its consideration of ways to improve the performance of electric vehicle chargers.

Additional points on the specific questions raised in the Green Paper are provided below.

If you have any questions regarding this submission, please contact me by email: info@energyforgood.co.nz.

I hope that this submission proves helpful to EECA's consideration of opportunities to improve the performance of electric vehicle chargers.

Nāku iti noa, nā



William (Bill) Heaps

Founding Director

Energy for Good Limited

Submission to EECA, 5 September 2022

Comments on EECA's Green Paper questions

Question 1: What are your thoughts on EECA's suggested engagement principles for EV chargers?

People, communities and environments are facing unprecedented challenges. Whilst many of the causes are external and global, the impacts will be felt locally. As the world responds, the emerging priorities of resilience, inclusivity, sustainability, and affordability must be realised through a just transition.

Achieving the goals implicit in these priorities may mitigate the medium term impacts of climate change and other major disruptive events facing our communities. Mitigation of the longer term and most severe impacts of climate change requires more urgent and drastic action than communities alone are able to provide.

There is evidence that New Zealand is gaining a greater understanding of the importance of focusing on communities as it builds the rapid response needed to address the climate emergency. One example is the Low Carbon Energy Roadmap to 2030 produced by the Aotea Circle which applied the combined wisdom of Mātauranga Māori and modern science to ensure inclusivity of ira tangata (people) and mana tautuutu (communities).

We agree with the Aotea Circle's thinking which we consider leads logically to ensuring that any policy, regulation and/or specification development commences by focusing on people and communities.

Whilst EECA's inclusion of *manage EV charging in a way that provides net positive societal outcomes* is an important engagement principle, we recommend that:

a. EECA reconsiders the engagement principles, and governance framework, for making decisions on the technical specifications for chargers to ensure they specifically include the requirement to consider impacts on people and communities;

b. economic analysis (e.g. options, cost/benefit) undertaken to assess proposed options includes both quantitative and qualitative outcomes for people and communities; and

c. the preferred option must meet priorities of resilience, sustainablity, and affordability, and support a just transition for people and communities.

Question 2: What are your thoughts on the proposed specifications for 'smart' chargers in New Zealand?

Technical specifications can both support and place barriers to the transition to electric powered transport. The transition will also create both opportunities and threats for communities. This is especially the case for remote communities and those with high levels of low income populations. Over the coming decades, communities in this position are likely to face climate change impacts more significantly than other communities.

The Green Paper states that EECA does not propose any requirement to support the realisation of what it sees as substantial benefits. Surely, not taking V2G and V2I into consideration will undermine the validity of any cost benefit analysis of proposed network investment. This is because future peak demand could be substantially less if V2G and V2I became common practice. If too much grid investment reduced the benefits achievable from V2G and V2I, the grid investment could be economically inefficient, leaving customers and communities to incur the costs for several decades.

For further information please contact: info@energyforgood.co.nz

Efficient capital investment in network capacity must ensure the highest benefit options for people and communites. Implicit in this desired outcome is that options with the highest net benefits to communities are implemented first. Any mandated standards must be shown to achieve the highest net benefit to communities.

Question 3: Do you support EV charging being open access and why/why not?

Seamless integration of EV charging with broader home activities will be a key success factor for maximising load control from distributed energy resources (DER). Also, smart chargers will need to integrate with EV operation management systems (e.g., know what level of charge is needed to meet owner's requirements). These, and other factors indicate that open access will be required to realise maximum economic and community benefits.

Question 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?

Some information such as location and use will be essential, other information may be desirable but not essential. Also, information such as charger location, capacity and charge rates will not change, so will not need to be regularly transmitted.

The non-essential information requirements should be subjected to a cost benefit test if they are considered to be mandatory standard candidates.

Question 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?

The need for electricity consumed and exported to be monitored and shared is an obvious requirement. This information should be available to the EV owner if it is requested e.g., if the EV owner considers it useful.

It is probable that the information and data will be used by 3rd party DER managers to interact with customers (EV owners, households, and communities) in a way that is useful to them. Accordingly, the electricty consumed data will need to be shared with 3rd party service providers nominated by EV owners.

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

It would be unfortunate and unjust to place suboptimal requirements and costs on low income people and communities. Accordingly, the need for mandated power quality control should be subjected to cost benefit and just transition tests.

Question 7 :What are your thoughts on regulating the energy efficiency of onboard EV chargers?

As above, the need for regulation of charger energy efficiency should be subjected to cost benefit and just transition tests.

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

If the information is presented in a usable format, mandatory labeling of EV charger efficiency will encourage EV owners to avoid purchasing low efficiency chargers.

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

This seems sensible as the cable will effectively be part of the overall charging system.

For further information please contact: info@energyforgood.co.nz

Question 10: What are your thoughts on the 'do nothing' option for EV chargers in New Zealand?

The 'do nothing' option is not credible as it will lead to suboptimal and unjust outcomes. It is important that the establishment of EV charger standards is undertaken swiftly to ensure that multiple non-compliametary systems are not installed.

Question 11: What are your thoughts on the likely effectiveness of information, education and labelling to improve the uptake of 'smart' EV chargers?

Information needs to be presented to people in a way that is understandable and useful. This means the information provided should relate to people's activities rather than technical aspects of the electriicty system. Specifically, smart EV chargers should be 'sold' to EV users on the basis of how they integrate with EV owner lifestyle, including saving money.

Question 12: What are your thoughts on the use of incentives to encourage the uptake of 'smart' EV chargers?

As above, the financial benefits and improved experience should be sufficient to pursuade people to purchase smart chargers. Other incentives may be needed if the basic benefits are insufficient to encourage EV owners to make decisions that deliver net national benefits.

Question 13: What are your thoughts on regulating the 'smartness' of EV chargers in New Zealand?

It is reasonable that minimum requirements for smart chargers are introduced. This would allow all EV owners to obtain benefits from flexibility incentives. Additional smartness should be left to the EV charger market to develop as this will better target individual EV owner requirements.

Regulating comprehensive smartness in chargers will introduce unneccesary costs for individuals and communities.

Question 14: What are your thoughts on using the PAS for residential EV chargers to underpin regulation/ incentives?

No comment

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

It is important to recognise that EVs and EV chargers will be integrated within community energy networks. Other components of community energy networks will be smart, whilst others will be not so smart. The successful integration of local energy supply and consumption will be critical to the sustainability and resilience of communities. To achieve this, systems will need to be sufficiently flexible to support rapidly changing technology.

EECA's involvement must be synchronised with many new, and as yet unknown developments. These include potential markets, pricing systems, and technologies. The primary focus of all these activities should be the creation of resilient, sustainable, and affordable communities. EECA can take an important role in promoting these outcomes.

The scope of the Green Paper primarily considers data and information that EV chargers could provide to EV users and external parties (e.g., flexibility managers, lines companies). However, the greatest efficiency gains are likely to be derived from two-way exchanges in information; for example, real time and forecast information on distribution capacity and constraints (which could be a price signal), communicated to smart EV chargers. This information would give EV owners options on how to respond most efficiently e.g., by changing planned activities.

Obtaining maximum efficiency from EV chargers will require information from other parties including EV and DER onboard systems, charger system managers, distribution system managers, flexibility managers etc.

For further information please contact: info@energyforgood.co.nz

Information from electricity lines companies (including system operator functions) will need to be freely available to EV and DER owners and operators. Currently, lines companies' information is generally limited to that provided under regulated information disclosures. It will be important to extend the current mandatory and standardised information provided by electricity lines companies to include that required for the efficient operation of smart ER and DER systems.

If there are multiple distribution network system operators (DNSO), flexibility managers and other essential service providers, standardisation of data exchange protocols will be essential. It will be more difficult to standardise charging protocols if EVs have onboard smart charger control systems which eliminate the need for smart chargers. It is quite likely that future EVs will have onboard charge management systems.

Early consideration of separating competitive and monopolistic elements of EV and DER systems will be essential if New Zealand is to avoid similar issues to those faced when electricity markets were introduced in the 1990s. These issues included slow progress on market implementation, barriers to market entry, withholding of essential information, and difficulties in establishing contracts.

To stimulate innovation and efficiency, elimination of opportunities for organisations to use data to monopolise access to information exchange will be needed. Also, experience shows that competition benefits will be limited if owners and operators of central monopoly networks, and information management systems, have interests in the competitive elements of EV and DER systems. These issues will need scrutiny and regulation.

For further information please contact: info@energyforgood.co.nz

EV Charging Green Paper – 8 August 2022

Sustainability Trust

Sustainability Trust, Te Ohu Toitutanga, is a social enterprise operating in the Te Ūpoko o te Ika (wider Wellington), region. We operate under a community/social enterprise model. We develop financial surpluses from a range of sustainability-focused business units which are used to support our social and environmental programmes. These programmes provide Wellingtonians with practical support to live warm and healthy lives with positive impacts on our environment.

Our vision is a just and sustainable low carbon future for Te Ūpoko o te Ika a Māui, the wider Wellington region. We're on a mission to create sustainable, healthy homes, support our communities to take climate change action, and to nurture their relationship with Papatūānuku.

Sustainability Trust and EV Chargers

Sustainabilty Trust supports the EV transition as an important part of climate behaviour change required to meet our carbon targets and tackle Climate Change. We are electrifiying our own fleet, and now have 6 fully electric cars and one EV van (purchased with funding support from EECA). Funding from EECA has also enabled us to put in place a public EV charging point, which is part of the Thundergrid network.

One of the Trust services is to offer free advice on ways to make homes warmer, healthier and more energy-efficient. Our home energy experts go into homes to assess and advise on practical solutions to improve home comfort and energy performance.

We have incorporated in our assessments an estimation of whether homes are "EV ready". This includes the capacity of the system in the home, the state of the wiring and switch board, earthing, and reviewing other applicances which may take a big draw on available power.

We also install EV chargers in homes. We work with Thundergrid to install the INCH Pro charger. The reasons we work with Thundergrid is becuase we recognise the need for 'smart' and energy efficient chargers.

When coupled with the Load Guard sensor, the charger can adjust charging power to other consumers to prevent overloads. Easy integration with local power generation, such as rooftop solar panels offers eco-friendly fast charging. With several connectivity options and open protocol support, the charger can seamlessly integrate with a smart home system.

What are our thoughs on EECA's suggested engagement principles for EV chargers?

- Manage EV charging in a way that provides net positive societal outcomes: agree

- Identify and address the impacts of EV uptake on the energy system early on (where practical): agree
- EV owners should receive the utility they require from their EVs and EV chargers: agree
- EV chargers should have a level of smartness and energy efficiency that is cost-effective and provides the greatest net benefit: agree
- Improvements to the energy performance of EV chargers should encourage the development of a robust, fair and effective demand flexibility market: agree

EECA questions

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?

- Basic functions – on and off and adjust charge rate:
- Default minimum charge mode:
- Randomised delay functions:
- Default off-peak charging mode:
- Default reduced charging at peak mode:
- V2G/V2I enablement:
- What other functions to include:
- What other functions to exclude:

No comment

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?

No comment

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?

No comment

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?

No comment

What are your thoughts on labelling aftermarket AC EV chargers?
We feel consistency needs to be introduced as soon as possible to these products, to minimise confusion regarding capability. We are already finding less knowledgeable customers making decisions based on lack of information, or on disinformation.

What are your thoughts on requiring mandated power quality and control settings for EV chargers?
No comment

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?
No comment

What are your thoughts on whether charging cables which contain a 'smart' charging enabling device should be in scope for intervention?
No comment

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?
Our experience dealing with e-waste and product stewardship suggests the market will not be driven by anything other than commercial advantage or regulation. Currently the commercial advantage is to supply cheap options with disadvantages to an ignorant clientele. Regulation will be vital to avoiding a "wild west" scenario in the EV charger market.

There is a high level of risk in doing nothing. The downstream effects could be catastrophic for the homeowner if incorrect products are installed and used.

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?
We regularly see homeowners interested in EV chargers for their homes. There is a wide variety in the levels of knowledge on the topic. We supply as much information as possible and find that if they are interested in EVs they are engaged to learn more.

We have found that due to our reputation in the market as honest brokers of advice on home performance, residents turn to us for EV charger information also. We have trained our home performance advisers to offer analysis and advise about EV chargers and have accumulated experience and knowledge regarding frequently asked questions and misconceptions. Importantly, this is aimed at non-technical people, because we are moving away from the "EV geek" early adopters, and on to the mainstream population.

As it can be known when EVs are being purchased through vehicle licensing, targeting information should be effective.

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?
No comment

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?
As retailers of the Etrel INCH product we understand the value of smart chargers. The best time to encourage these products is as soon as possible!

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?
No comment

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

Other comments
The standards for EV chargers should go beyond energy efficiency and load management. Government should encourage the uptake of chargers with other sustainability considerations in mind. For instance, EV chargers would fall under regulated product stewardship for e-waste if introduced. Chargers should be designed for durability, repairability and recyclability at end of life.

26 August 2022

TRUST HORIZON

5 Richardson Street,
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Whakatāne, 3158
0800 323 800
07 307 0893
trusthorizon.org.nz

Re: 'Improving the performance of electric vehicle chargers' discussion paper

Thank you for the opportunity to submit on EECA's Improving the performance of electric vehicle chargers discussion paper. Trust Horizon is a local Charitable Trust with investments that include 100% ownership of Horizon Networks (Horizon Energy Distribution Limited).

By way of background to our submission Trust Horizon first began back in 1994. Originally named the Bay of Plenty Consumer Trust, it was formed with the goal of keeping a portion of the local electricity company under community ownership.

In 2000, the Trust was renamed the Eastern Bay Energy Trust (EBET), and over the next 20 years grew into a large fund with a diverse and robust portfolio of assets. In 2015, the Trust obtained 100% ownership of Horizon Energy Group, which includes the lines company that distributes electricity to homes and businesses throughout the Eastern Bay. The Trust has distributed over $41M to worthwhile energy-related causes in District since inception to assist the community with energy use, hardship, efficiency and transition.

The author has a PhD in Engineering and has been involved with various relevant projects including switching a fleet to Electric Vehicles, installing AC/DC EV charging, a V2L demonstration and writing an integration to control OCPP1.6 chargers using a Home Energy Management System for over 5 years.

Yours faithfully

Derek Caudwell

Derek Caudwell
Chief Executive, on behalf of Trust Horizon

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?

It is recommended the last principle is amended to reflect the Demand Response (DR) benefit comes from the *widespread* (aggregated) control of EV chargers rather than its energy performance. Also see comments on Q8.

Widespread control of EV chargers should encourage the development of a robust, fair and effective demand flexibility market.

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, why?
• What information could you supply to EECA to help inform our thinking about this issue?

It does not seem sensible to redefine "smart" charging for NZ when there are international standards that provide functional definitions. The requirements set out in SNZ PAS 6011 are a sensible minimum to be considered a "smart" charger for home use, namely it should comply with the latest secure OCPP1.6 specification or above *and* support the **Smart Charging** and **Firmware Management** feature profiles (noting that not all do and current marketing and manufacturer labelling often does not provide this level of detail). For public use the additional feature profiles (**Reservation, Remote Trigger and Local Auth List Management**) should also be supported to future-proof services. As noted in the PAS it is also important that the charger can be connected to any OCPP server to prevent locking out owners from switching charge management service providers or future innovations.

Characteristics that relate to aggregation of charging such as a *Randomised delay function* are better managed through the OpenADR or a similar standard between the EDB and Charging Management System (CMS which then interfaces with the charger via OCPP) provider. Noting there is likely to be a more optimal control approach than using a randomised delay (subject to information availability).

In relation to the *Default minimum charge mode* suggestion, this seems to be counter intuitive as it limits the power control range and increases losses (see Q7). Under OCPP there are some chargers that do not allow specifying a smart charging profile of 0A (eg for the Wallbox Pulsar Plus the minimum current is 6A), however firmware updates are progressively removing this limitation.

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 agree with EECA that 'open access' EV chargers would deliver the greatest benefit for New Zealand. Noting cyber security is already addressed through the OCPP and OpenADR standards, and chargers can be updated if the charger supports remote firmware management as discussed in Q2.

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?

Rather than an EV charger transmitting information on its location (likely to be static) it would be preferable for the CMS provider to capture this information and transmit it along with any other relevant customer details to a DR aggregator, EDB or other party. The CMS provider would then be responsible for safeguarding any sensitive data, along with agreeing terms and conditions of its use with customers.

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?

OCPP compliant chargers will already have this capability (the minimum requirement is to transmit the energy import register). When it becomes possible to have Multiple Trader Relationships (MTR) this information could facilitate further pricing innovation.

The other important measurements are Active Power Imported / Exported and Voltage to ensure the service fuse limit is not exceeded, to facilitate demand response (ie how much power is available for shedding) and network voltage monitoring / stability.

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

Mandating power quality and control settings makes sense for chargers with inverters and V2G capability ie DC chargers, however it is not clear there would be any advantage or rationale for an AC charger.

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?

A first step would be to understand the current efficiency from vehicle manufacturers. The inverter losses on a Nissan Leaf 3.6kW onboard charger are 300W for example. The efficiency is therefore determined by the charge rate - at 1.4kW (3 pin plug) it is 79% efficient and at 3.6kW (dedicated EV charger) it is 92% efficient.

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

Additional labelling and educational information on chargers' capabilities is essential in this rapidly developing market, particularly as it is not well understood by consumers.

To help inform consumers charger manufacturers/importers should be required to stipulate whether their charger has been certified OCPP compliant, along with confirming they meet the minimum requirement for a 'smart' home charger in Q2. A number of manufacturers include OCCP support on their marketing material but subsequently have issues when connecting or transferring messages to a CMS due to incomplete/inaccurate adoption of the standard.

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

If a cable has active SAE J1772 communication and a contactor it should be considered an EV charger rather than a passive cable.

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?

Without intervention the lack of information/understanding and difference in price points (smart vs dumb) it can be expected that consumers will make sub-optimal choices. Particularly if some of the benefits are to NZ Inc rather than the consumer.

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?

The lack of a robust DR market means that most customers are unable to financially benefit from a 'smart' charger, hence it is likely consumer choices will be made largely based on current cost as opposed to future benefits. Noting units sold without 'smart' capability have the potential to increase electricity system costs and create home/network management issues for at least a decade and likely longer. The 2018 Concept Consulting report[1] estimated the difference in cost between passive and smart EV charging at $3.6 billion (2018 dollars for net zero by 2050) and the CO_2 emissions to be 2.9x less due to smart charging.

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?

Incentives would assist with increasing the uptake of 'smart' chargers. Without a clear regulatory framework that would enable other parties to monetise the benefits of 'smart' charging the incentives would need to be provided by Government. The report referred to in Q11 provides commentary on some incentive options.

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?

To achieve widespread adoption, and hence support achieving DR benefits of 'smart' charging, chargers should meet minimum compliance standards for safety and smart charging (as per Q2). The threshold for compliance could be set based on maximum charging rate eg above 3kW. Without widespread adoption there will not be a large enough market for DR aggregators, EDBs etc to justify investing in the ICT systems required to support managing the EV load. By way of example the NZ ripple control system was highly successful historically due to the widespread adoption, this has been subsequently eroded with time due to changes in the regulatory environment.

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?

[1] "Driving change" – Issues and options to maximise the opportunities from large-scale electric vehicle uptake in New Zealand Prepared for Orion, Unison, and Powerco
https://www.concept.co.nz/uploads/1/2/8/3/128396759/ev_study_v1.0.pdf

The published PAS has very useful information, however, it is still highly technical for most consumers. Breaking the information down and presenting it in other forms for widespread media would be useful.

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

No comment.

BetterNZ Trust

CHAMPIONING SUSTAINABLE INITIATIVES

Feedback for Green paper on improving the performance of electric vehicle chargers

Energy Efficiency and Conservation Authority, (2022), Improving the performance of electric vehicle chargers, Wellington, New Zealand, a green paper by the Energy Efficiency and Conservation Authority.

The Better NZ Trust
PO Box 302 446
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Championing Sustainable Initiatives
http://betternz.org
http://facebook.com/LeadingTheCharge

Q1. What are your thoughts on EECA's suggested engagement principles for EV chargers?

The engagement principles seem reasonable and complete. A compromise between usability for the EV owner and a fair and effective flexible electricity network for the whole country is essential.

1 The increase in residential installations of PV solar and associated storage solutions demonstrates that many households appreciate that generating their own electricity from the sun offers a level of autonomy for charging cars during the day without straining the grid.

2 EECA needs to get ahead of the installation of technologies before the number of 'non-compliant' installations becomes significant and hence expensive to change. This should include support for solar and vehicle-to-grid facilities.

3 One of our members is writing software to model control of smart chargers. Our modelling shows that even with current battery capacities, a 7kw charger may be required to run all night to replenish a 60-80 kW pack. It is also likely that vehicle battery capacities will increase in the next few years.

4 Any attempt to control residential charging capacity by 'smart' means has to not result in too many failed charge sessions, where a fail is a vehicle that does not have the sufficient range at the beginning of the day for the owners' requirements.

5 It is stated that the owner would have the ability to override any control function, but it would be better to minimize the use of such a feature. We think it should be the very last option to override the control of the charger, but to achieve this, the user must have complete confidence that they will get the charge they need.

Q2. What are your thoughts on the proposed specifications for 'smart' chargers in New Zealand?

1 The most important function would be the basic ability to adjust the charge rate with a minimum charge mode. In reality, this single function will allow a Network operator to implement most of the other functions.

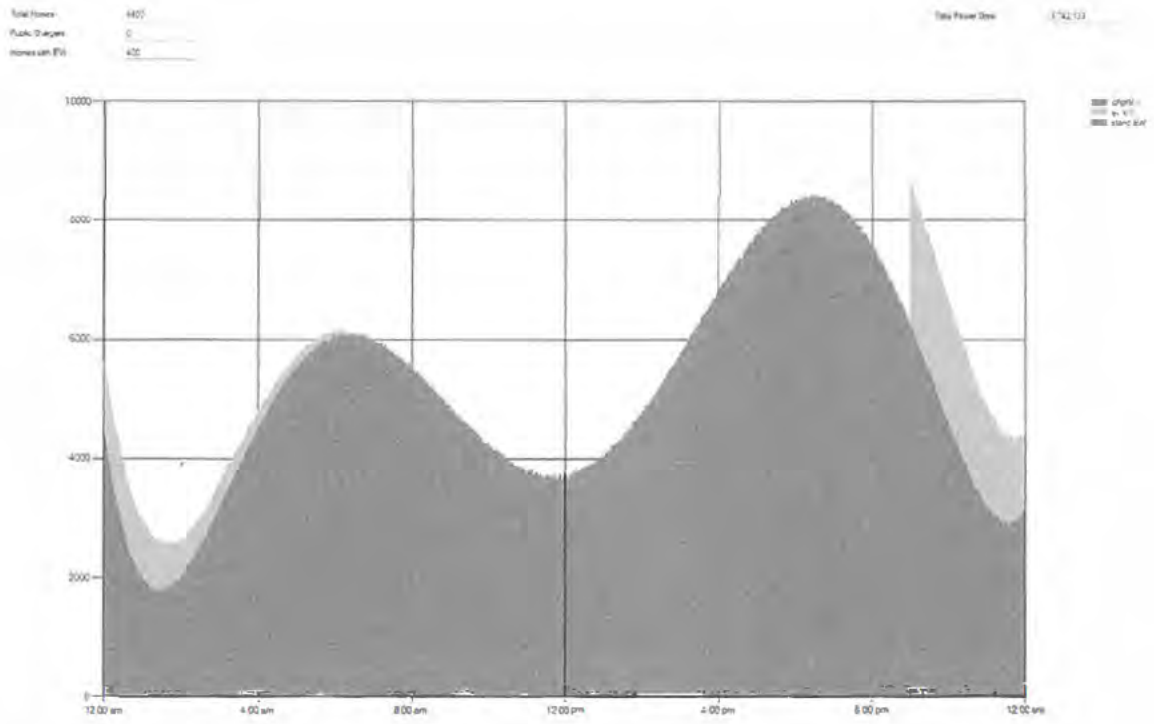
2 A randomised time delay function allows the vehicle owner to contribute to the 'smoothing' of the grid profile independently of the network operator.

3 We suggest that the addition of a level of interoperability with PV solar systems would allow the daytime transfer of solar energy if the sun were shining and the car is at home – many EV owners with solar installations currently do this manually.

4 We have no references to substantiate this possibility but consider that slower charge rates may be more inefficient for some vehicles. The Renault Zoe was one vehicle that an owner had noted charged very badly at 8 amps and did not really work well until the charge level was at 16 amps. The reason suggested was its use of the inverter for the charging circuit rather than the extra weight of an onboard charger.

5 Our additional thoughts include this sample graph from some modelling software we are developing. The model attempts to simulate vehicle charging with the intent to create an algorithm for control.

The example graph shows 400 homes out of 4400 (the example for electric vehicle numbers in 2030). This example has no control other than the charging set to start at 9 pm in line with current discount energy plans. It uses a random pack discharge capacity, and all vehicles charge at 7kw.



We acknowledge that there are a large number of variables that could be altered in such a graph. However, we think that we can create a few probable facts.

1 Current battery pack capacities can potentially take all night to charge.

2 The majority of homes will be limited to a 32amp supply, but smaller pack vehicles are actually limited to 3.3 kW on AC, and others max out at 11kW or 14kW.

3 In designing our charger control software model, we also note that AC charging provides no communication from the vehicle to the charger. So, the charger, and hence the network operator, cannot know how much time a particular vehicle needs to reach its programmed capacity. This is crucial for eliminating a failed charge, as noted previously.

In a recent discussion with a charging company, it was noted that a charger could initiate a DC charging session in order to negotiate details with the vehicle. Then revert back to an AC session. This could possibly provide sufficient information for a more accurate charge session. We have not found any details about this and have not had any charger provider indicate they had such a feature.

Q3. Do you support EV charging being open access, and why/why not?

1 It is essential that an open access protocol is implemented in the charger. Each and every network operator needs to be able to control the majority of vehicles within its charging network to make any difference.

2 Security will obviously be critical. The proliferation of "smart devices" with no update capabilities is an open door for hackers. Our expertise does not extend to any useful solution to the security query. Although there are examples of systems that work, i.e.: Tesla provides a "token" created by the user authenticating directly to Tesla, and then that token is provided to the software being given access. One problem with this option is the expiration of the token requires the user to re-authenticate periodically.

3 An exchange of encryption keys could be used. This requires a transfer of the key either physically or perhaps electronically to set up the link from the network operator to the charger. Chargers would have a unique identifier such as the MAC address or the Cell network identifier. These, however, can be spoofed but could be useful in conjunction with other security factors.

Q4. 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?

We consider that setting up a second-party collection of data would be complicated. Would it not be simpler to keep the data collection relationship between the household and the retailer? The contract with the consumer would be covered by the sign-up in line with the collection currently in place with smart meters.

However, the network operators, rather than the retailers, require information regarding load on their network, by substation, and perhaps even the street level. The permissions for the collection of this data should be wrapped into the current supply agreements (the detail of which would dictate the new terms required between the retailer and consumer).

In summary, to simplify the data security and contractual complexities, there should be two relationships :

1. Between the consumer and the retailer
2. Between the retailer and the energy supplier

Q5. 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?

1 As many more organisations move their fleet into the EV space, there is a requirement for employees using a company EV to be able to recoup home charging costs, and so the ability to record times and charging quantities would be essential in our view.

2 The standard for required information should be that which offers easy management of the grid and electricity supply. It is our view that over-specification may limit the adoption by manufacturers.

3 It is likely that charger manufacturers will wish to provide some features and functionality to differentiate from competitors. The information suggested in the paper seems like a minimum requirement for a useful application, but we think that need not be made a requirement.

Certainly, the retailer should include all the information collected as part of the data presented to the consumer on the portals most currently have.

Q6. What are your thoughts on requiring mandated power quality and control settings for EV chargers?

We are in favour of such controls being recommended. Our issue with too many mandates would be the risk of eliminating too many options for the market. Presumable feedback from manufacturers might shed light on that possibility.

Q7. What are your thoughts on regulating the energy efficiency of onboard EV chargers?

In a similar vein to our response to question 6, a more global version of specifications is likely to be required to effect change by vehicle manufacturers.

Q8. What are your thoughts on labelling aftermarket AC EV chargers?

This question is a little confusing in relation to the paper. It appears the paper is targeting private, and mainly home, chargers. Almost all of these will be the AC type. We have noted that A DC charging solution may be more practical for speed and information flow if control of grid load is required. However, as the paper notes, home charger circuits are likely to be limited to a single 32amp circuit and, in a few instances, 3-phase 32amp.

With respect to the direct question. Chargers for sale to consumers should have clear labelling to indicate what regulations they adhere to.

Q9. What are your thoughts on whether charging cables which contain a 'smart' charging enabling device should be in scope for intervention?

There is always a need for a simple, use-anywhere charging solution. At least until a driver can expect to find a charger anywhere and everywhere. With the current regulation for limiting to 8 amps when connected to a standard 3pin outlet, it is assumed that the safety risks are low enough. There is not really any advantage in controlling such a slow charger. If anyone were to build a smart version, surely it would not be commonly purchased?

As such, we think they could be excluded from the scope of intervention.

Q10. What are your thoughts on the 'do nothing' option for EV chargers in New Zealand?

1. A 'do nothing' approach is likely to cause future stress on the grid and electrical generation requirements in NZ. The Trust applauds the arrival of this paper to address what is surely going to be a necessity in 10-20 years. And getting ahead of the mainstream adoption of incapable charging systems will surely save a lot of money for consumers.
2. The majority of consumers are price driven. This may not be the case for early adopters but is surely the general rule for what will become the majority of EV owners of the future. Smart charging solutions today vary quite a bit in price. A basic device is very simple, and the added cost is marketed as "smart features". It is highly likely that regulation is required to create the necessary standards to achieve sufficient control to benefit the grid.

Q11. What are your thoughts on the likely effectiveness of information, education and labelling to improve the uptake of 'smart' EV chargers?

Labelling would be a good idea. In the current digital world, the labelling guidelines would have to enforce clear indications of the label information on websites rather than just the product.

Q12. What are your thoughts on the use of incentives to encourage the uptake of 'smart' EV chargers?

1 The information we get in discussions with our members indicates that incentives are proving very effective. However, the first wave of EV buyers tended to be focused on environmental factors and have a greater appreciation for factors that affect them, no matter how small. For example, the use of free charging at malls and supermarkets requires the purchase of a cable, the cost of which will take several years to recoup with the 'free' electricity they are accessing. There is a significant psychological factor at play.

2 Incentives are designed to encourage - and installing such smart chargers would become the 'norm' if incentives were offered.

3 Switching to a 'smart charging' solution at home, which would offer savings on the power bill, should be incentive enough for purchasers. But we know that the savings amount to tens of dollars a month. With the price of a smart charger being $1-3k, we believe this would restrict the number of people who would invest in one if they can manage with the supplied 8amp charger lead.

4 In addition, a charger with the features required to benefit the electricity system may be retailed at an even higher price point. It will be the electricity generators/retailers who benefit the most if smart charging reduces their requirement for building more generation. Hence, it would seem to be in the interest of retailers to look at supplying charging equipment in the same manner as they do smart electricity meters now. They would recoup benefits by owning the equipment whilst offering savings to their EV-owning users.

Q13. What are your thoughts on regulating the 'smartness' of EV chargers in New Zealand?

Regulation should be for those participating in the "smart" electrical network. Participation should be voluntary but provide a sufficient benefit that everyone would wish to join.

We do not think that all charging systems be regulated. In essence, we do not wish to take away the freedom to choose or remove an option that may be convenient for a specific time or use case.

Q14. What are your thoughts on using the PAS for residential EV chargers to underpin regulation/incentives?

The PAS seems to be a comprehensive document covering all the important factors. Perhaps more than is required. Our experiences relate to users rather than electrical engineering, so we wish to add our concern for excessive regulation hampering the widespread installation of chargers in public spaces.

Q15. In what other ways might the energy performance of EV charging in New Zealand be improved that do not require EECA's involvement?

We have no comment to add to this question.

DRIVE ELECTRIC

5 September 2022

RE: Improving the performance of electric vehicle chargers

1. Introduction

Drive Electric is a not-for-profit advocacy organisation supporting the uptake and mainstreaming of e-mobility in New Zealand, a key part of decarbonising transport.

Drive Electric represents a member base comprising new car OEMs, used car importers and distributors, infrastructure organisations (electricity generators, distributors and retailers, electric vehicle service equipment suppliers), e-bike/scooters, heavy vehicle importers, finance, fleet leasing and insurance companies, along with electric vehicle users. We have more than 70 members from the sector.

2. Summary

Smart charging will help make the most of New Zealand's existing electricity infrastructure and avoid unnecessary capital investment, by helping manage peak demand. It is critical that measures are taken to support widespread adoption of 'smart chargers' in parallel with the adoption of Electric Vehicles (EVs).

To summarise:

- Drive Electric supports the definition and regulation of 'smart chargers', but this needs to be done carefully.
- The intent of this regulation should be to enable the creation of a demand response market in the interests of end users and in support of decarbonisation.
- Drive Electric supports the exploration of a well designed government subsidy to overcome barriers to uptake of 'smart chargers', justified by the collective benefit of smart charging to the electricity system and decarbonisation.

Drive Electric has been advocating for a National EV Charging Strategy to systematically identify barriers and opportunities for a successful charging ecosystem in New Zealand. We understand that this is underway. However, we note that consulting on elements of this potential strategy, such as set out in this paper, is not ideal without this broader context.

3. Responses to Consultation Questions

PO Box 3899, Auckland 1140

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?*

Drive Electric Response:

We generally agree with the principles laid out. We would add:

Safety: As we are dealing with electricity we need to ensure there are standards around installation and safe use of smart chargers, and that these are met.

Cost: We need to ensure that consumers are able to afford to install smart chargers if they are the desirable outcome for the ecosystem. There are also equity considerations.

We also want to stress the importance of enabling the market to provide consumers with solutions. There are many future innovations that are possible around charging.

We also believe that these regulations should apply to 'smart chargers' installed beyond the home, such as in businesses and apartments.

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?*

Drive Electric response:

We believe functionalities for inclusion in a standard are:

1. Capability to connect with an aggregator or service provider, for dynamic and remote management;
2. default off peak charging mode – particularly for the earlier stages of EV uptake;
3. open communications protocols;
4. safety and other settings.

We note that when defining what constitutes a 'smart charger', we need to take into account evolving market solutions. For example, we anticipate vehicle manufacturers will be providing customers the option of at home 'smart chargers' in about 12 months time.

As recommended in the Green Paper, we see no need to propose any requirements around V2G or V2I.

Drive Electric may be able to provide EECA through our members, depending on your requirements and privacy obligations, telemetry data; vehicle data; customer uptake data; and network usage data through our members.

2.1 Capability to connect with an aggregator or service provider, for dynamic and remote management
We propose that chargers can connect to an aggregator or service provider, so that they can manage demand dynamically and near real-time. (We note that chargers need to actually be connected to an aggregator or service provider for demand management to operate, so consideration needs to be given to how this is achieved and whether installation of a 'smart charger', education, and market incentives are enough.)

We are not proposing that 'smart chargers' are used as 'meters', as this data can be sourced through smart charger installation data, EV registration data, and existing data provider through meters.

2.2 Default off peak charging mode – particularly for the earlier stages of EV uptake;
We are open minded about default off peak charging settings, if consumers can opt out. Although we note that opt-out has the potential to undermine the effectiveness of demand management. This functionality could be useful in managing peaks when EV uptake is still relatively low and when the market for smart EV charging services is developing.

We need to be careful that other canvassed functions, like randomised delay, do not limit the way that the market and users can efficiently solve demand management issues. For example, randomised delay functionality may make it difficult for providers to predict exact charger behaviour and calculate/provide incentives for end users. Providers may instead aggregate staggered charging in a logic-based way to respond to market signals.

2.3 Open communications protocols
We support the adoption of an open communications protocol, such as open ADR or OCPP, but recommend that the sector is further consulted and other markets reviewed in making this determination.

2.4 Safety and other settings
Safety (e.g. overload protection), communications, and privacy factors should also be considered in 'smart charger' requirements.

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?*

Drive Electric response:

Standard communications protocols are a necessary requirement for a functioning demand response capability. Control of EV chargers should be restricted to the supply chain participants connected to the end user. This is necessary to ensure that the end user receives the EV charging that they require as well as benefiting from the financial incentives that are on offer.

Open access protocols are distinct from open communications protocols and have significant implications for cyber security. Communications protocols and cyber

security need to be considered in parallel. In particular, it is important that there is a process through which providers / aggregators are authorised to offer EV management services.

Data privacy must also be considered and consumers need to be aware of how data is being collected and who will have access to it, and for what purpose.

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?*

Drive Electric response:

Understanding where EVs charge and when is critical for efficient network planning. This is heightened by the fact that this technology is new, largely unknown and the uptake pathways are still unclear. The important thing in providing this visibility is that the EVs are registered to an ICP at the time of installation.

For the full value of smart EV charging to be realised, chargers need to both have the right functionality and be connected to a platform or third-party aggregator for management. We note that as is the case in the UK, a qualified installer programme (or process – which leverages existing electrician qualifications in NZ) or a widened CoC process could help provide this.

Note - We don't think the charger itself necessarily needs to be able to transmit the information in this question, as long as it is obtainable (as per our answer to 2.). To capture this data, other options to explore could be installation data; consumer self-reporting; or algorithm/inferencing based on meter data.

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?*

Drive Electric response:

We support this functionality, but it may not be necessary to make this mandated. This sort of capability is still evolving, and we don't want to preclude market innovation.

We anticipate market participants may voluntarily provide this sort of information as part of their value proposition for end users.

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

Drive Electric response:

We support voltage management strongly, and your proposal for a setting where the EV charger automatically turns off or down if frequency of voltage drops below a pre-set threshold and restores when the frequency or voltage recovers. New Zealand should adopt and adapt EV charging standards that meet network requirements and ensure customer and equipment safety.

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?*

Drive Electric response:

We do not currently have any evidence relating to this matter nor have had this issue raised with us. We encourage EECA to obtain the most up-to-date information for further consideration.

We would be instinctively cautious about regulating on-board charging, as this may impact on the range of EVs available in the New Zealand market. Providing consumers information about efficiency of on-board chargers may be preferable.

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

Drive Electric response:

We strongly believe that it should be clearly identified whether a charger is 'smart' or not, so that a consumer can choose to receive additional benefits from demand response activity (and benefit from any available incentives).

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

Drive Electric response:

We support a range of technologies that enable optimised charging but note that charging cables have natural limitations in their functionality. The potential impact of these charging cables to support demand response is limited given the charging speeds, and so we do not necessarily see it necessary for these to be in scope.

That said, we note that the UK regulates specifications for smart cables but excludes them for non-smart cables, which may be a pathway forward.

We also note that there may be a need from a safety perspective for regulation of charging cables, but perhaps this could also occur through electrical safety standards and/or Worksafe safe charging guidelines.

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?*

While regulation may increase the cost of 'smart chargers' generally, we believe that this is justified in order to ensure the New Zealand electricity system reaps the benefits of demand management. The reality is at the moment that the cost falls on the individual buyer, and the benefits largely accrue to the public more generally. The market can offer incentives when a 'smart charger' is in use, but it's not clear these will be enough to incentivise the upfront purchase. In short, without intervention, it's unlikely the market on its own will deliver 'smart charging' at a critical scale that will deliver the benefits of widespread demand management.

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?*

Consumer education alone will not be enough to promote the uptake of 'smart chargers', but there must be trusted information available to consumers to help them make informed purchases, install safely, and understand how to use them.

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?*

There are two forms of financial incentives that need to be considered:

- Financial incentives from the market when 'smart chargers' (i.e. pricing incentives)
- Government subsidies to support uptake of 'smart chargers' (accompanied by regulation)

Our view is to stimulate the rapid uptake of 'smart chargers', in line with the principles set out in this paper, both are necessary.

With respect to the market, we expect a functioning demand response market will offer consumers incentives as part of managing demand. For example these could be: time-of-use electricity tariffs. We note that EDB incentives for EV charging demand response are in their infancy, and investments in smart charging now will enable these markets to form as the scale of EV (and smart EV chargers) grows to an economic level. However, we are not convinced that these market-led incentives will be enough to stimulate widespread adoption (as per question 10).

Our view is that some form of government subsidy to support the uptake/installation of smart chargers is necessary to achieve the principles set out by EECA in this Green Paper, supported by consumer information and regulation of 'smart charging'. These incentives should *enable* an open and contestable demand response market.

Without incentives to support uptake we expect that the expense of installing or retrofitting a smart charger will be a barrier to EV uptake, as this creates a further cost on top of the vehicle itself. This is also an equity issue.

A key consideration is time - we want consumers to switch to EVs today for carbon reduction purposes (a benefit that extends beyond the user), rather than to wait. This provides a justification for a well targeted subsidy to support EV uptake.

Additionally, the benefits of managing demand through smart charging are experienced across the ecosystem, rather than by the individual user. This collective good further justifies a form of an uptake subsidy.

These subsidies need to be carefully designed so that they are:

- Financially sustainable over time (potentially time bound)
- Administratively manageable
- Effective (and don't create unforeseen or undesirable market distortions)
- Recognise technology is evolving and the incentives therefore need to be flexible

Fiscal incentives for installing chargers exist in Canada, China, EU, India, Japan and the USA.[1] So it is important to learn from these jurisdictions as to what has and hasn't worked, against the criteria above. These subsidies appear to either come in the form of a tax rebate or a direct subsidy.

We don't yet have a specific view on the design of the subsidy in New Zealand, but we note that in most jurisdictions they are offered by the central government. There may be a way to design the incentives so that they are cost neutral (or close to), similar to the intent of the Clean Car Discount being funded by penalties on higher emitting vehicles. For example, this could be funded through the taxes collected on fuel or the ETS. In that way the incentive becomes a 'green redistribution'.

Other considerations include:

- How the incentives would apply to apartment buildings and other shared housing arrangements, whereby there's not one owner of the charging location.
- How the incentives could be scaled or adjusted to reflect uptake in lower income communities.
- Whether the installation of smart chargers should be made mandatory for new home builds / new apartment complexes / new commercial buildings. We note it is far cheaper to install a charger in a new build than retrofitting it.

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?*

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1 https://www.iea.org/reports/global-ev-outlook-2021/policies-to-promote-electric-vehicle-deployment

The 'smartness' of an EV charger is going to need to be regulated to enable consumers to understand what they're buying; to provide clarity to market participants; to enable demand response; and to underpin any effective subsidy scheme. However, we suggest focussing this regulation on the minimum requirements (as per our response to question 2). This regulation will also need to be reviewed regularly as technology evolves.

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 are open-minded about using PAS to underpin a future regulated standard for smart EV charging. As above, we also support inclusion of provisions for voltage management within a smart charging standard.

At the same time we need to ensure that New Zealand looks to international standards and doesn't get ahead of them in a way that international manufacturers can't meet the standards of our local market.

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

There are a number of industry forums (some with EECA involved) and entities that are tackling the electricity system problems and looking to support the establishment of a market for flexibility services. Examples include FlexForum, Demand Response common protocols Project, as well as many trials being conducted by EDBs, retailers, metering providers and charging solution providers.

We also note that banks, like Westpac, are offering interest free loans to install EV chargers and batteries, which is a form of an incentive. We support the market providing these solutions. However, this sort of offer still depends on a regulated standard for smart chargers. It also applies to a certain segment of customer that is eligible for and can afford to take advantage of that loan.

We note however that we want a coherent system for the country, which supports New Zealand's aspirations around decarbonisation. This justifies some degree of government intervention to lay the foundations for this market.

Submission on Green Paper on EV charging

Eric Pyle, Director of Public Affairs and Policy, solarZero [redacted]

Many thanks for the opportunity to comment on the Green Paper on EV chargers.

We have two fundamental points:

- Charging should be under the control of customers and lines companies should put in place incentives to encourage the right response from consumers. In addition, there should be an education campaign around pricing regimes, e.g. time of use pricing. Pricing will help encourage the right behaviours, such using solar at the house to charge the EV when the sun is shining.
- Standards will be developed internationally and we question whether New Zealand should be contemplating developing its own standards. We are a fraction of the international market and standards will be set elsewhere, either formally or by companies adopting informal standards across manufacturers.

Q1: The key principle is that pricing/incentives should encourage the right behaviour. Lines pricing is an obvious incentive. A less obvious incentive is enabling EV chargers to participate in electricity markets which means data from the EV charger should be able to be used in the market, as compared to data from the electricity meter in a house.

Q2: The specifications will largely be developed internationally and we probably have very little ability as a country to influence these.

Q3: Yes, we support open access in principle. The challenge will be in relation to detail.

Q4: The approaches to monitoring will be developed internationally. The key is creating incentives for the data to be used, for example, participating in an aggregated service which will require the electricity market systems to accept data from EV chargers albeit via an aggregator, as compared to the electricity market solely working on household meter data.

Q5: Again, the reporting ability of the charger will be determined by overseas markets and manufacturing. Customers do need educating in terms of the benefits of different options.

Q6: Our experience in mandates is New Zealand can quickly get out of date due to the very slow processes for updating mandates in an industry that is rapidly evolving. For example, the solar industry is required to use standards set a decade or more ago, despite the standards being updated multiple times internationally, legally the industry cannot use the updated standards in New Zealand. The slowness in updating standards in New Zealand is severely constraining the use of the latest technology and we simply cannot allow the totally unacceptable delays in updating electricity standards to cross into the EV charging space.

Q7: Again, it is likely that international developments will drive this area.

Q8&9: The timer on the EV is really important for charging. Customers are likely to use this as their primary source of charging regimes, not the timer on the wall.

Q10&11: As per the fundamental points at the beginning of this submission, we think that incentives and education are really important. Lines charges are really important for sending the right incentives to customers and the guide to programme the charging regime on their EV.

Q12: Information and education is really important to answer the customer's question: "Why should I invest in a smart charger".

Q13: As per our answer to Q6, New Zealand is woefully slow at adopting the latest international standards. We do not want the situation where mandates are created and then not updated for many years meaning that New Zealand consumers are forced to use out of date equipment for years to come.

Q14: A PAS may be a work around for the woeful delays in the updating of standards, if a PAS can be updated quickly.

Q15: As per our fundamental points, (i) incentives (e.g. lines charges) and (ii) education of consumers are both key. EECA should be across international developments in terms of standards and technologies for EV chargers.

Feedback on the EECA green paper "Improving the performance of electric vehicle chargers"

About Us

Evnex is a New Zealand based company which designs, manufactures, installs and operates smart EV chargers from our headquarters in Christchurch. Our vision is that every car gets charged from clean energy, and all the lights stay on.

Our customers range from private EV drivers with a charger in their home, through commercial organisations with multiple office based or employee-in home chargers, to grid partners with whom we are already working to understand and break down the challenges associated with the increased load caused by EV uptake. Two ongoing publicly notified examples would be the Vector's EV Smart Charging Trial and PowerCo's Smart EV Charging Project.

We have an installed base of around 2500 chargers in 1500 locations, connected to our in-house developed cloud backend. They report usage data and LV network information every five minutes, and can be managed to charge at reduced speeds, or stop charging completely. Our smartphone app for drivers lets them opt out of this management for any session.

Summary

- In order to achieve the desired outcome of an effective demand response market, we need chargers which are both smart *and* connected to a backend which enables market participation.
- Mainstream consumers need experts to handle market participation for them, and for that we recommend a registered installer program.
- Beyond those technical underpinnings, any regulation which gets applied must help to unlock a range of value stacking opportunities rather than stifling commercial innovation.
- Flexibility markets will not be accepted by the general public unless as an industry we first build trust that their cars will always be charged when they need them.
- Of the four options, we think a limited period of option 3 (incentivisation) leading into option 4 (regulation) is the pragmatic approach. There must be wide consultation before any regulation, and we would recommend that it be initially minimal, with space for refinement as the market develops.

Detailed response to the consultation questions

1. **What are your thoughts on EECA's suggested engagement principles for EV chargers?**

   We strongly agree with the first three principles covering societal outcomes, addressing impacts early and a commitment to utility for EV owners. From our perspective the following two points sound like implementation details which would follow from abiding by the first three, which makes them somewhat redundant. However, we don't materially disagree with any of the content.

   One principle we would add to the list is a commitment that the transition should be safe for everyone. This would include usage of chargers, but perhaps more importantly their installation. At present an installation by a qualified electrician represents a significant fraction of the cost of installing a smart charger (our most recent research suggests a $1200 median install price, around 40 50% of the total cost). This is a large enough barrier that it pushes drivers to attempt it themselves.

2. **What are your thoughts on the proposed specifications for 'smart' chargers in New Zealand?**

   We believe that the 'Basic functions' outlined are technically sufficient for the desired network robustness outcomes. A major omission however is the lack of a requirement for chargers to actually be connected to a cloud backend which enables that flexibility market engagement to take place.

   We foresee a risk of installing lots of unconnected 'smart-capable' chargers that will never be able to contribute to the desired network benefits. Whilst existing early adopter / prosumer EV drivers might be interested in actively enrolling in a flexibility market, we don't foresee the financial benefits being significant enough to encourage less tech savvy mainstream adopters to do this. It is our view that unless the charger is connected as part of the installation process, the chances of it happening later are small.

   Our recommendation is that EECA look at something similar to the OZEV registered installer scheme in the UK. This could ensure that when a smart charger is installed it gets connected to an appropriate backend. There are also opportunities here to make additions to the CoC which would allow for the collection of data around what types of chargers are being installed and which ICP they are connected to (pertinent to Q4).

   Beyond that we would stop short of going further in the technical requirement space, since our view is that there is a need to earn a 'social licence' early in the establishment of a flexibility market. Any regulation beyond the minimum risks consumer pushback which could start us off on the wrong foot.

   As an example, we know a number of our customers purchased a 32A capable smart charger in order to make use of 'zero-priced' tariffs offering an hour of free power. If those drivers suddenly experienced a randomised delay to their

charging, that could prevent them from completing a session in that window. We would prefer more freedom for the market to develop solutions to the problem, rather than regulating how it gets done.

Outside of these network considerations, from a safety perspective we'd like to suggest that overload protection be considered as a required function in a smart charger. As households decarbonise by electrifying, we will see larger loads placed on their supply. The ability to automatically slow charging if the home is nearing its pole fuse limit (such as when an induction hob, oven and heat pump are being used simultaneously) would prevent household outages on freezing nights. This isn't something we would expect mainstream consumers to have to work out and manage on their own.

3. **Do you support EV charging being open access and why / why not?**

We are generally supportive of open standards for communication, but aren't convinced that on their own they will drive any meaningful flexibility benefits due to the need for an effective backend connection, as mentioned previously.

For effective demand response markets to develop we would suggest that at this stage it is too early to enforce any particular access method, as it may stifle the very innovation you hope to stimulate. It is very clear from our market research that upfront cost is the major barrier to smart charging adoption, and manufacturers may want to lower the starting price by assuming some amount of future flexibility revenue. In this context it would need to be acceptable for there to be a cost associated with switching flexibility supplier (comparable to early exit fees for fixed mortgage rates or cell phone contracts).

In the case of cybersecurity, following an open standard rather than a proprietary route is prudent the software world is littered with broken attempts at implementing effective security.

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?**

We don't think the charger itself necessarily needs to be able to transmit this information, as long as it is obtainable (location and installation date might come from the backend, for example). As you have identified, access should depend on the extent to which the data is personally identifiable – we would expect different permissions for aggregated usage statistics compared to data linked to a particular ICP.

Consideration also needs to be made as to the cost of obtaining / storing this information, as there is risk that onerous requirements would cause manufacturers to raise the price of their smart EV chargers, adding to the most significant existing barrier to adoption.

We estimate that a 'live' consumption feed (say 5-minute intervals, available as soon as they are received) over a cellular network would cost around $20-$40 per charger per year to obtain and store. It would be unfortunate if this had to be priced in at say $400 for a 10-year lifespan.

As an alternative, the "fixed" data (location, installation date, equipment characteristics) could be captured as part of an installation registry along the lines of the certificate of compliance.

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?**

   We think this is a useful requirement from the perspective of helping an EV driver to understand their energy consumption and carbon emissions, and make better choices around their choice of retailer or times of use. Encouraging engagement with the usage of their charger may also help them to feel comfortable with making their charger available for flexibility services.

   We also recognise that this information would be beneficial for electricity industry partners, and that perhaps it should be considered as part of the minimum dataset from question 4.

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

   We think that there should be a distinction between settings to assist in emergencies, and abilities which can be used to provide ancillary services for the grid. We support requiring the former as an option of last resort. However, the latter would be good candidates for value stacking (i.e. increase potential revenue opportunities for the owner), and thereby support the economic case for purchasing and making smart chargers available for flexibility services. If support for particular services were mandated, then it would prevent a charger from being offered to the highest value service.

7. **What are your thoughts on regulating the efficiency of onboard EV chargers?**

   We foresee a risk whereby regulation in this area would restrict the choice of EVs available in New Zealand. As a small market it would be unlikely for a vehicle manufacturer to make changes specifically to meet our standards. If there is a larger market applying regulation in this area it might be better to piggyback on that instead.

   One way to provide better information to drivers would be to include the total kWh from the supply when quoting kWh / 100km. So rather than how many kWh are used by the battery to travel 100km, make it how many kWh need to be supplied from the wall to travel 100km.

   Further to the above, we find it unlikely that even an inefficient onboard EV charger would cause a car to have a worse carbon impact than an ICE vehicle, so would like the bigger picture to be considered when looking at the implications of regulation.

   A larger concern to us in this area is the power consumption required to keep a car "awake" whilst charging. This can be up in the region of 250W, and so

becomes significant when charging slowly over long periods.

For example, the mean charging session on our residential network is currently about 17kWh. If we assume 230W to keep the car awake, that means 1A is being wasted. To add 17kWh to the battery would take 10.6 hours at 8A (of which 7A is useful) and use 19.4kWh, or 2.4 hours at 32A (of which 31A is useful) and use 17.5kWh. So, charging at 32A would save 11% energy over charging at 8A.

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

   We were a bit confused by this question. We'd be supportive of something to clearly differentiate smart from not.

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

   Even if wall mounted smart chargers become overwhelmingly prevalent in homes, we believe three pin charging cables will remain an important part of the charging ecosystem due to their use when travelling to other destinations. Our view is that they are unlikely to be powered up most of the time, and their location will move around. When under use they should be drawing at most 10A and will need to be used for around 4 times as long as a 32A charger.

   In light of these points, even smart cables would appear not to contribute significantly to alleviating future grid constraints. Charging cables will often need much of the night to fill a car (as mentioned above, over 10 hours for the mean charge) so the potential to shift the load to a different time is significantly reduced compared to a 32A charger. Our data indicate a median plug in duration of 13 hours, so most of that time would need to be spent charging.

   The fact that charging cables spend much of the time not powered on means that it is more difficult to call upon them when services are needed. Also the varying location makes it confusing for drivers to offer them up for use, since their value will vary wildly depending on where they are, and they may need to be offered into different markets.

   Finally, the load is not exceptionally onerous anyway – particularly for an individual charger – though we note that a million of them in use would still be problematic at 6pm!

   In summary, we'd lean towards excluding smart charging cables from any intervention.

10. **What are your thoughts on the 'do nothing' option for EV chargers in New Zealand?**

    In our view, the market is unlikely to address this issue since the benefits are largely external to the driver with a smart charger. At present, the (significant) cost falls on the purchaser of a smart charger, while the network benefits accrue as small amounts to everyone.

Wall mounted chargers which can supply 32A (for faster home charging), and which can be controlled through a smartphone app (for scheduling), but which are not 'smart' can be purchased for well under $1000. For example, the Gen 3 Tesla wall charger costs $800. From a driver perspective this is a well specced charger which does everything they need (it can charge non Tesla EVs), but they are unlikely to be enrolled into a future flexibility market.

We also believe that as EVs become more commonplace and less the domain of early adopters / prosumers, we cannot expect drivers to take as much interest in optimising their charging behaviour. The majority of consumers do not take a significant interest in turning existing home appliances on and off depending on the demand on the electricity network. EV buyers need simple, easy to use solutions that optimise for low cost, low network impact, low carbon behaviour on their behalf.

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

We believe that education will be needed regardless of any use of regulation or incentives. However, we think expensive marketing campaigns on their own would provide a poor cost-benefit ratio. Today's consumers are bombarded with conflicting sustainability claims and their decision will largely be driven by emotional factors.

It is unreasonable to expect the mass market to understand the complexities and requirements of the electricity network. This is evidenced by EECA's 2020 Ripple Control report, where 57% of consumers surveyed believed that either ripple control provided no benefit to them, or that they weren't sure, despite the huge value that ripple control still provides to the network today.

At present the price disparity between fully installed 'dumb' and 'smart' chargers generally exceeds $500, which we believe is large enough that behavioural change is unlikely to occur simply through education. The flexibility market is not yet understood to the point that any campaign can truthfully point to $100 savings each year from a smart charger, so the financial cost will still appear too large.

Finally, as EECA has already recognised, the benefits of smart chargers are enjoyed by the wider electricity system, not the individual consumer. Therefore, even with an effective education campaign, behavioural change is likely to be limited.

Where we do see educational value is alongside either regulation or incentives, so that drivers can understand what the regulation means, or why some chargers are incentivised but not others.

12. **What are your thoughts on the use of incentives to encourage the uptake of 'smart' EV chargers?**

In the short term we think that incentives provide an effective way to reduce the barrier that prevents uptake of smart EV chargers. Our experience is that when

price is no object, drivers prefer to have them. None of the trials done by EDBs to date have had any trouble signing up hundreds of participants to get a free smart charger even when they knew it would be centrally controlled.

However, we are unconvinced that this is a desirable medium- or long-term solution. Not only would it be costly, but also it would be further ammunition that the uptake of EVs is just an excuse to give handouts to the wealthy.

As mentioned in the green paper, the UK incentivised smart chargers in all homes for just over 3 years, which drove adoption up to 70-100%. Over that time, the industry scaled up to the point that a fully installed charger was no longer so cost prohibitive. For example, podpoint will today install a smart charger for £799. At just over $1500, that is well below the ~$2500 level which is common here.

The UK incentive has achieved its goal in the case of simple home intalls, and now only applies to more complex situations such as apartments (which still have high installation costs) and rented accommodation (where the tenant might not be staying long enough to see the benefit of an installation, and the landlord doesn't see long term value to future tenants).

We believe that a time-bound or uptake-bound incentive would be a good option for New Zealand. Time-bound would incentivise smart chargers for a fixed period, say 2 years (it likely need not last as long as in the UK). Uptake-bound would incentivise a fixed number of chargers, say 50,000.

Such an incentive model signals to the industry that it is time to scale up further and faster, which would bring the cost down so that prices would remain lower even after the incentive were over. It would also deliver an install base which is large enough for some commercially viable flexibility services to become practical, enabling development of a market mechanism much sooner.

For reasons described in our answers to questions 1 & 2, we think that any incentive scheme should be applied across both hardware and installation. This works to address potential safety concerns of self-installs, builds capacity and capability for an installer base after any incentive ends, and creates a mechanism whereby chargers can be confirmed to be connected to a backend that is actually going to provide the desired network benefit.

We note that in the UK OZEV scheme installers claim back the incentives on behalf of consumers, and we would expect a similar model to work well here.

13. **What are your thoughts on regulating the 'smartness' of EV chargers in New Zealand?**

Overall, we are somewhat supportive of this approach, but it would need to be done carefully. The key risks to avoid are the pushback resulting from raising the upfront costs of charging EVs, and the failure to actually achieve the desired network outcomes by having smart chargers that are unconnected and not participating in flexibility markets.

We think the process in the UK has shown itself to be quite effective. It boils down

to a short period of incentivisation leading into regulation. This gives time for the industry to scale up and thereby build capability and capacity and reduce costs, while developing the regulation in a collaborative way that mitigates some of the identified risks. We agree that the key requirements you have identified are an appropriate starting point for that collaboration.

14. **What are your thoughts on using the PAS for residential EV chargers to underpin regulation/ incentives?**

    It might sound attractive for New Zealand to lead the way, but we would need to avoid getting into a position where our legislation differs to the point that international manufacturers aren't willing to offer a product into our market.

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

    A key part of unlocking the financial benefits of smart charging is the development of a flexibility market. This will encompass much more than just EV charging and has ramifications that we would consider to be beyond EECAs remit though it is great that EECA has visibility of this work which is why being an observer in groups such as the FlexForum is valuable.

    Where EECA *is* the appropriate organisation is in leading and implementing the incentives or regulatory intervention required around the chargers themselves. We believe that the private sector is too fragmented to agree on and drive the required change in a reasonable period of time.

Meridian.

5 September 2022

Electricity Efficiency and Conservation Authority (EECA)
By email: STAR@eeca.govt.nz

Improving the performance of electric vehicle chargers

Meridian appreciates the opportunity to submit on EECA's green paper on *Improving the performance of electric vehicle chargers*.

About Meridian

Meridian is New Zealand's largest generator of renewable electricity. We are also a nationwide retailer. We are very enthusiastic about electric vehicles and have converted 100% of our passenger fleet to electric. We also provide EV charging solutions for homes and businesses. Our plans include the recently-launched Zero charging network, which is a nationwide network of chargers. We expect to install over 250 destination chargers throughout the country; an additional 80 fast chargers in the Wellington and journey chargers in remote South Island locations. We are also developing our home and business charging capability.

General comments

- We support the development of an open and contestable demand response market. If done well, the benefits of this market go beyond the challenges faced by network companies. This could result in efficiency across the entire industry, with the benefits of behaviour change going directly to consumers.
- We prefer an industry-led approach to solutions in this area. Our concern is that there are risks to having EECA define the characteristics of a solution is risky, and that this could also be a barrier to innovative solutions being proposed.

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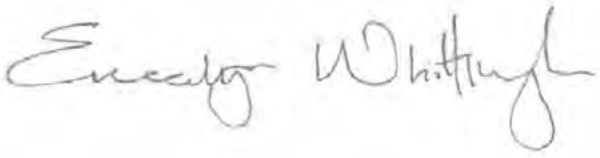
- Of the 4 options proposed by EECA, we think "Option Three: Incentives" will have the biggest impact and should be supported.

Meridian's comments on the specific questions raise in the consultation are contained at the end of this submission.

Nothing in this submission is confidential. It can be released in full. Please contact me if you have any queries.

Nāku noa, nā



Evealyn Whittington
Senior Regulatory Specialist

Responses to questions raised in submissions

	Question	Meridian's comment
1	What are your thoughts on EECA's suggested engagement principles for EV chargers?	Meridian agrees with the approach and the principles laid out, however another principle that could be considered is safety.
2	What are your thoughts on the proposed specifications for 'smart' chargers in New Zealand?	As long as chargers support open communications protocols (eg OCPP or OpenADR) and have functionality to change the rate and time of output then the ability will be there to manage constraints. Some of the listed characteristics like randomised delay and default off peak charging are not (or should not) be 'functions' of a charger and are rather a method of achieving load management. Having a predetermined set of features or standards could restrict the innovative ways that the market could solve the challenges we face. We therefore recommend against this approach. As an example, a market participant may take an upcoming constraint signal (e.g. like a morning peak issue tomorrow) and aggregate staggered charging in a logic based way to respond and ensure the benefits of that are passed to the end user. Randomising to approximate diversity could make this type of solution much more challenging to offer.
3	Do you support EV charging being open access and why/why not?	We believe standard communications protocols are a necessary requirement for functioning demand response capability. Control of EV chargers should be restricted to the participant who is connected to the end user. This is necessary to ensure that the end user receives the EV charging that they require as well as benefiting from the financial incentives that are on offer. We think market participants should be consulted on setting of open communications protocols. It is important to differentiate between open communications and open access. We do not believe chargers should be open access and control should only be given to those authorised by end consumers. There are also potential security concerns to consider, especially in an 'open access' environment.

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?	While there are system benefits to some market participants knowing the location of smart chargers, in an environment where we have an effective demand response market, we do not believe that specific information on how energy is used by individual chargers is required to be visible to all participants in the market.
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?	We support this and liken it to how smart meter data is provided to end users today. A customer should have the right to request data from any entity they have chosen to manage their EV charging. Many market participants are likely to provide this through apps as part of a value proposition for end users and making this mandatory may not be required.
6	What are your thoughts on requiring mandated power quality and control settings for EV chargers?	As this relates to flexibility to provide ancillary services to the system and benefits to the customer, we believe these issues would naturally be resolved through trials and any resulting demand response market. There is however potential need for requiring mandated power quality in emergency systems. This does create complexity for providers of flexibility services for consumers so the market should be consulted.
7	What are your thoughts on regulating the energy efficiency of onboard EV chargers?	We have not seen evidence of energy efficiency as it relates to EV chargers being an issue. As pointed out, the efficiency of a vehicle's on-board charger is more significant and regulating in this space could have adverse impacts such as the most affordable EVs being unavailable or restricting the amount of utility vehicles available in NZ.
8	What are your thoughts on labelling aftermarket AC EV chargers?	We believe there could be value in consumers being able to clearly identify whether a charger they are considering is 'smart' or not and will enable them to receive additional benefits from demand response activity.
9	What are your thoughts on whether charging cables which contain a 'smart' charging-enabling device should be in scope for intervention?	The potential impact of these charging cables to support demand response is very limited given the charging speeds. There is value from a safety perspective for intervention, but perhaps electrical safety standards and/or Worksafe safe charging guidelines are better placed to consider this.

10	What are your thoughts on the 'do nothing' option for EV chargers in New Zealand?	We believe option 3 will have a more material impact.
11	What are your thoughts on the likely effectiveness of information, education and labelling to improve the uptake of 'smart' EV chargers?	We believe option 3 will have a more material impact, but education is an area that EECA could play an effective role in regardless of which option is chosen.
12	What are your thoughts on the use of incentives to encourage the uptake of 'smart' EV chargers?	This is the area that we believe has the best potential to solve the challenges being faced and to ensure the objectives laid out in EECA's approach to managing charging in NZ and therefore where the focus should be. We support the development of an open and contestable demand response market. If done well, the benefits of this market go beyond the challenges faced by network companies alone and could function to ensure efficiency across the entire electrical system.
13	What are your thoughts on regulating the 'smartness' of EV chargers in New Zealand?	There could be value in a 'smartness' requirement for EV charging. However, we caution against detailed regulation such as defining charger characteristics given the risk of limiting innovative solutions. Until an effective market is developed and incentives are in place for end users to benefit from changing behaviour, there could be a case for smart charger subsidies.
14	What are your thoughts on using the PAS for residential EV chargers to underpin regulation/ incentives?	While we do not have a position on this we do want to raise potential concerns with taking a position inconsistent with international markets. If we lead the way in this space, there is potential risk of regulating in a way inconsistent with the market we rely on for smart charging technology.
15	In what other ways might the energy performance of EV charging in New Zealand be improved, that do not require EECA's involvement?	There are a number of industry forums (some with EECA and other government entities involved) and entities that are tackling the electrical system problems and looking to support the establishment of a market for flexibility services. Examples include FlexForum, Demand Response common protocols Project as well as many trials being conducted by EDBs, retailers, metering providers and charging solution providers.

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6 September 2022

Energy Efficiency Conservation Authority
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Improving the performance of electric vehicle chargers in New Zealand

Genesis Energy (**Genesis**) welcomes the opportunity to respond to the Energy Efficiency & Conservation Authority's (**EECA**) consultation on improving the performance of electric vehicle (**EV**) chargers. We support the Government's goal around the uptake of EV's, which contributes towards our shared vision of reducing emissions in New Zealand.

As we anticipate there will be 1.5 million EVs in New Zealand by 2035, we believe renewable electrification of the New Zealand economy represents a unique opportunity to build a genuinely low carbon economy.

For our part, Genesis offers a suite of EV services and products that use technology to maximise social benefits for our customers. For instance, our Energy EV plan offers lower rates for our customers, and our EV Sync app (currently being developed) can manage charging based on demand and supply and optimises charging at times of low cost and emissions. Customers can also track their energy use and costs on our EV IQ app, which is linked to our Energy IQ app that provides an overall breakdown of their energy use in their homes.[1]

As New Zealand's most diverse energy business, with commercial interests from end to end along the supply chain, Genesis is well placed to provide comment on the benefits, challenges, and opportunities for the EV charger landscape. We have responded to your consultation questions in the suggested format below, with key principles forming the basis of our response:

1. **The regulatory framework should remain flexible for the evolving market**
2. **There is a need to align with other jurisdictions' regulatory regimes to maximise choice and innovation**
3. **Rewards should be given for services that reduce costs to the grid and optimise value**

[1] https://www.genesisenergy.co.nz/for-home/services/manage-your-account-online

1. *What are your thoughts on EECA's suggested engagement principles for EV chargers?*

Genesis is committed to 'empowering New Zealand's sustainable future'. We believe the proposed principles align with our strategic direction, particularly minimising energy emissions through renewable energy use and encouraging EV uptake.

Nevertheless, we consider it appropriate to go further and amend the principles to say 'accelerating EV uptake' to encourage the fast-tracking of the uptake of EVs objective from top down.

In addition to the proposed principles, we also would like to stress that the installation of EV smart chargers needs to be cost effective for consumers. With the market in its infancy, some products are costly. On average EVs cost $35,000 and most smart chargers cost approximately $2,000 to install,[2] and therefore are out of reach for some. To ensure a just transition, we must ensure that products that are introduced to our market are affordable. Therefore, we believe a principle that provides directive on cost should be included.

Furthermore, we suggest another principle be developed that focuses on enabling technology for global markets. This will allow New Zealand to benefit from emerging technologies from other jurisdictions and export technology developed here. Flexibility will ensure our country is not left behind the rest of the world in the uptake of technology which could help reduce energy costs, such as smart meters that have in-built home energy management systems.

2. *What are your thoughts on the proposed specifications for 'smart' chargers in New Zealand?*

Genesis considers all the specifications set out under the consultation are important for our transition. However, while the proposed functions might be relevant today, it is plausible that some characteristics will become outdated. For instance, the minimum charge mode seems to be based on the character of EV models, and default off peak needs to realise the importance of renewable variability and the unintended consequences of creating additional demand peaks.

If these specifications are to be implemented, Genesis encourages officials to consider applying them only to some smart chargers and not others i.e., a 3kW smart charger has a significantly different impact to a 22kW smart charger.

Moreover, specifications need to be market led and 'technology neutral' due to how fast paced this area is. We want to encourage the use of EVs and smart appliances, and therefore it will be important to align with other jurisdictions that manufacture these products, so our market complements any current or future smart products we import or export. This will ensure New Zealand benefits from innovation and consumer choices are not restricted.

Globally, EV charging is generally guided by three series of international standards, IEC 61851, IEC 62196, and ISO/IEC 15118 series for vehicle to grid communication interface (V2G CI). We believe jurisdictions, namely the United States, Europe, Japan and China, that follow these standards will be important to align with in future.

Further proposals that we can suggest to you regarding specifications, include:

[2] https://www.eeca.govt.nz/assets/EECA-Resources/Research-papers-guides/EV-Charging-NZ.pdf

- having **standardised security** for in-home EV smart chargers, which will protect consumer data. Having standardised built-in security will help prevent cyber-attacks and illegal use of data.
- a focus on EV smart chargers that **relieve energy capacity issues**, as well as promote the use of renewable energy sources. EV smart chargers can assist the grid by absorbing renewable energy and place energy back into the grid at times when more energy is required in that area.

3. *Do you support EV charging being open access and why/why not?*

Genesis supports EV charging being open access and considers that open protocols and enforcement of compliance should be mandatory.

An exchange model, such as Open ADR, will help facilitate demand response actions that will help grid supply and demand to mitigate electricity costs, particularly during dry periods. Allowing price and reliability signals to uniformly exchange between events also helps streamline data sharing and management of energy on grid.

Additionally, open access will likely integrate well with other smart technology, such as Genesis' EnergyIQ app, which helps to inform customers of their energy use and see carbon emissions in an interactive way. Further, in future, it will help automate and incentivise sustainable and cost-efficient energy use, as well as complement smart grids, which NZ is likely to adopt in future to help with security of supply of electricity.

<u>Issues of cyber security</u>

Genesis considers that smart chargers should be subject to standard industry controls and certifications to address issues of cyber security. Extensive deployment of smart chargers without appropriate controls around vulnerability management and patching will provide opportunities for widespread and "grouped" misuse, while physical devices could be compromised over time.

We encourage officials to consider incident response in the event of compromise, coupled with the potential impacts of supply chain risk. The ability to control data plays a significant factor in threat modelling e.g., hackers can override charging schedules and draw more energy from the grid than expected. Any access to data should be restricted to providers, system operators, distributors, government, and relevant consumer/s. By allowing open access for these parties, while having IT protections against cyber-attacks in place, consumers and industry will be able to see the full benefits of the model.

Industry already provides safeguards for cyber threats to our smart system to protect our customers. However, because cyber-attacks are more frequent due to devices becoming increasingly connected, we advise having independent networks rather than a national 'charging' ecosystem to minimise the impact of an attack if a single network is compromised. Further consideration must also be given to ongoing identity control and protection, as well as any supply chain risk e.g., backdoor code.

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?*

Genesis agrees with chargers transmitting information on location in use in principle. However, we believe that the requirements are onerous compared to requirements

placed on other in-home products, such as heat pumps, which are only subject to guidance.

In terms of the "maximum benefit", we consider this to be a subjective issue, where there is a presumed benefit based on assumptions about how charging patterns may evolve. Nevertheless, what might be considered currently beneficial may not be suitable for smaller capacity chargers, which will most likely be commonly used in homes.

We also caution that this requirement may impose additional and unwarranted costs on our system, which subsequently may fall onto consumers. If industry is obligated to require information in a certain format, and a smart charger does not have that functionality, it will need to be adapted or augmented with additional software that may not be sold in New Zealand.

New Zealand only makes up a small portion of the international market, and therefore our level of influence over manufacturers for EV chargers is limited. Consequently, having certain information requirements could restrict our access to the EV market in future. Electric vehicle fleet development is in its infancy in New Zealand and represents less than 2% of vehicles in the country. As such, we do not recommend developing a prescriptive regulatory framework before we know how the market will evolve.

Regarding other ways this data could be captured, although it depends on the integration topology of the smart chargers and utility, information could be provided through documentation at installation rather than requiring a "transmitting" function. The live consumption data could be inferred through smart meter data or population level assumptions (as we do today for all other loads).

Any data collated must be clearly defined and include personally identifiable information as part of customer identity and billing functions. Moreover, it should be encrypted with appropriate access controls to ensure only people and systems with authorisation to access that data are granted access. Access should be determined by the principles of privilege. Only those (or systems) with a requirement to access the data should be provided access.

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?*

Genesis supports monitoring and recording electricity consumed and / or exported during charging times and for this information to be available to the EV owner and providers. EV smart chargers should be able to measure or calculate the electricity imported or exported and the amount of time of each charging event. Providing this type of information, even if it is the minimum use, helps consumers engage with energy bills and usage, and allows measurement of this consumption information. Customers also have a right to see their data to inform their energy use and is important from a consumer data rights perspective.

We consider that requirements around monitoring for EV smart chargers will have the same benefits as energy smart meters. As an energy provider who is transitioning with technology, we have already seen the benefits of smart meters helping consumers with costs, as well as education around energy consumption.

In addition, we understand other jurisdictions, such as the UK, already monitor and report electricity use as it is consistent with PAS standards.[3] To ensure our infrastructure remains interoperable, we recommend aligning with other jurisdictions by taking this approach.

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

Genesis holds some concern around mandating control settings for consumers as it will likely have unintended consequences. For example, mandating charging windows will limit consumers for when they can use their EV as well as restrict their choices around incoming new charging technology, which will not incentivise the uptake of smart chargers. It could also have the unintended consequences of creating additional peaks in electricity demand as consumers will be expected to charge within a certain timeframe. With the anticipated hike in demand of electricity from EV use, this will likely place a strain on the grid and energy supply.

A market led approach could be an energy provider or other party controlling the settings. This would involve consumers agreeing to a provision in return for discounted network and/or energy pricing for managed EV load. Much like how hot water cylinders are managed, consumers benefit with lower rates for handing over an element of control. We understand that some networks already provide monetary discounts to some energy providers for electricity distributed to EV customers. This discount could then be passed onto consumers as the incentive. We believe this could be extended to smart chargers at a greater discount.

A price based mechanism would encourage uptake of smart chargers and other products that can sync services and combine loads e.g. an in-home energy management system that combines EV charging and other appliance electricity use, which saves costs and energy. As such, this recognises the distinct nature of EV load with its storage characteristics and would likely deliver better outcomes around coordinated charging and pricing.

7. *What are your thoughts on regulating the energy efficiency of onboard EV chargers?*

Genesis considers any regulation or standard that is enforced for onboard chargers should be aligned with international standards for reasons discussed above in this submission. This is due to the unintended consequences of limiting our market and we will not be able to import and purchase certain vehicles and technology that may be beneficial to consumers' lives.

Beyond the impact of regulation on the market, there is also a very practical barrier for the uptake of smart EV chargers in New Zealand. Many New Zealanders park their cars in carports. This means that EVs with inverters are necessary for many consumers, even if some are less energy efficient. Therefore, we would support informing consumers of this aspect via labelling but recommend not regulating further than this due to this current barrier.

Although energy efficiency may vary between some vehicles, it is important to align with the international market and any new technological developments. Thus, we would encourage a lighter regulatory approach be taken, where labelling requirements on manufacturers could be enforced to inform consumers on how energy efficient the

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015285/electric-vehicle-smart-charging-government-response.pdf

charger may be. This not only would allow the market to be consumer-led but also have an educational impact that may have more lasting benefits. This would also help industry to decipher the types of energy capacity needs for EVs in the market.

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

We consider it sensible to label aftermarket AC EV chargers. This will help consumers to make more informed choices around EV charging rates and capability. It will also help to create a more consumer led market, which will create more competition and help level prices of chargers.

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

Genesis agrees with Drive Electric's submission that the potential impact of these charging cables to support demand response is limited given the charging speeds, and so we are not inclined to include these in scope for intervention.

There may be a need from a safety perspective for intervention, but perhaps this would occur through electrical safety standards and/or Worksafe safe charging guidelines. If regulatory intervention is taken for charging cables, we encourage New Zealand aligning with other jurisdictions as noted above.

Genesis' response to proposed options (questions 10, 11, 12 & 13)

We do not support the 'do nothing approach'. It would be inappropriate to have no standards or safeguards for a new market in New Zealand. Nevertheless, we do consider some of the risks that have been identified in this consultation to be overstated. While the EV market is still early in its development, there should be some regulation that does not inhibit our market and allows for the uptake of EVs and dynamic control of charging.

Following the above, while it is commonly accepted that chargers can burden capacity load in homes and local networks, we understand that smart chargers will materially address this point and cost behaviour when appropriately managed.

As noted in the consultation, EV chargers and charger cables functionality are improving home energy management systems and helping with energy capacity issues. Therefore, it is likely that this issue will be void and the market will naturally evolve, without requiring market control.

Genesis considers a combination of options 2, 3 & 4 is appropriate

Genesis considers it appropriate to combine options two, three and four. This would enable a fit for purpose framework that will allow our industry and market to evolve and operate effectively to serve consumers.

Information, education & labelling

Genesis strongly supports this option. It will help instil confidence in consumers to make more informed decisions and take ownership of their energy-use and costs. Without this provisional intervention, some consumers are likely to choose sub-optimal paths and the benefits of EV charger technology will not be satisfactory.

Furthermore, labelling the energy efficiency of chargers will enable the industry to become market led. This approach was proven to be successful with heat pumps, which also are accompanied by good-practice guidance. Genesis encourages EECA to adopt the same approach for smart chargers while the market is still developing.

Incentives to encourage uptake of smart EV chargers

Genesis supports incentives being given to consumers to increase the uptake of EV smart chargers, as it is likely that the investment required by consumers for this transition will be costly. In America, it is anticipated that it will cost homeowners nearly $20 billion for home charging stations by 2030.[4] We anticipate the transition for New Zealand will face similar costs per capita with the uptake of EVs from 30,000 to 1.5 million by 2035.

For our part, we already encourage our customers to adopt smart charging, as it helps build financial literacy, while also helping with demand issues. Genesis provides incentives to our customers to adopt smart meters via our Energy EV plan, by providing a 50% discount to their household electricity rates for the hours between 9am- 7pm.

One way the Government could help increase the uptake is by providing rebates to consumers who purchase smart chargers. By covering either a percentage of the smart charger cost or by covering installation costs of the smart charger, consumers will be incentivised to make the purchase as they will become more affordable items.

As demand for electricity will increase significantly in coming years, the uptake of smart chargers will play an important role in helping manage energy supply, therefore, it is important that incentives be given to consumers to fast-track this transition.

Regulating the 'smartness' of EV chargers and our thoughts on the approach adopted by the UK

We support a light-touch approach be taken for regulating EV smart chargers in New Zealand to avoid any unintended consequences. From a high level, we consider there is a need for clarity around the stewardship and management of data to avoid future challenges between actors providing electricity services to consumers. This will help ensure a smoother transition.

At an operational level, regulations should be developed and kept up to date e.g., the Electrical Code of Practice, to ensure smart charges are safe to use in consumers' homes and are aligned with other jurisdictions. As smart chargers can sync with other technology in the home and collect data, it is important that there are specific technological safeguards to ensure this data is not illegally accessed and used.

Nevertheless, regulation must not stifle innovation choice or development of the market. As this sector is early in its development, it is in New Zealand's interests to allow the market to emerge to deliver positive societal outcomes. New Zealand only consists of a small proportion of the international market, and therefore we have little influence over manufacturers. Any premature prescriptive regulation may be counterproductive as it may prevent us from accessing existing or future products,

[4] KPMG, Modern technology has the potential to improve energy outcomes in New Zealand. https://advisory.kpmg.us/articles/2022/electric-vehicle-charging-boost.html

which may carry significant benefits e.g., may help with energy capacity on the grid, consumers costs or data management.

Turning to the UK government's regulatory framework for smart EV chargers, Genesis favours aligning with other jurisdictions, such as the UK with regulation. The UK Government seems to have taken a flexible regulatory approach to this industry, which we support. Furthermore, there are some similarities between the features in our markets that would be useful to take a comparable regulatory approach.

Still, there are some key differences in our market which should be considered if the UK regulatory model is the precedent for this work, such as the UK being a significantly larger market than New Zealand, and therefore holds more influence than New Zealand over the international market with their regulations.

14. What are our thoughts on using PAS for residential EV chargers to underpin regulation/ incentives?

We believe it is appropriate to use PAS to underpin regulation for cybersecurity for EV chargers. However, we do not consider it appropriate to regulate the market holistically, which would be the case if PAS were adopted, due cybersecurity reasons. Therefore, Genesis advocates for the government to maintain guidance for the market at this stage to help direction of travel and inform industry and consumers.

As referenced above, we consider that it is important to align with other jurisdictions' standards. We propose aligning with the **European Network for Cyber Security**,[5] as it sets an appropriate level of cyber security and data privacy requirements for smart chargepoints and mandates that IoT devices comply with security requirements. This is particularly important as chargepoints pose additional security risks which warrant more extensive mitigation than other IoT devices. The types of access chargepoints provide opportunity for hackers to harm our electricity system. As such, we also support regulation be applied to organisations that interface with EV charging to mitigate these threats.

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

Another way in which the Government may help is by extending the Clean Car discount to include discounts for smart chargers. Smart chargers are currently unaffordable for some consumers, and this option could encourage a market-led solution that will likely increase competition and reduce prices.

Conclusion

Genesis supports the transition of New Zealand's energy sector to a low carbon economy and agrees that modern technology has the potential to improve energy outcomes in New Zealand.

Nonetheless, as the market is still in its infancy, we consider that any regulatory framework that is developed needs to align with other jurisdictions and be flexible to allow for the market to evolve. It should not act as a barrier for any future products that consumers may benefit from.

[5] https://encs.eu/

We encourage taking a lighter approach to developing regulation at present (with the exception of health and safety and cybersecurity), while recognising that education, labelling and incentives may produce more desired outcomes for the uptake of EVs and smart chargers at this time.

If you have any questions about our submission, please do not hesitate to get in touch with our Regulatory Affairs and Government Relations team.

Nakū noa, nā

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5 September 2022

Feedback on the Green paper on improving the performance of electric vehicle chargers
8 August 2022

1. What are your thoughts on EECA's suggested engagement principles for EV chargers?
   1.1. What would you add or take away?
      1.1.1. We would like to see the customer being represented more. A focus on providing value to the customer, and reducing barriers for EV ownership. For example, providing simple and clear messaging and signals to customers.
      1.1.2. New Zealand is ultimately a technology taker so it will be important that New Zealand regulations and standards align with international requirements as otherwise New Zealand consumers will bear increased costs or lack of access to chargers. The technical capabilities of chargers are changing rapidly so the regulatory approach will need to take a 'guide rails' rather than a prescriptive approach to avoid lock-in of specifications that quickly become outdated.
      1.1.3. Furthermore, most new model electric vehicles are equipped with systems that allow them to communicate and be controlled directly without the need for a smart charger. Where an EV can be directly controlled it seems unnecessary to require replication of these smarts within the charger.
   1.2. Is there anything you disagree with?
      1.2.1. No
2. What are your thoughts on the proposed specifications for 'smart' chargers in New Zealand?
   2.1. What do you see as most and least important?

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2.1.1. A critical function is for the user to be able to grant access to other parties to control the charger. Ensuring 'access' to control is fundamental, we are aware that some manufacturers charge 'access' fees for users to enable access to third parties, this may make control prohibitively expensive, and it's inconsistent with the principles of interoperability and that the benefits of control are realised by the end consumer.

2.1.2. Providing the "basic functions" is key, with the ability for on/off contract and to control the charge rate. All the other modes discussed can be achieved with this and may be difficult to build the logic into each charger.

2.2. What functions would you add or exclude, if any, why?

2.2.1. Suggest keeping it simple and only including the "Basic functions", although these could include the ability to apply set schedules.

2.2.2. Having smart chargers relay back information from the vehicle is also essential, for example the actual charge rate, and vehicle state of charge. Although this is discussed elsewhere in the paper.

2.3. What information could you supply to EECA to help inform our thinking about this issue?

2.3.1. Octopus Energy has been running smart EV charging trials, and an EV licensing business for a number of years now in the UK. We also integrate customer's chargers with our DER platform to optimise against wholesale and SO/Network pricing signals. We could provide real-life experience of customers using "smart" charging.

2.3.2. It's important to note that a smart charger isn't essential for this, what's critical is that either the EV or a charger can communicate and the charging be controlled. We ourselves integrate with both chargers and EVs directly. It would be unnecessary for EECA to mandate a smart charger if the EV can talk to us directly.

3. Do you support EV charging being open access and why/why not?

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3.1. **Yes, as discussed, open access will be critical if we want control/flexibility to be used.**

3.2. What information could you supply to EECA to help inform our thinking about this issue?

3.2.1. With our DER platform Kraken Flex, we have extensive experience with smart charging protocols - including OpenADR, as well as integration with both EVs directly and chargers. We have since moved away from OpenADR due to its dated technology and capabilities. We believe a similar view is being formed by the UK grid and network operators

3.3. Do you think that 'smart' chargers should address issues of cyber security?

3.3.1. Yes, very much.

3.4. How would you suggest this is done?

3.4.1. **Any protocols being used should be modern, and internationally recognised. Ideally with existing support from major vendors.**

3.4.2. A commonly recognised and supported protocol (for example OCPP) will also give consumers the ability to change retailers and/or flexibility platforms - encouraging competition in the marketing and ultimately benefiting the consumer.

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?

4.1. Who should be able to access this information?

4.1.1. This could be included on the electricity market registry against an ICP, however the registry probably needs to be modernised more generally.

4.2. In what form should it be transmitted?

4.2.1. This information should be transmitted to the retailer or flexibility provider who is controlling the device for the customer. It may be appropriate for this information to also be provided in aggregated

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format to other electricity market participants such as network or transmission companies.

4.3. What processes should be in place to safeguard the data?

4.3.1. The data should be anonymised and aggregated.

4.4. Is there any other way this data might be captured?

4.4.1. The electricity market needs to consider more generally how information is architected to support a more dynamic energy future. EV charging data is likely to be a subset of consumption data, it could be appropriate that it is recorded centrally along with distributed generation/ battery information.

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?

5.1. What other information may be valuable to the EV owner?

5.1.1. No comment.

5.2. What format should be used for this information if this requirement is adopted?

5.2.1. OCPP is a well proven format.

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

6.1. These would be beneficial if it meant there would be less barriers for consumers to install these. Any increase in charger costs would need to be considered though.

7. What are your thoughts on regulating the energy efficiency of onboard EV chargers?

7.1. What information could you supply to EECA to inform this issue?

7.1.1. This would be better directly at the vehicle manufacturers.

7.2. What challenges, if any, do you see in regulating in this area?

7.2.1. This is a complex area for consumers to understand. The true cost of EV ownership, including comparisons of differing on-board charging efficiencies would be useful for consumers. As long as it was easy to digest.

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

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8.1. In the future it will be useful for a consumer to understand if a wall mounted charger can enable them to make use of "demand response" retail tariffs. So understanding whether a wall mounted charger would "works with...." would be useful.

8.2. It should also be considered that new EV's coming to market often include onboard cloud integration, which may negate the need for a "smart" wall mounted charger. The key benefit of a wall mounted charger in the future may be more safety related - when compared to a standard 3-pin charger that comes with the vehicle.

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

9.1. With newer EVs having sufficiently larger batteries, and requiring longer charging times if used with a "standard" 3-pin charging cable, these should not be recommended from a safety point of view when compared with larger, hardwired (and inspected) wall mounted chargers.

10. What are your thoughts on the 'do nothing' option for EV chargers in New Zealand?

10.1. Do you think the market can adequately address this issue without the need for government intervention?

10.1.1. There are already a large number of charger providers, each with varying methods of integration to a third part and levels of 'smartness'. The 'do nothing' option is likely going to see an increase in variations, and a corresponding difficulty for customers to be able to freely 'switch' between providers. Limiting the potential benefits they can get from owning an EV, and subsequently the uptake of EVs.

10.2. What information could you provide to EECA to inform this issue?

10.2.1. -

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

11.1.1. Energy efficiency labelling on vehicles that includes the on-board charging efficiencies could help promote more efficient charging.

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11.1.2. Labelling to inform a consumer if a product "works with" a range of retail and flexibility offerings in the future could also be of value. But these are not widely available as of yet.

11.2. What information could you provide to support your position?

11.2.1. -

12. What are your thoughts on the use of incentives to encourage the uptake of 'smart' EV chargers?

12.1. What incentives do you think would be effective and who should provide these?

12.1.1. Incentives would need to be provided by a consumer's electricity supplier. These would be based on pricing signals made available to retailers from the System Operator and local networks. A common protocol for these pricing signals to be made available by these parties would be very useful.

12.1.2. Government incentives for chargers could also play a part. Although there are a lot of points to consider there.

12.2. What other incentives might be valuable beyond financial incentives?

12.2.1. Anything that could help reduce the capital cost of a wall mounted charger. As discussed in the paper, consumers are inclined to stick with their charging cable provided with the vehicle, and these have safety concerns. We believe the primary reason for this is the associated cost of the charger, and the installation.

13. What are your thoughts on regulating the 'smartness' of EV chargers in New Zealand?

13.1. What do you think of New Zealand adopting the approach being undertaken in the UK?

13.1.1. It is clear in the UK that a 'guide rails' approach to regulations will be more preferable than a prescriptive approach.

13.1.2. Consideration also needs to be given to whether it is the 'smartness' of wall chargers or the vehicles themselves.

13.2. What information could you provide to support your position?

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13.2.1. **This is probably best in the form of a conversation between EECA and our UK team if that would be of interest as the situation is quite fluid at the moment.**

Feeback collated by David Charlton - Head of Technology Delivery at Octopus Energy NZ.

[redacted]

Mercury

Submissions EV Charging Green Paper
EECA
Via email
STAR@eeca.govt.nz

5 September 2022

Green paper: Improving the performance of electric vehicle chargers

Thank you for the opportunity to submit on EECA's Green paper "Improving the performance of electric vehicle chargers". Mercury's submission is attached to this letter, and we have also set out our key points below.

Minimum standards should be considered for "smartness" generally not just EV chargers

Mercury supports the consideration of minimum standards for EV charging however this should be done slowly and with careful consideration of the wider context surrounding distributed energy resources (DER). Regulation must align with current and future initiatives to harness the value of DER flexibility to optimise sustainability, security/reliability and affordability across the electricity value chain. This may require a framework that incentivises "smartness" generally to unlock the full value of DERs, rather than focusing on EV charging in isolation.

Standards, education and market incentives should stimulate the development of flexibility markets

Standards alone may not be sufficient to encourage consumers to choose smart charging for their homes. Education and market incentives can be adopted simultaneously and will help drive the direction that any potential regulation should take:

- Education about the benefits of charging flexibility will be critical to gaining consumer buy-in. EECA will have a leading role to play here through information campaigns and building support for smart charging.
- Electricity market participants can play an important role in optimising EV charging. Access to monetise the value provided to the electricity system will be key to developing rich consumer offerings. Customer behaviours will change where they can see direct value from investment in DER. Ultimately these offerings could develop into thriving flexibility markets where value accrues to end users and industry participants across the whole electricity value chain, from generation through to transmission and distribution. This will require regulatory changes within the electricity sector as well as greater familiarity and experience with DER technology industry wide.

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Home EV charging should be considered as part of the wider charging ecosystem

Home EV charging (the primary focus of this consultation) is only one part of a nationwide charging ecosystem encompassing workplace EV charging and public EV charging. Flexibility from smart charging may initially be more practical to incentivise and/or regulate at workplaces and in public settings. Over time, it is also possible that private home EV charging loses some ground to workplaces and public chargers, because of housing intensification or lack of off-street parking for example.

Please don't hesitate to contact me by email at [redacted] or by phone on [redacted] if you have any queries in relation to Mercury's submission.

Yours sincerely

Jo Christie
Regulatory Strategist

Appendix: Mercury Submission

Consultation Question	Mercury Submission
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?	Mercury agrees with the principles but would like to suggest a further principle acknowledging that EV charging is just one part of the wider ecosystem of distributed energy resources (DER). Any regulation considered in relation to EV charging must align with current and future initiatives to harness the value of DER flexibility to optimise sustainability, security/reliability and affordability across the electricity value chain.

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, why? • What information could you supply to EECA to help inform our thinking about this issue?	Mercury supports the option to consider minimum industry standards as a first step in managing the smartness of EV chargers however we recommend these remain voluntary in the short to medium term. We also recommend that EECA look more broadly at other connected consumer technologies which also have the potential to provide significant quantities of flexibility such as water heating devices and air conditioning units. It is this characteristic of "smartness" across DER that requires standardisation to ensure that the full potential of demand response is unlocked rather than just specific technologies (such as EV chargers) in isolation. Furthermore, EV chargers that are not smart in and of themselves do not preclude smart charging. For example, smart charging may be regulated by the EV itself or a smart home device communicating with a smart wall plug. Any standards set should be developed in wide consultation with all affected parties including suppliers of software/equipment and aggregators, to ensure that they are fit for purpose. Further, efforts should be made to align with international standards and approaches wherever possible, to leverage learnings and avoid barriers to adoption of overseas technology. In our view, the key minimum standards that will enable the system-wide benefits that DER flexibility offers are Interoperability, open communications, and easily discoverable registration/visibility. • **Capability and connection to receive and respond to dynamic system requirements** is an important proposed specification for smart chargers. EV chargers/DER need to be able to receive requests to reduce during peak demand and increase at times of high renewable electricity supply, in accordance with the customer's preferences. EV chargers/DER must have **open communications protocols** to be able to be remotely accessed without the need for proprietary interfaces or gateways. We note however this is distinct from **open *access*** and submit there should still be a requirement for the consumer to approve which party, or parties, are authorised to communicate with their charger. • We would support moves to register the presence of a smart EV charger/DER of sufficient size or in use. This would enable electricity industry participants to optimise their activities factoring in these resources. For example, if network operators have **visibility** of where chargers are, they can plan network upgrades accordingly.

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 agree EV chargers must have **open communications protocols** to be able to be remotely accessed without the need for proprietary interfaces or gateways. Furthermore, we note again that EV chargers that are not smart in and of themselves may not preclude smart charging. For example, smart charging may be regulated by the EV itself or a smart home device communicating with a smart plug. We note however this is distinct from **open *access*** and submit there should still be a requirement for the consumer to approve which party, or parties, are authorised to communicate with their charger.
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?	Given the highly distributed and intermittent nature of DER, additional data will be required to increase visibility and help operators better plan to meet electricity demand, manage voltage and frequency, and maximise financial reward for participants. We agree that EV chargers should contain the minimum requirements suggested by EECA with clear boundaries set as to how the data is to be used and who is entitled to access it. As we have suggested above, a register of EV chargers would enable authorised third parties to assess the full potential of smart devices in their respective locations.

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 agree that recording consumption data would provide consumers with the opportunity to secure best value from smart charging and provides a market for third parties to compete in this space. Ensuring that consumers have easy access to this data may alleviate the limitations currently experienced by third parties wishing to obtain consumption data from MEPs and retailers.
6. What are your thoughts on requiring mandated power quality and control settings for EV chargers?	Mercury agrees that mandated power quality and control settings could play a key role in maintaining network and system stability, particularly in emergency situations.
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?	It is not realistic to think that New Zealand as a nation will have any impact on the engineering choices car manufacturers will make. Mercury thinks that a less efficient EV is more desirable than an internal combustion engine (ICE). During the transition from the ICE to EV this may only reduce options and slow adoption. Put simply it is too soon to be considering this.
8. What are your thoughts on labelling aftermarket AC EV chargers?	No comment.

9. What are your thoughts on whether charging cables which contain a 'smart' charging-enabling device should be in scope for intervention?	As stated previously, EV chargers that are not smart in and of themselves may not preclude smart charging. For example, smart charging may be regulated by the EV itself or a smart home device communicating with a smart plug. Therefore, EECA and the wider industry need to be cognisant of the need to incentivise flexibility in general for the broader benefit of the electricity system and consumers. Flexible EV charging should be seen as part of the broader DER landscape and frameworks that incentivise such smartness in general will go further to unlock the full value of DER for the electricity system and consumers.
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?	Mercury agrees with EECA that doing nothing is unlikely to be optimal for New Zealand. Increased demand from EV charging needs to be incorporated in a way that doesn't compromise the sustainability, reliability, security and affordability of our electricity system. However, EV charging should be seen as part of the broader DER landscape and frameworks that incentivise such smartness in general will go further to unlock the full value of DER. Electricity market participants can play an important role in optimising EV charging. Electricity retailers such as Mercury already incentivise customers to charge EVs during off peak times through dedicated EV plans. As DER technology evolves, so will market offerings. Market participant access to monetise the value provided to the electricity system will be key to developing rich consumer offerings. Customer behaviours will change where they can see direct value from investment in DER. Ultimately these offerings could develop into thriving flexibility markets where value accrues to end users and industry participants across the whole electricity value chain, from generation through to transmission and distribution. This will require regulatory changes within the electricity sector as well as greater familiarity and experience with DER technology industry-wide.
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?	Standards alone may not be sufficient to encourage consumers to choose smart charging for their homes. Education about the benefits of charging flexibility, as well as suitable economic incentives from flexibility markets (refer Q10 above) will be critical to gaining consumer buy-in. EECA will have a leading role to play here through information campaigns and building support for smart charging. It is also crucial to note that home EV charging (the primary focus of this consultation) is only one part of a nationwide charging ecosystem encompassing workplace EV charging and public EV charging. Flexibility from smart charging may initially be more practical to incentivise and/or regulate at workplaces and in public settings. Over time, it is also possible that private home EV charging loses some ground to workplaces and public chargers, as a consequence of housing intensification or lack of off-street parking for example.

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?	Mercury submits that incentives will be necessary to encourage the uptake of smart EV chargers however we would generally favour market innovation over direct government subsidy. It is too early in the development of DER technology for government to risk picking winners by backing one form of DER over another. Further, any subsidy applied to EV chargers would disproportionately benefit higher income households in our transition to a low carbon economy. Electricity retailers such as Mercury already incentivise customers to charge EVs during off peak times through dedicated EV plans. As DER technology and market participant access to flexibility value evolves, so will market offerings. Customer behaviours will change where they can see direct value from investment in DER. Ultimately these offerings could develop into thriving flexibility markets where value accrues to end users and industry participants across the whole electricity value chain, from generation through to transmission and distribution. To unlock the potential value of flexibility markets, EECA should consider innovation funding to stimulate the development of scalable solutions that focus on customer desirability in addition to technical feasibility. This would speed up consumer investment in smart connectivity.
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?	Mercury would like to see the introduction of minimum standards and education campaigns before regulation is considered. There are too many unknowns and too many factors to be determined by market forces to risk creating rules that may stifle innovation or have unintended consequences that could ultimately impact on the security of supply.
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?	No comment.

15. In what other ways might the energy performance of EV charging in New Zealand be improved, that do not require EECA's involvement?	As described in our prior responses, Mercury ultimately sees smart EV charging as part of thriving flexibility markets for all forms of DER where value accrues to end users and industry participants across the whole electricity value chain, from generation through to transmission and distribution. This will require regulatory changes within the electricity sector as well as greater familiarity and experience with DER technology industry-wide. Some of the regulatory changes required involve Electricity Authority and Commerce Commission processes governing matters such as: • Network pricing reform to incentivise efficient DER uptake and flexibility responses. • Regulation incentivising distributors to evaluate both flexibility and non-flexibility solutions thereby reducing incentives to favour CAPEX over OPEX or network solutions over non-network solutions.

5 September 2022

EECA
By email STAR@eeca.govt.nz

Powerco Limited (Powerco) welcomes the opportunity to provide a submission on the Energy Efficiency and Conservation Authority's (EECA) green paper, *Improving the performance of electric vehicle chargers*.

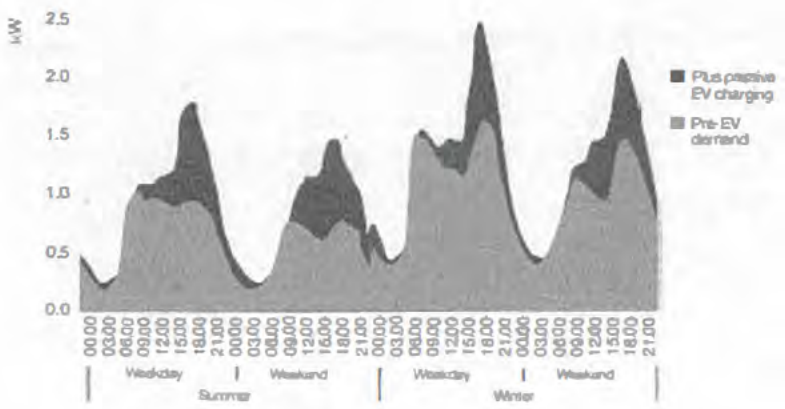
Powerco supports EECA's investigation of ways to improve the energy performance of private electric vehicle (EV) chargers. We are fully aware and excited about the significant potential for our network to help our customers adopt new technologies, including EVs, to create, use and save energy as efficiently as possible.

Smart EV chargers will support the effective use of network capacity

From an electricity network perspective, managing EVs (or not) is one of the more critical issues we face in the foreseeable future. To facilitate EV charging, particularly at peak demand times and with fast chargers, could require substantial network reinforcement.

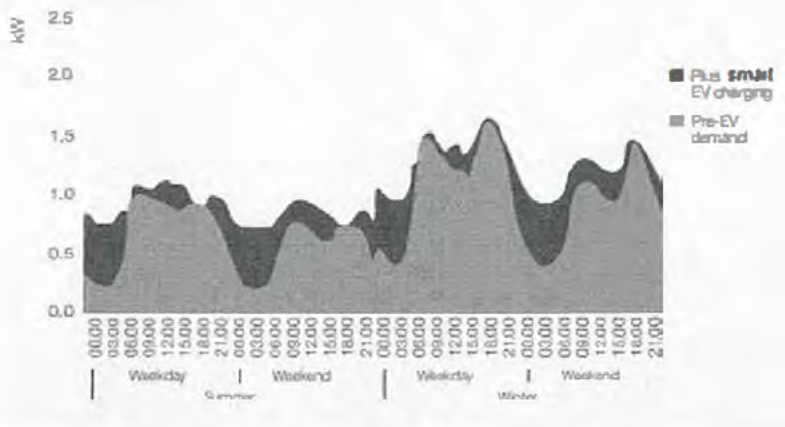
In 2018, we commissioned a study in collaboration with Unison and Orion to model the impact of EV charging on residential ICP demand. It showed that, without any control, the demand could increase significantly, as shown in Figure 1.

Figure 1: Potential impact of passive EV charging on an average household demand profile



Meeting this increasing peak by only installing more assets will result in a significant cost increase for consumers.[1] So, we must be clever about managing EV charging. The study suggested that this increase in demand can be mitigated by customer use of smart EV chargers. Figure 2 shows how smart EV charging can influence the demand profile.

Figure 2: Potential impact of smart EV charging on an average household demand profile



In practice, controlling EV charging to use network capacity effectively means electricity networks have some ability (preferably direct control) to shift EV charging away from peak load times. We support implementing a national or international standard for smart EV chargers to help achieve this.

Attachment 1 has our response to the consultation questions. If you have questions abou this submission, please contact Nathan Hill [redacted]

Andrew Kerr
Head of Policy, Regulation, and Market

[1] For Powerco, unmanaged charging could potentially add 100-150MVA of peak demand on our network, depending on EV uptake. We estimate meeting a 150MVA increase with additional network investment could represent around $1 billion of additional capex.

Attachment 1: Powerco's response to consultation questions

Q1. What are your thoughts on EECA's suggested engagement principles for EV chargers?

- *What would you add or take away?*

  Add: Consider charging management via the vehicle. Almost all new EVs have smart charging capability. If vehicles can efficiently and effectively control EV charging, regulating chargers will be far less critical.

  Add: We must recognise that charging locations and behaviour may change overtime. For example, if future mobility includes more public transport, ride sharing and autonomous vehicles the placement of charging infrastructure (and smart charging needs) could be substantially different.

Q2. What are your thoughts on the proposed specifications for 'smart' chargers in New Zealand?

- *What do you see as most and least important?*

  Most important: a default off-peak charging mode with customer ability to override. We think this option works well for the customer and the distributor because the control is simple to implement - it is a hands-off approach rather than requiring dynamic load adjustment.

  Default reduced charging at peak mode is similar to the control we are testing in our current EV smart charging trial. From this trail, we can already see a reduction in ADMD and peak load with minimal impact on customer satisfaction and behaviour.

  Least important: is Vehicle to-grid (V2G). This functionality may be helpful in the future but may not be necessary for solving initial constraint issues.

- *What functions would you add or exclude, if any, and why?*

  Add: Default dynamically operating groups of chargers based on transformer connection. Syncing together chargers that are connected to the same transformer will enable load reduction on a transformer at times of simultaneous charging.

  Exclude: Turning off vehicles. Based on our initial trial results, customers do not see this as beneficial and do not respond well to this control. In addition, in some cases, this causes vehicles to pause charging completely until the charging cable is reset.

- *What information could you supply to EECA to help inform our thinking about this issue?*

We are happy to share initial insights from Powerco's EV Smart Charging trial.[2] Initial findings from the trial that may be helpful to EECA include the effect managed charging has on different types of networks, e.g. rural v urban, and insights into customer tolerance.

Q3. Do you support EV charging being open access, and why/why not?

We support EV charging being open access because it will support the innovation required to respond to market changes over time.

Having a system of layers of control might be a good idea. For instance, distributors could control the charging threshold, and the market space can be built below, allowing fair competition between aggregators without the issue of a market unintentionally creating a new peak demand. In this scenario, customers must be able to opt out via an override option, bypassing both the aggregator and the distributor

- *Do you think that 'smart' chargers should address issues of cyber security? How would you suggest this is done?*

The communication systems and protocols for controlling EV chargers will need to be very secure from a cyber standpoint and operable in the event of a power outage. A national or international standard for Smart EV Chargers would be a good idea from these perspectives.

Q4. 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?

Ideally, we would have the charger's location (e.g. ICP number and street address) to help interface directly with our customers. However, we may only need the charger's transformer location for distribution management at this stage.

- *Who should be able to access this information?*

Any party involved in the charging management process.

- *In what form should it be transmitted?*

Ideally, wired ethernet connection to reduce control coms issues.

- *Is there any other way this data might be captured?*

Data could potentially be captured directly from the vehicle.

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[2] From 2021-2023, we're collecting data on how Kiwis charge their electric vehicles at home to prepare our network for the future. You can find more details on the project here: https://www.powerco.co.nz/what-we-do/our-projects/smart-ev charging-project

Q5. 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?

We support a requirement for EV chargers to monitor and record electricity consumed and exported during EV charging.

Peak demand data (KW) is more critical than kWh data for electricity networks because peak demand determines network capacity investment.

To do demand side flexibility the following information would need to be available to a distributors/flexibility supplier

- Battery state of charge.
- Plugin time, charge complete end time, unplug time.
- Charger status. For example, if the car is not plugged in, currently charging, plugged in but vehicle has finished charging.
- Flexibility of each session. For example, if an EV was plugged in for 8 hours but only charged for 3, the flexibility would be 5 hours, or a percentage of the charging session 62.5%. This information would help with improving managed charging for different customer types.
- Power, Voltage and Current.
- Load management profiles or type of control. For example, dynamic or fixed.
- Alert for override button

- *What other information may be valuable to the EV owner?*

Information and data that helps the customer understand the effects (benefits/trade offs) of managed charging.

- *What format should be used for this information if this requirement is adopted?*

We think the following data requirements should be adopted:

- Minimum of 5-minute data resolution to enable fast response times.
- Continuous and synchronized reporting between chargers to provide a snapshot of grid information. This information could be beneficial in finding other information—for example, the house phase, which would help the implementation of future markets like multiple trading relationships and peer to-peer electric vehicle charging.

Q6. What are your thoughts on requiring mandated power quality and control settings for EV chargers?

We support mandated power quality and control settings for EV chargers.

Q7. What are your thoughts on regulating the energy efficiency of onboard EV chargers?

Energy efficiency is important. As suggested in the paper, this should be looked at in further detail to determine whether New Zealand should regulate it.

Q9. What are your thoughts on whether charging cables which contain a 'smart' charging enabling device should be in scope for intervention?

We think any devices, including charging cables, that can enable smart charging should be within scope.

Q10. What are your thoughts on the 'do nothing' option for EV chargers in New Zealand?

A few networks could adapt to this scenario, but it would be a significant wasted opportunity. Instead, controlling EV charging will promote efficient and effective use of the electricity system, benefiting New Zealand.

- *Do you think the market can adequately address this issue without the need for government intervention?*

We think the government should be involved initially to support a standard protocol for these devices.

opticharge

EVisi

EVisi appreciates the work EECA are doing to promote Electric Vehicles and the support the organisation is providing organisations and business that are working to enable New Zealand to move toward a low carbon transport sector.

This 'EV-charging-Green' document is an important step to provide a path to enable the continued growth of EV registrations while recognising the need to minimise the systems costs of related peak demand growth.

Please find our response to questions below.

Kind Regards

Chris Olson
www.evisi.co
www.opticharge.co

a) What are your thoughts on EECA's suggested engagement principles for EV chargers?

- What would you add or take away?

  Take away//

  NA

  Add//

  Ensure that pricing signals (particularly from EDBs reach the customer via retailer tariffs

- Is there anything you disagree with?
  No

b) What are your thoughts on the proposed specifications for 'smart' chargers in New Zealand?

- What do you see as most and least important?

  The most important item is Default off-peak charging mode. The ability to set a default start time is crucial to avoiding high peak demand and to make clear the importance of this requirement to the charger operator. An addition to this would be to add the Randomised delay function to smooth the aggregate charger peak load rate of change.

  The least important item for us is 'Default reduced charging at peak' mode. If this option were available as a default value, the charger operator would have to calculate what power should be used during the peak power period. It may be better to use the 'Default off peak mode' and allow the charger operator to override this value is required.

- What functions would you add or exclude, if any, why?
  Additions

Exclusions

- What information could you supply to EECA to help inform our thinking about this issue?
  EVisi believes that charger operator utility is the most important aspect which includes the ability to minimise cost of charging operations. If there was a mandate to ensure that EDB 'Time of Use' charges were passed through to electricity consumers, EV charging peak demand minimisation would be in the charger operator interest.

  Of course, additional charger functions would be useful to minimise the potential for steep demand peak at a price charge inflection point such as randomised delay function.

  Evisi charger optimisation algorithms calculate the required minimum charge profile to ensure that vehicles are charged on-time to required battery SoC% while minimising charge costs and peak power demand. Depending on the vehicle battery capacity, start and final SoC% and charge time period, charge sessions may have to charge through the peak price periods to ensure desired charge outcomes are met. But if majority of charger operators were aiming at minimum cost (which should align with minimum peak demand and also min CO_2 emissions) then an optimal outcome could be achieved for EDB capex and charger operator utility.

c) Do you support EV charging being open access and why/why not?
Yes, EVisi supports EV charging being open access.

If we distinguish the difference between the previous section 'Potential Characteristics of EV Chargers' and this 'Open Access' EV Chargers section we should distinguish 'Internet Connected' and 'Non Internet Connected' Smart Chargers.
Many of the potential features of 'Smart Chargers' listed in the previous section don't require Internet connection. But the 'Open Access' section does require an electronic communication mechanism to these chargers.

EVisi does not support all chargers being subject to being 'Internet Connected' as this is an onerous requirement on some charger operators. Setting specific characteristics (such as maximum power rating) for mandatory internet connection would be good. And a carrot approach to incentivising use of internet connected chargers would be beneficial.

- What information could you supply to EECA to help inform our thinking about this issue?
  EVisi view is that flexibility markets and EDB ToU price tariffs can provide charger operators (both individual and fleet chargers) with the incentive to shift loads to minimise peak power demand attributed to EV charging.

  While EVisi fully supports the use of open standards for Demand Response management, enforcing a specific DR protocol could be detrimental to engaging potential EV charger users and could also preclude innovative options to manage charger operator Demand Response activities. Additionally, enforcing specific modes of charger operation is likely to minimise innovative approaches to minimizing peak demand issues.

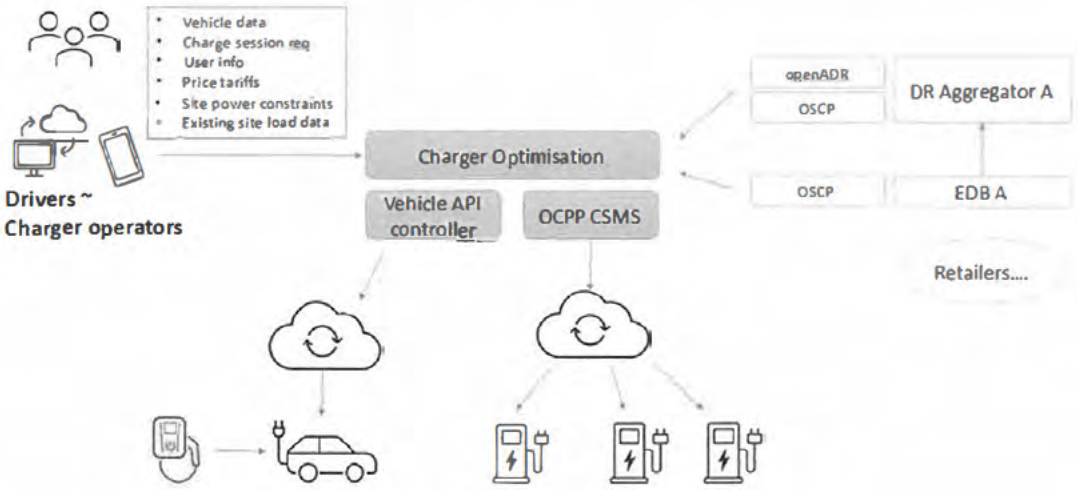
  An example of this could be that direct control of vehicle onboard charger power via vehicle API is a more flexible method of managing DR requirements compared to enforcing EV chargers be open access and connected to the internet.

  EVisi is focused on developing fleet EV Charger optimisation software and believes that models to deliver DR services should remain flexible to enable participating parties to deliver innovation which benefits both consumer behavioral requirements and electricity industry participants (EDB, Retailers, Grid etc)

opticharge

EVisi

An example of one such potential model could look like below but there will be many variants.



- Do you think that 'smart' chargers should address issues of cyber security?
  Yes, EVisi submits that internet connected smart chargers should be subject to cyber security requirements. There is a Health and Safety aspect that is imperative to manage so that EV chargers are not operated by external actors to the authorised charger operator instructions.
- How would you suggest this is done?
  The use of incentives for charger operators to ensure they install open access charging systems would be helpful. The benefits of avoided EDB network and generation capex should be shared with charger operators to enable additional costs of implementation and operation of smart charging systems to be compensated thereby making it an attractive proposition for charger operators.

  a) This could be assisted with beneficial time of use tariffs which are enforced – ie EDB Time of Use tariffs must be transmitted to the customer via their retailer.

  b) EDB incentives for flexibility markets to be created along with incentives for charger operators to participate

  c) Allow EDB and Flexibility markets to choose their own DR protocols. Options such as OSCP 2.0 provide good benefit with lower implementation overhead compared to openADR.

d) **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?**

EVisi is in favour of EV chargers transmitting data to a DER data store for the benefit of DR operations. The minimum set of data suggested in this document is a good start.

As mentioned, the MTR and P2P type entities would require and benefit from a common data repository to facilitate the operations of these programmes.

This requirement could be an opportunity to create a centralized DER meter data repository to benefit the entire NZ electrical system and provide a data set to provide EDBs with LV data that is currently missing. Some level of standards may have to be introduced but the benefit of having this data available provides more advantages than enforcing highly accurate data.

EDBs could reward the provision of LV data to be available from smart charger systems in some manner as information will enable better decision making for asset management.

- 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?

e) 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?

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

EVisi supports this potential requirement as it is a simple addition to charger firmware and can operate independently of the charge session control mechanism, whether via a vehicle API or direct to the charger.

The hardware mostly already exists in both mode 2 and 3 chargers so would require little change for charger manufacturers but would add a large benefit to the security of EDB networks.

g) What are your thoughts on regulating the energy efficiency of onboard EV chargers?

Yes, this aspect should certainly be investigated, and information made available to potential EV purchasers. Could this be added to the Fuelsaver website ?

Consumers should know what the energy efficiency of their vehicle is.

- What information could you supply to EECA to inform this issue?
  None
- What challenges, if any, do you see in regulating in this area?
  Unsure

h) What are your thoughts on labelling aftermarket AC EV chargers?
We assume the labeling is for energy efficiency purposes.
Labelling AC Chargers for energy efficiency would probably have to distinguish between mode 2 and mode 3 chargers. This may introduce higher price requirements for mode 2 chargers. If these are basic (non-internet connected) chargers then labelling may not be required for this type of charger.

i) What are your thoughts on whether charging cables which contain a 'smart' charging-enabling device should be in scope for intervention?
EVisi thinks that mode 2 charger equipment is an important factor in the future of residential and non-public charging infrastructure. These devices can offer users a flexible device which can be used in multiple locations (home, bach etc) instead of having to purchase multiple mode 3 devices to permanently wire at each location.

That said, we think high powered versions of mode 2 chargers should be subject to the requirements of mode 3 chargers in order to minimise peak load issues on local networks.

EVisi is working with a mode 2 charger manufacturer to add internet connectivity to a 20 amp portable charger to enable control and monitoring of the charger device even though it can be used in multiple locations.

These devices will use CEE specification plugs with temperature monitoring of the plug pins.

We believe that allowing mode 2 chargers to be used for smart charging provides many benefits. But again, how do we categorise mode 2 charging to be included in the Smart Charging requirements. most likely to be maximum power rating ?

j) 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?

  EVisi believes that some market intervention is required in 2 main forms.

  1) Set standards for EV charger technology. This could be based on maximum power rating of chargers. Ie something like

  * Charger with < 16 amps max capacity require
    - default off peak start time
    - randomized start function
    - underfrequency / voltage temporary stop function

  * Chargers with > 16 amp rating are required to have an open access communication protocol whether that is via a cloud server or direct to the charger. Caveats for dumb chargers where the vehicle charge power is control instead (difficult to manage)

  2) Create incentives to encourage charger users / operators to want to use 'open access' smart charger devices. This would likely come in the form of flexibility markets or EDB incentives to offset and minimise requirement for infrastructure build to manage increasing peak demand.

  Without these interventions, we think the most likely path is mobile app controlled 16/ 32 amp chargers with addition of load balancer and solar PV export consumption to manage best value at the charger site. But this misses the opportunity to have cloud connected EV charger load shifting optimisation with ability to integrate with flexibility markets to avoid EDB capex requirement.

- What information could you provide to EECA to inform this issue?

k) What are your thoughts on the likely effectiveness of information, education and labelling to improve the uptake of 'smart' EV chargers?

Evisi's view is that education of the benefits of smart chargers is a worthy exercise but is unlikely to have new EV drivers decide to purchase an 'open access' smart charger. They are more likely to take advice of the EV retailer and purchase what is offered at that point. The EV salesperson is likely to see the product that provides the most attractive margin.

We think labelling of Energy Efficiency will help.

But mostly, there should be a mechanism developed where the charger user is incentivised to use a smart charger to load shift to off peak periods. This requires electricity tariffs to reflect the actual cost of the use of the peak build.

- What information could you provide to support your position?

l) What are your thoughts on the use of incentives to encourage the uptake of 'smart' EV chargers?

Evisi is developing a smart charge app which load shifts charger power to minimise peak power price. We estimate that we can save the user about 25% of their charge costs when they use ToU tariffs.

But we don't think this is enough to have EV drivers chose to use our app. We think we need to offer incentives which reflect the savings made by EBD for these load shifting services. This will require either flexibility markets or direct incentives (with provable participation) from EBD for charger users actually loadshifting to offpeak time.

One of the easiest way for this action to be delivered is by enforcing retail tariffs to reflect the

EDB ToU tariff structures. But if charger users are able to participate in rewards schemes which share the savings of offsetting infrastructure costs, they are far more likely to want to purchase smart chargers to participate in this flexibility services market via their mobile app provider or other EDB / Flexibility provider rewards mechanisms

- What incentives do you think would be effective and who should provide these?
- What other incentives might be valuable beyond financial incentives?

m) 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?

Yes, a good secondary plan. But using incentives to begin with is important such as discounts on specific charger types. Enforcement could come at a later stage but education and incentives should be used first as the public doesn't understand the potential issues of peak demand from EV chargers. In fact we are only just moving past the 'EVs are bad' stage here in NZ.

- What information could you provide to support your position?

n) 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?

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

EECA
By email: STAR@eeca.govt.nz

24 August 2022

Improving the performance of electric vehicle chargers

Well done on publishing the green paper and it is exciting to be looking forward to a greener future. It is important, as we do this, that we do not limit ourselves to today's problems and today's answers.

EECA's paper is focused on consultation on plug-in chargers but there are much bigger gains and flexibility to be had from wireless charging as it becomes broadly available.

IntDevice has developed unique technology for charging electric vehicles at a range of power levels and are working with vehicle manufacturers towards standard deployment in vehicles of the future. Our solution offers high charging rates (>50kW), combined with no material above-ground infrastructure cluttering footpaths and busy spaces (unlike cable chargers) and an ability to be deployed everywhere.

The Context Will Change – the future is wireless

The green paper notes that 82% of cars charge in garages currently – this number will fall over time as families' second cars are increasingly electric and EVs are bought by a broader socio-economic demographic. You need only look to the busy streets of New Zealand's main cities over night to see how many cars do not have garage access. These cars will need ready access to charging facilities – in-road wireless charging will be ideal. Widespread deployment of plug-in chargers will not be accepted in busy urban streets where the trend (as it should be) is to make more space for pedestrians and to make prettier streets. Do not prepare for a future with row-upon-row of ugly boxes with long cables that drag on the ground and get regularly damaged.

The situation will become more extreme as cars are increasingly autonomous over time. One of the benefits of autonomy is greatly reduced kilometers travelled. It will be counter-productive to force autonomous vehicles "back to base" to charge and ridiculous to require a human to plug them in. Widespread wireless charging in public areas will solve both of these issues.

Benefits to come

The green papers refers to some core features of future charging infrastructure:

1. efficiency – our wireless solution is as efficient same as plug in (measured from energy source to battery)
2. interoperability – whatever solution may develop is easily implemented with our wireless technology
3. connectivity – unlike plug-in chargers, all our systems are Wi-Fi enabled as the ground and vehicle pads need to communicate. Connecting other Wi-Fi networks nearby to share data is very simple.

A significant focus of the paper is on limiting peak usage as demand grows. Turning off discretionary demand as peak times will clearly help. Reversing current flows through V2G goes much further to dampen peaks. V2G is an inherent feature of our wireless technology

and, combined with the native Wi-Fi connectivity, simple to activate as demand requires. Fully-automated wireless charging, on a wide scale, may be the single most significant measure we can take to limit peak energy consumption in distribution networks.

As a final thought, it has always been hard to predict the future and the optimal solution for EV charging is no different. As a default, we recommend the New Zealand environment focus on removing barriers to solutions and allow users to see what works. It is well trodden ground that "picking winners" in complex environments is beyond our best abilities.

Regards,

Nick Clarke
IntDevice
CCO

Star

From: Larry Green [redacted]
Sent: Sunday, 28 August 2022 11:35 pm
To: Star
Subject: Inclusion of EV Charging Stations into the Gaspy Application

To whom it may concern,

We have recently embedded all known EV Charging Stations into Gaspy. These are now available as an alternative fuel type to our 1 million+ membership. In the process of implementing EV into Gaspy we are constantly receiving and compiling valuable feedback from drivers across NZ. We would like to share these findings with ECCA in the interests of improving EV uptake and further supporting existing EV drivers . Please forward this email to the relevant parties.

Looking forward to sharing our findings soon,

Larry Green
Director
www.gaspy.nz
www.hwem.nz

Influx Energy Data Ltd feedback on the EECA green paper "Improving the performance of electric vehicle chargers"

https://www.eeca.govt.nz/assets/EECA-Resources/Consultation-Papers/EV-charging-Green Paper-8-August-2022.pdf

At Influx, we believe in the power of data. As one of New Zealand's leading energy data solutions providers, and through our extensive network of smart and legacy meters, our dedicated team provide services that empower customers, driving innovation for Kiwi businesses, industries and the communities we share.

Influx is a MEP (Meter Equipment Provider), specialising in asset management and compliance. We operate and manage check metering, Smart (AMI) and Legacy meter installations. We manage the full lifecycle of metering assets from installation, maintenance, compliance, in-market meter upgrades, communications upgrades, revenue assurance and connection services.

Influx develops a range of innovative cloud services for providing richer data, insights and management of meters.

Influx is a 100% owned subsidiary of The Lines Company.

Influx provides demand response services for hot water load management on and off The Lines Company network.

Influx also operates a small number of GoodMeasure EVSE smart EV chargers, that it develops and manufactures.

Prepared by: Mike Ullrich
CEO
Influx Energy Data Ltd
[redacted]
www.influxdata.nz

Influx Energy Data Ltd ("Influx") response submitted 2nd September 2022.

Q1. 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.

Q2. 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?

Flexibility will be a critical feature of our future electricity system. In particular, smart EV Charging (and, in time, V2G) has huge potential to provide a range of services, from balancing renewables on the grid to managing localised constraints on distribution networks.

In terms of most important to least important:

- *Basic functions - unclear from the paper - but the assumption is that this is controllable centrally by an aggregator*
- *Default off-peak charging mode*
- *Randomised delay function*
- *V2G/V2I enablement*

What functions would you add or exclude, if any, why?

- *Essential that the charger is able to be dynamically controllable by EDBs, Retailers, End Customers, other parts of the energy value chain, that can act as possible DER aggregators.*
- *Useful for the charger to adopt a standard that supports the ability to query the status and current charge levels of an EV battery to ensure that customers that most need a higher charging rate can be prioritised.*

Q3. 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?

Generally speaking, open access, standardised protocols are important to quickly build up critical mass and provide interoperability.

However, the paragraph in the consultation paper is describing what the end points need to support, without considering the infrastructure and system that it interacts with. OpenADR may be a good candidate for a protocol in conjunction with OCPP, but further examples / case studies of what the system may look like needs to be developed first and used to validate the requirements.

We agree with the principle of open access, however further work is required to determine which open access protocols are appropriate.

- *Do you think that 'smart' chargers should address issues of cyber security?*

Smart EV Chargers should support industry standard encryption protocols, authentication, and best practice (such as rate limiting of requests) to address cyber security.

A significant risk to consider is what happens to orphan EV chargers once the manufacturer is no longer offering firmware updates to address security vulnerabilities. It would not be unexpected for many installed EVSE chargers to still be operational and in use in 10 – 20

years time. There are many manufacturers of EVSE equipment, and a portion of those will not be around to support these EV chargers for 10 - 20 years.

Should a significant volume of EVSE chargers become compromised:

- What is the severity and likelihood of this risk to the electricity network?
- What can the DER aggregators do to mitigate this risk?

Q4. 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?

We agree that EV chargers should transmit information on energy consumption. This will be increasingly important as new business models utilising concepts like MTR (Multiple Trader Relationships) become established.

Location should be tied to an existing meter ICP (Installation Control Point), perhaps as a new sub-ICP. The location is this ICP should be recorded in a centralised registry as it is today.

MEPs are currently set up to manage these records and process data as per the Electricity Industry Participation Code (EIPC). It makes sense to leverage this existing infrastructure that is subject to EA audits.

- *Who should be able to access this information?*

Anyone who the end customer authorises the MEP to release data to. This should include, by default, a Trader (typically a Retailer), the EDB (for network management purposes), and any other party that the end customer authorises.

- *In what form should it be transmitted?*

Using the current, or potentially an extended version of EIEP data formats.

- *What processes should be in place to safeguard the data?*

From EV charger to data aggregation point, they should be using industry standard encryption and authentication, and also following the requirements set out in EIPC as used currently by MEPs.

Q5. 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 agree that EV chargers should monitor and record electricity consumed and for this to be provided to the owner. We expect that this will be done by the Trader (Retailer) and in many cases may also be done by the EV charger provider.

- *What other information may be valuable to the EV owner?*

When the charging occurred, and if charging incurred fees at different rates (off-peak, shoulder, etc).

- *What format should be used for this information if this requirement is adopted?*

We expect that this is provided to the EV Owner visually by the Trader (Retailer) through a GUI, however, this will be up to the Trader to innovate and provide a competitive user experience.

Q6. What are your thoughts on requiring mandated power quality and control settings for EV chargers?

If these features are not commonly available in most EV chargers, then limiting NZ to only use chargers with this capability may lead to reduced EV charger options and higher prices for the end consumers.

Q7. 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?

We are unaware of significant differences in efficiencies of on-board chargers.
Further research should be undertaken to better understand the breadth of this issue. If it is indeed a significant issue, then it may be useful to educate end customers through efficiency labelling on cars.

Q8. 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. However, as the AC EV is simply acting as a switch, it may not make sense to label efficiency, instead focusing on whether it is smart and charging rate. There appears to be significant confusion in the industry on charging rate ("speed"), and whether they are smart.

Q9. What are your thoughts on whether charging cables which contain a 'smart' charging enabling device should be in scope for intervention?

All EVs are provided with some sort of portable charging solution, and they are useful for "away from home" charging. These solutions tend to be lower current, 16A and below.

Professional installed EV Chargers should provide addition benefits, including faster charging, ability to access cheaper plans by time shifting, etc, which would provide an incentive for customers to use these in preference to the portable charging solutions.

The impact on networks due to portable charging solutions is expected to be low and therefore, it does not make sense for these EV Chargers to be in scope for intervention.

Q10. 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?

With the "do nothing" approach it may take time for the market to establish critical mass and then correct itself to the optimal solution, and in the meantime there is likely to be divergent incompatible solutions.
Further, customers may adopt solutions that become orphans (unsupported in the medium to longer term), which will lead to additional costs and be an undesirable outcome for them.

Q11. 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?

Education and providing information is important to drive appropriate behaviours including websites, total cost of ownership efficiency labelling, etc. We believe that this is part of the solution.

Q12. 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?

There is a high upfront cost for purchasing and installing Smart EV Chargers.
The clean car incentive appears to have been effective at driving adoption of the purchase of EVs. Perhaps a larger incentive can be provided on proof of purchase of a smart EV Charger once it is connected to a recognised DER aggregator or Demand Response dispatcher.

Q13. 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?

We support the use of regulation to require that all EV chargers sold for domestic use in NZ have smart capabilities. The approach taken in UK appears sensible.

Q14. 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 are unfamiliar with PAS - no comment.

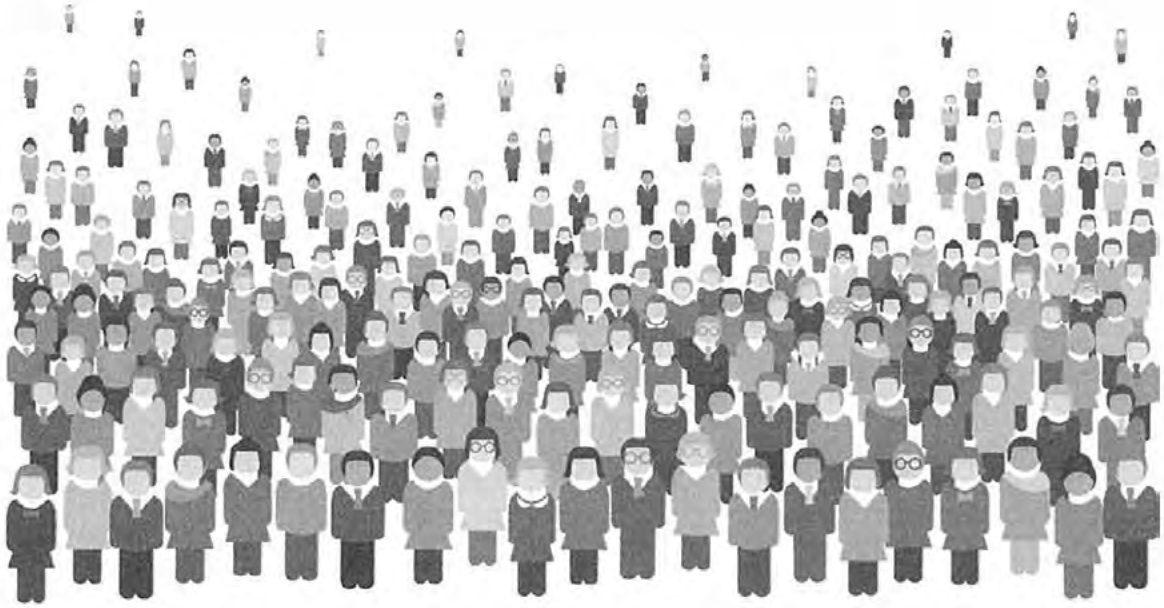
Q15. In what other ways might the energy performance of EV charging in New Zealand be improved, that do not require EECA's involvement?

Our expectation is that EV manufacturers will begin to promote energy performance as customers become more accustomed to EV charging and the costs associated with it. Labelling, as discussed under Q11, will help inform customers on efficiency, but ultimately this is just one aspect that contributes to their decision in purchasing an EV and EV charger.

26 August, 2022

NZ Automobile Association submission on:

Improving the performance of electric vehicle chargers



SUBMISSION TO:	Energy Efficiency & Conservation Authority
REGARDING:	Improving the performance of electric vehicle chargers
DATE:	24 August 2022

ADDRESS:	EECA PO Box 388 Wellington 6140 Email: STAR@eeca.govt.nz
SUBMISSION AUTHORISED BY:	Simon Douglas General Manager, Motoring Affairs New Zealand Automobile Association Incorporated (NZAA) PO Box 1, Wellington, 6140
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Executive summary

The New Zealand Automobile Association (AA) welcomes the opportunity to provide comment on EECA's green paper, Improving the performance of electric vehicle chargers.

The electrification of our light vehicle fleet will bring many benefits to society and the environment. However, the replacement of a large proportion of our light vehicle fleet by EVs will have significant impacts on our electricity systems. Smart charging can make charging EVs significantly cheaper and safer for EV owners and allows them to play a part in electricity demand response.

Our current grid will not handle these new loads in electricity caused by large scale EV charging. Currently our peak load occurs twice daily: once in the morning as people arise and turn lights and appliances on, and again in the evening when we return home and turn lighting and appliances on. This is further increased in winter when we heat the house as well. This leads to a surge in the power demand. To meet this demand, significant extra investments will be necessary to upgrade both the networks that supply electricity and our generation capacity to provide it. This could mean electricity prices increase for consumers. If EV charging continues to rely on regular charging points, which simply supply power at a standard rate until the vehicle is fully charged, this could cause real issues for EV owners.

The AA supports the adoption of EV smart chargers that are subject to regulated standards and supported by time-of-use pricing and demand response capability.

Further, the AA encourages an Emissions Trading Scheme-funded large scale investment in private and public EV charger infrastructure via the Low Emissions Transport Fund. Such an initiative could be co-funded by electricity suppliers with a contribution from the householder. This model has been successfully used by EECA in its Warm-Up New Zealand home insulation programme.

Consultation Questions

Q1 Engagement principles

EECA wants to ensure the costs and benefits of smart EV chargers are equally shared for both electricity providers and consumers. The AA is concerned the cost to upgrade the physical network will be passed on to consumers through an increase in line charges while the benefits of managing peak electricity demand will accrue to the electricity providers.

Traditionally electricity in the network flows in one direction, from generation to transmission lines on to lines companies then to the consumer. If vehicle to grid (V2G) is introduced, then the local lines and isolation points, as well as transformers, will need updating to handle the bidirectional flow of electricity. The cost of these upgrades will be passed onto all consumers, creating a situation where householders and industry will be cross subsidising infrastructure required for EV owners.

The AA agrees with the stated principles and challenges EECA to "ensure the costs and benefits of smart EV chargers are equally accredited to both electricity provider and consumers".

Q2 Proposed specifications for smart chargers

The proposed specifications as outlined as potential characteristics of smart chargers appear appropriate. The most important characteristics are safety, reliability, compatibility and efficiency.

Q4 Information on location and use

Currently the Electricity Authority maintains a register of all meters, and each has a unique installation control point (ICP) number. Publicly viewable data about the type of meter, its certification expiry data and electricity supplier along with other information is available on the EA website. It would be easy to link the EV charger information to the ICP number to more easily allow multiple trader relationships or peer-to-peer trading. If linked, then a correctly configured smart meter may be able to provide the live consumption data and make the requirement for EV charger open access communication redundant.

Q5 Monitoring and recording electricity consumption

As noted above, this is an important feature for an EV owner and network operator. It could be achieved by measurements taken by the EV charger or an appropriately configured smart meter.

Q6 Mandating power quality

With the proliferation of EV chargers expected in the future and the additional load and impact on the network, it is imperative that the power quality be mandated to minimise any negative impacts on the network.

Q7 Regulating energy efficiency

The main barrier to regulating the energy efficiency of on-board chargers is that they are not a stand-alone device, rather a component in a vehicle. This would make it very difficult to regulate the on-board charger for two reasons:(1) The New Zealand new vehicle import market is treated by many manufacturers as a branch of the larger Australian market, making up 15% of the Australasian market. The Australian market is 5% of the Japanese export market and New Zealand adds a further 1%. Therefore, it would be extremely difficult to mandate specifications for on-board chargers supplied to our market as we have a small market share without influence. (2) In 2020 around 45% of new entrants to the fleet were used vehicles. By the nature of their age, the technology in these used vehicles is dated. Creating a Minimum Energy Performance Standard (MEPS) for in board chargers that was applicable and fair to the new and used vehicle importation sectors would be problematic. Also, a MEPS usually removes a percentage of the worst performing appliance or product that was on the market. It would be counter productive to New Zealand's climate change goals in the transport sector to remove the availability of some models of EV if their on board chargers did not meet the required standards.

The AA does however support MEPS for fixed chargers.

Q8 Labelling aftermarket AC EV Chargers

No Comment

Q9 Labelling aftermarket AC EV Chargers

No Comment

Q10 Do nothing option for EV Chargers

The AA welcomes government intervention to set international agreed standards and protocols for smart charging EVs in New Zealand. The failure to do so early will be a lost opportunity to cost-effectively manage over investment in the electricity network. Waiting will ultimately be more costly to consumers and slow the uptake of EVs.

Q11 Information, education and labelling

A marketing campaign and information on websites will inform potential owners of smart chargers, of their potential benefits and features. However, as they are installed by an electrician and more than likely purchased as part of the total service, equipment and installation for a price, then labelling would have limited impact.

Q12 Incentives to encourage the uptake of smart EV chargers

In 2021 to 2022 only $4m was allocated to the Low Emissions Transport Fund to co-fund the adoption of public EV charging infrastructure. In future years this level of funding will be insufficient to meet the growing demand for public charging stations. As well as increasing public charging infrastructure, there is also the need to rapidly increase the installation of private charging infrastructure at scale.

Timing of Investment is Critical

A December 2021 report from Concept Consulting, funded by a group of energy providers and automotive interests (including the AA Research Foundation), estimated that approximately 85% of EV charging will occur at home, but there is also a need for significant public and community charging infrastructure. This infrastructure requires large-scale public funding to overcome the "chicken and egg "situation that arises with new technologies. Public charger investment needs to be leading, not lagging EV uptake. With uncertainty over the uptake rate of EVs, private investors tend to under-invest rather than over-invest. Concept Consulting's analysis around the outcomes from under- or over-investment calculated that bringing forward investment two years too early would cost $165m. Delaying the investment and impeding EV uptake by two years would increase transport costs by $4.2bn, twenty-five times as much. This shows the importance of government investing to help stimulate action at the right time.

Changes to Planning Rules Increase the Need for Public Charging Infrastructure.

The National Policy Statement on Urban Development (NPSED) prevents councils in Auckland, Wellington, Tauranga, Christchurch, and Hamilton from imposing height restrictions of less than six-storeys. They also remove the need for developments to provide car parks. Further, for other urban areas with more than 10,000 people, district plans must not include minimum car parking requirements, other than for accessible carparks.

This densification of housing without carparks will create a much greater need for community EV charging stations as although it is envisaged that these large-scale apartment complexes will be serviced by good public transport, there will still be a need for private vehicles, and to meet our carbon reduction targets, these vehicles need to be electric.

Provision of Private Charging Infrastructure

WorkSafe NZ guidelines strongly discourage allowing an employee with an employer-owned vehicle from charging the vehicle at home using Mode 2 charging with an in-cable control and protection device. This is because it relies on the safety and integrity of the home's wiring, something that the employer has little control over.

To address this issue, when home charging a vehicle used for business purposes is considered appropriate, a dedicated charging station should be installed at home. Currently, these guidelines promote the safe use of EV domestic charging to limit the liability of the employer, but they could also act as a disincentive for companies to purchase EVs for work purposes. Any barriers such as this to purchasing EVs need to be removed. Given fleet buyers are the biggest purchasers of new vehicles, they are able to become the biggest purchasers of new EVs as long as any disincentives like this are removed.

Therefore, the AA proposes that EECA should significantly scale up the Low Emission Transport Fund so that there is a much greater investment in both public and community EV charging infrastructure, and also investigate the development of a scheme to co-fund private smart EV charging installations. These domestic charging points could be co-funded with electricity suppliers with a contribution from the householder. This model has been successfully used by EECA in its Warm-Up New Zealand home insulation programme.

Like insulation, a domestic EV charger would be a legacy asset for a home because it would remain installed even when a home changes ownership.

The AA favours the participation of the electricity suppliers in this, so that they know where chargers are located and can therefore forward plan demand profiles, the size of transformers, and facilitate a two-way smart grid where the householder is potentially a buyer and seller of electricity. This could further encourage and increase the uptake and utility of renewable electricity. Concept Consulting calculate that large-scale smart charging could avoid $1.7bn in peak and generation investment.

The AA supports revenue from the Emissions Trading Scheme levy on mineral fuels being hypothecated towards funding projects that reduce transport emissions, which could include establishing EV Charger Standards and subsidies to accelerate the installation of EV chargers at scale. Currently the government is collecting about $950m a year in ETS revenue from transport.

We encourage the use of hypothecated revenue from the Emissions Trading Scheme allocated to the Climate Emergency Response Fund to be used to increase the funding of the Low Emission Transport Fund.. Transport emissions are recognised as low hanging fruit in the Emissions Reduction Plan. Therefore, the AA strongly supports the Low Emissions Transport Fund be significantly

expanded with ETS funds to provide greater public EV charging infrastructure, commence a home EV charger installation scheme modelled and scaled on the Warm-Up New Zealand programme.

Q13 Regulating EV chargers

The AA supports regulating the smartness of EV chargers so that the full benefits of load management and time-of-use pricing be attained. The opportunity to do this early is important and issues like safety, cyber security, communications, time-of-use variability and energy efficiency should be addressed.

The AA believes that New Zealand should adopt an approach similar to that employed in the UK so as to unlock the full potential of EV ownership.

About the New Zealand Automobile Association

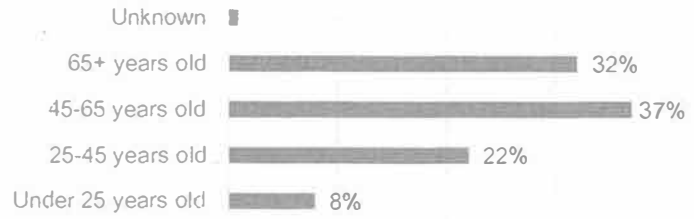
The NZAA is an incorporated society with over 1.8 million Members, representing a large proportion of New Zealand road users. The AA was founded in 1903 as an automobile users' advocacy group, but today our work reflects the wide range of interests of our large membership, many of whom are cyclists and public transport users as well as private motorists.

Across New Zealand, the motoring public regularly come into contact with the AA through our breakdown officers, 36 AA Centres and other AA businesses. Meanwhile, 18 volunteer AA District Councils around New Zealand meet each month to discuss local transport issues. Based in Wellington and Auckland, our professional policy and research team regularly surveys our Members on transport issues, and Members frequently contact us unsolicited to share their views. Via the AA Research Foundation, we commission original research into current issues in transport and mobility. Collectively, these networks, combined with our professional resource, help to guide our advocacy work and enable the NZAA to develop a comprehensive view on mobility issues.

Motorists pay over $4 billion in taxes each year through fuel excise, road user charges, registration fees, ACC levies, and GST. Much of this money is reinvested by the Government in our transport system, funding road building and maintenance, public transport services, road safety work including advertising, and Police enforcement activity. On behalf of AA Members, we advocate for sound and transparent use of this money in ways that improve transport networks, enhance safety and keep costs fair and reasonable.

Our advocacy takes the form of meetings with local and central government politicians and officials, publication of research and policy papers, contributing to media on topical issues, and submissions to select committees and local government hearings.

Total Membership	1.8+ million members
	Just over 1 million are personal members
	Over 0.7 million are business-based memberships

% of licenced drivers	At least 29% of licensed drivers are AA Members
Gender split	54% Female 46% Male
Age range & Membership retention	Age of AA Members  Half of AA Members have been with us for 10 years or more.

EVs Enhanced

Date: 29/08/2022

EVs Enhanced Submission on “Improving the Performance of Electric Vehicle Chargers” Green Paper

1 Introduction

First we would like to thank EECA for the opportunity to submit our views on the "Improving the performance of electric vehicle chargers" green paper. EVs Enhanced appreciates having the forum for our suggestions and experiences to be heard.

As a technical point, we have noted that the term 'EV charger' has been used in the green paper to describe what is typically referred to an an EVSE to avoid confusion with the on-board charger in the vehicle. Following the convention used in the green paper, we have also used the term 'EV charger' interchangeably with the term EVSE. When referring to the charger in the vehicle, we have used the term 'on-board charger'.

Our responses to the green paper questions can be found in the section below.

2 Q&A Responses

Q1.) What are your thoughts on EECA's suggested engagement principles for EV chargers?

The one listed engagement principle that we believe is misguided is:

- EV chargers should have a level of smartness and energy efficiency that is cost-effective and provides the greatest net benefit; and

We believe this statement focuses too heavily on the connectivity or smartness of the EV charger as a requirement to to shift demand away from peak periods to align it with periods of low demand. We also believe that the discussion of energy efficiency of EV chargers is problematic which we will discuss further in our answers to later questions.

We would suggest the following replacement:

- There should be a reliable mechanism to shift EV charging demand away from peak periods to align it with periods of low demand;
- EV charging solutions should be cost-effective and not reduce the charging efficiency of an EV while in use;

We also think that consumer data privacy needs to be a core guiding principle in engaging with residential EV charging. There is a strong cross section between resistance to EV adoption and opposition to monitoring and surveillance, and that further entrenchment against EV usage could be an unintended consequence of making smart charging devices a regulated requirement.

We see in the proposal that data privacy is raised in a number of locations, but we think it is important enough to be a part of the guiding principles.

Q2.) What are your thoughts on the proposed specifications for 'smart' chargers in New Zealand?

All of these specifications boil down to shifting EV charging demand away from peak periods to align it with periods of low demand. The smart functionality built into the EV itself if already far more capable of achieving this independently of the EV charger that supplies the vehicle. Therefore, EVs owners already have the ability to alter their charging habits without incurring any additional costs, but currently they are often not sufficiently incentivised to do so.

We believe that smart chargers actually achieve a slightly worse overall result for both the reduction of peak demand and energy efficiency. As correctly pointed out in the green paper, "there is evidence that some vehicles do not restart charging if the charger is switched off before charging is complete". As a dirty way to to address this, smart EV chargers often need to maintain a minimum level of current or power when it is connected to the vehicle. However, on most EVs, the charging efficiency will be reduced when charging at a much lower charging current/power than the car's on-board charger has been designed for. In contrast, when the EV is controlling the charging session, the entire charging event can be delayed until off-peak times and then when charging does commence, charging with occur at maximum efficiency. Furthermore, a connected smart EV charger will always have slightly lower charging efficiency than the equivalent 'dumb' charger due to the energy consumed in operating a cellular or Wi-Fi radio.

The randomised delay that is discussed to stage in charging of EVs during off peak times, can be achieved through sufficiently strong differences in price signals for different customers on different electricity plans.

We are happy to provide more detailed information to back up the comments above.

Q3.) Do you support EV charging being open access, and why/why not?

As is the case with almost all connected IOT devices, there is some cyber security risk that does not exist with the equivalent non-connected solution. The damage caused in the event that residential smart EV chargers are successfully attacked seems fairly minor, but if the goal was to cause maximum havoc for the electricity system then presumably switching on all smart EV charging at maximum charging power at exactly the point of peak demand during a cold winter evening would do that.

Having the majority of smart EV chargers being the same brand or even just sharing the same communications protocols does mean that a successful attack would likely have a wider impact than a more fragmented approach. However, there are also clear advantages of having a standardised protocol as pointed out in the green paper and one well-designed protocol is likely to have fewer security vulnerabilities than a proprietary protocol implemented ad-hoc on a smaller scale. However, less widely used protocols are also a less lucrative target. Clearly there is not one correct answer with each approach having pros and cons and the real risk being difficult to quantify.

However, in contrast, using the EV to control smart charging reduces the cyber security risks as electricity operators would not have direct control over the EV charging, but could still have a strong influence on EV charging behaviour (and the use of other electrical loads) as long as price signals are sufficiently strong.

Q4.) 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?

We do not believe that EV chargers should need to transmit information on their location and use. Every residential address already has a known location and the combined consumption of all loads at this address is already monitored via the smart power meter used for billing. Incentivising load shifting of all loads at that address (whether from an EV or not) would more beneficial for reducing the load on the grid at peak times and minimising the need to operate dirty 'peaker' power sources.

We also believe that requiring this information will strongly dis-incentivise privacy-forward people from making the switch to an EV.

Q5.) 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?

This should not be a requirement, but an additional feature that the EV owner may choose when purchasing an EV charger. Many EV chargers do have built in energy meters, but including an accurate meter does add cost and having this information is not a requirement to allow an EV owner to charge in a smart way that is both environmentally and financially advantageous.

Q6.) What are your thoughts on requiring mandated power quality and control settings for EV chargers?

This seems like a reasonable requirement to ensure resilience of the electricity network, however this requirement can easily be met without the need for a smart charger involving connectivity and control by a remote party. EV chargers could simply be designed to turn off when the frequency or voltage drops below a pre-set threshold.

Q7.) What are your thoughts on regulating the energy efficiency of onboard EV chargers?

As the green paper correctly points out, consumers have low awareness of charging losses. Rather than regulating the energy efficiency of EV chargers, we suggest adding vehicle based information on charging efficiency to the Vehicle Emissions and Energy Economy Labelling that is advertised with the sale of each new EV. This information should include charging at various power levels up to the maximum that the on-board charger in the EV can accept. We have seen information that suggests that charging an EV at a much lower power level than the on-board charger has been designed for can reduce the charging efficiency considerably. Giving this information to someone purchasing an EV would provide an incentive to purchase/install the type an EVSE that will allow the on-board charger in the EV to operate as efficiently as possible.

Q8.) What are your thoughts on labelling aftermarket AC EV chargers?

It is not clear to us what the proposed labelling would include beyond that power rating that the EV charger can support which all of these devices already list. Almost all single phase wall-chargers in NZ support charging up to 7.4kW and there are very few EVs that support single-phase charging at higher power. Some labelling for the varying degrees of 'smartness', than an EV charger may have could be useful to consumers if these helped to identify what features the 'smartness' enables.

Q9.) What are your thoughts on whether charging cables which contain a 'smart' charging enabling device should be in scope for intervention?

We believe it is false to suggest that plug-in Mode 2 EVSEs are not designed for constant overnight use and that they pose safety risks even when correctly designed and manufactured. A poorly designed and manufactured wall-mounted Mode 3 EVSE poses a similar safety risk to a poorly designed and manufactured plug-in Mode 2 EVSE. The main difference is that plug-in Mode 2 EVSEs support significantly lower powered charging rates (typically 1.85kW for a standard 10A three-pin socket). Charging at such a low power may have reduced charging efficiency on some EVs. An example of a plug-in Mode 2 EVSE which can still provide maximum efficiency can be found when charging an EV with a 3.6kW on-board charger (which applies to the majority of imported Nissan Leaf models). In this case, a 3.7kW Mode 2 EVSE (with a standard 16A 'caravan' plug) provides a safe and cost effective solution that still allows maximum charging efficiency.

A Mode 2 EVSE can have the same connectivity and smartness as a Mode 3 EVSE. As a result, there should be no distinction between the two types other than the charge rates that they can support.

Q10.) What are your thoughts on the 'do nothing' option for EV chargers in New Zealand?

We fully agree that cost reflective electricity prices will send signals to consumers that encourage behavioural changes to maximise savings. However, we believe that currently these signals are not strong enough and in particular many New Zealanders remain on fix tariff power plans where time of use is irrelevant to them. In reality, time of use is important for both the cost of electricity supply/distribution and the environmental emissions related to different types of generation required at the time of use.

Therefore, we think that fixed rate tariffs should be abolished. This will prevent people from defaulting to a position of indifference regarding their impact on the grid loading. While exposing all consumers to spot-pricing is almost certainly a step too far, we would like to see all residential customers move to power plans with more than just two rates for peak and off-peak usage with significant financial incentives available for them to shift their usage for all loads (EV or not) to periods of low demand.

With the cost of living increasing and the average New Zealander getting even more price conscious, we believe that the correct price signals would easily modify the charging behaviour of EV owners. Most EVs already have the built-in functionality to move charging to off-peak times while retaining a conventional and cost-effective 'dumb' charger.

In regards to energy efficiency, this has little to do with smartness of the EV charger, but only the power rating that the device supports and the EV that it will be connected to. If anything, a connected smart EV charger will have slightly lower charging efficiency than the equivalent 'dumb' charger due to the energy consumed in operating a cellular or Wi-Fi radio. We agree that more information on charging efficiency is needed, but this is specific to the EV at various charging power levels rather than the EV charger that is connected to the EV. As pointed out in the green paper, in the case of AC charging, the conversion is occurring in the on-board charger of the EV and the external EVSE is just acting as a switch that closes to allow AC electricity into the EV. We suggest adding vehicle based information on charging efficiency to the Vehicle Emissions and Energy Economy Labelling that is advertised by car dealers when selling an EV. This information should include charging at various power levels up to the maximum that the on-board charger in the EV can accept.

We may be able to assist with collecting and/or providing further information on the charging efficiency when operating at various power levels for a range of different EVs that are available in the New Zealand market.

Q11.) What are your thoughts on the likely effectiveness of information, education and labelling to improve the uptake of 'smart' EV chargers?

As discussed in our answer to Question 10, the energy efficiency during charging has nothing to do with whether an EV charger is smart or not. Any information or education to suggest that a smart charger is required for efficient EV charging would be misleading. The information that we would like consumers to be more aware of it the various benefits of shifting all electrical loads to periods of low demand and this is particularly important for larger loads like a charging EV. Combined with advertising of appropriate price signals, consumers will be incentivised to seek an effective solution to minimise the cost of charging their EV whether that be through the use of a connected/smart charger or not.

Q12.) What are your thoughts on the use of incentives to encourage the uptake of 'smart' EV chargers?

The current time-of-use tariffs are not used widely enough for all consumers and on many plans the two-tired tarrifs are not sufficient to reflect the differences in the cost of electricity generation and supply. We believe that the incentives for shifting demand should be based on the power plans offered to consumers rather than promoting connected-smart chargers as the only way of controlling EV charging. In reality, most EVs have the ability to control their own charging in a far smarter way than most 'smart' EV chargers can. Likewise, we think that time of generation should also be factored into power plans to encourage the installation and use of Vehicle to Grid (V2G) systems where EV owners are heavily incentivised to assist the grid in times of peak demand. A significant barrier to uptake is that currently the price for providing power through V2G or other means is unviably low, and does not reflect the spot price or the value of that power at times of high demand. It seems unlikely that handing control of charging and V2G to the same institutions that currently manage these prices would give EV users the maximum utility of their vehicles or chargers.

One application where we can see that smart charging has significant benefits and where incentives will likely be required is in the case of some residential rental properties where vehicles must be parked outside in a shared area. The problem here is that many tenants may be interested in purchasing an EV, but will be discouraged from doing so if they don't have a suitable place to charge it overnight. Furthermore, if the tenant does choose to buy an EV when they don't have convenient access to overnight charging, they will tend to clog up public destination chargers and fast chargers often at times of day when the load on the electrical grid is at its peak. This is clearly an undesirable outcome moving forward.

Currently landlords don't have an incentive to upgrade their properties to include EV charging particularly in a rental market where there is high demand for their property anyway. Providing landlords with an incentive to install a 7.4kW Mode 3 wall charger with Type 2 socket at their rental property would provide benefit to any current and future EV owning tenants regardless of which EV they have. In shared parking areas where anyone could plug-into the charger, such EV chargers would need to be smart and have the option of offering either restricted use or separate billing. There would also need to be a mechanism to ensure that the charger remains at the same location once installed.

Q13.) What are your thoughts on regulating the 'smartness' of EV chargers in New Zealand?

We do not think that the 'smartness' of EV chargers should be regulated in New Zealand. Regulations requiring the use of smart chargers will increase the cost of a household moving to an electric vehicle and reduce their desire to do so. Requiring EV charging to be controlled by a third party for the sake of the electricity network also reinforces the message that the grid is fragile and cannot support EVs which is already emerging as argument against buying an EV. Therefore mandating the use or smart EV chargers could be directly working against the goal of minimising energy emissions and encouraging EV uptake.

Just sending the correct and sufficiently strong price signals based on time-of-use avoids these issues.

Q14.) What are your thoughts on using the PAS for residential EV chargers to underpin regulation/incentives?

We have not taken the time necessary for an in-depth technical review of the content of the PAS so will refrain from commenting.

Q15.) In what other ways might the energy performance of EV charging in New Zealand be improved, that do not require EECA's involvement?

As noted in the green paper, most countries are not explicitly addressing the energy performance of EV charging. This does seems like a good opportunity for New Zealand to set the example for grid management with respect to EV charging.

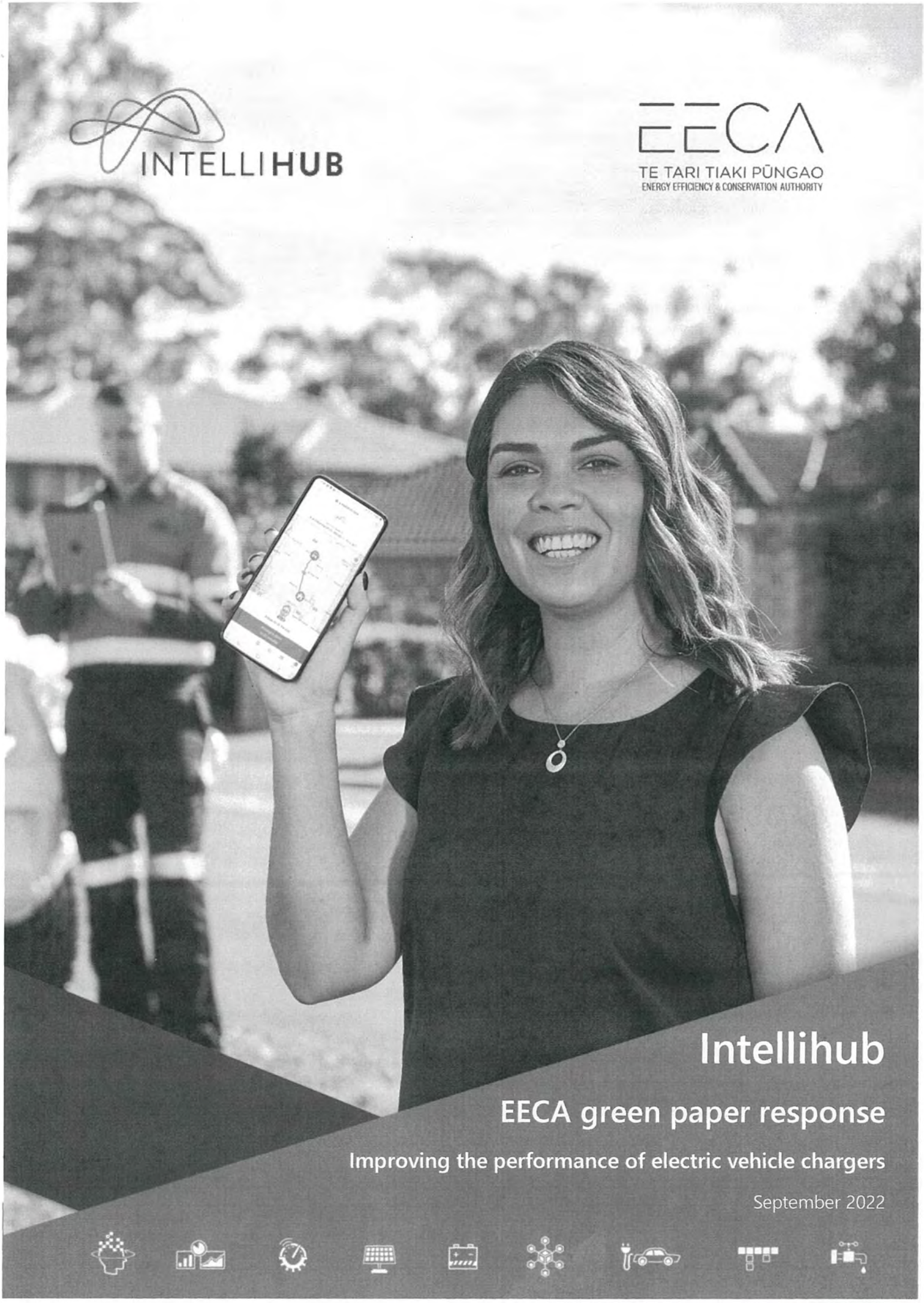
EECA's time could be well spent looking at how power pricing relates to grid loading and popularising split tariff power plans. Consumers will naturally shift to late night charging if these plans become the standard offering and they have greater access to attractive off peak pricing.

Our understanding is that losses during charging incurred in the EVSE are small to insignificant when compared to the losses incurred in the EV's on board charger and the battery itself. As such, we would like to see vehicle-based information on charging efficiency added to the Vehicle Emissions and Energy Economy Labelling that is advertised with the sale of EVs. This information should include charging at various power levels up to the maximum that the on-board charger in the EV can accept. We would suggest displaying the charging efficiency at three points:

- 1.85kW (i.e. a standard 10A 3 pin plug)
- 3.7kW (a 16A "caravan" plug)
- 7.4kW if supported by the vehicle

It would also seem appropriate to indicate the approximate duration of a charging session at these different power levels. A 4th data point for fast charging would also seem appropriate. In almost every case, DC fast charging will result in significantly lower charging efficiency than AC charging at home.

This information would empower consumers to make more informed purchases and encourage manufacturers to produce more efficient vehicles, just as it has in other sectors.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EECA green paper response
Improving the performance of electric vehicle chargers
September 2022

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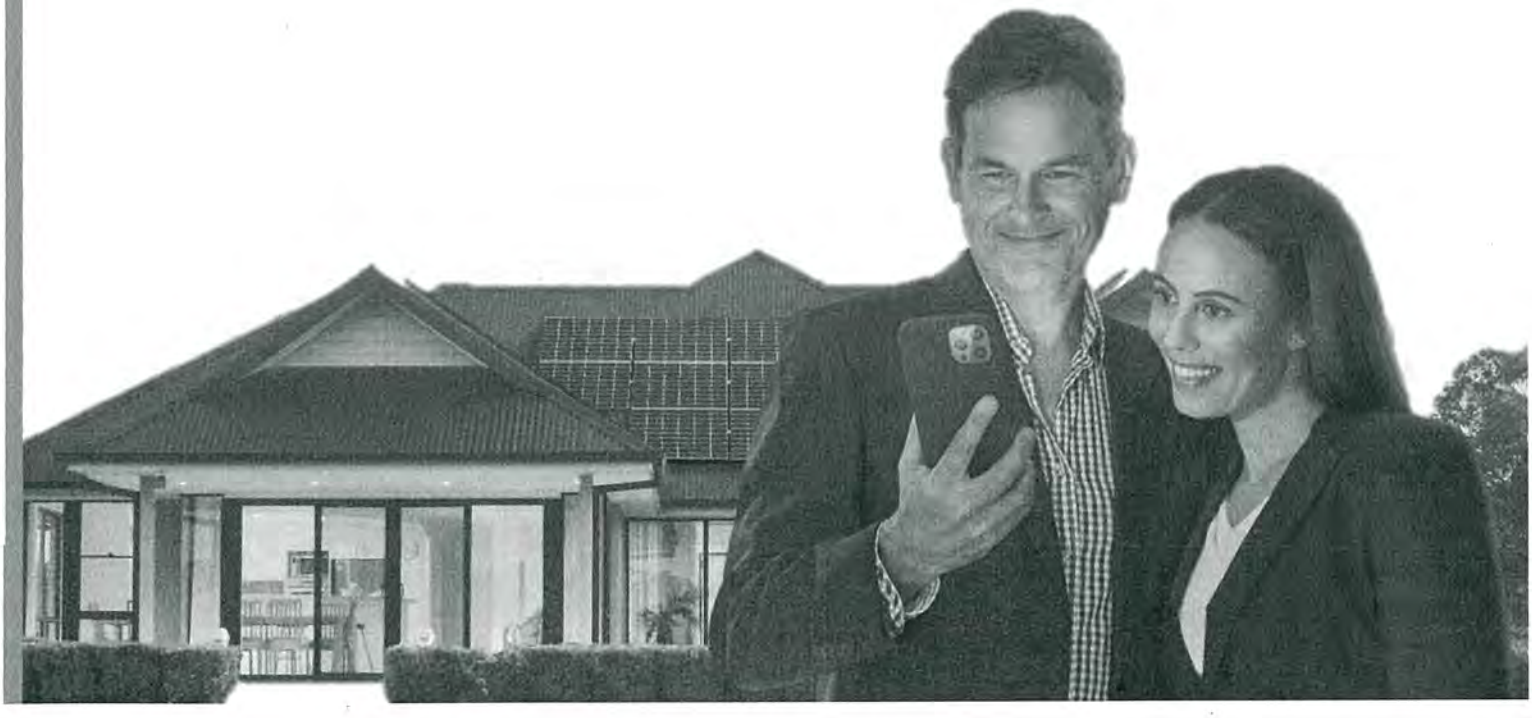


0 | Intellihub

0.1 | About Us

Intellihub Group is an Australia and New Zealand utility services company that delivers innovative metering and data solutions to utilities to enable digital and new energy services with a focus on driving an exceptional end-consumer experience. It is an experienced and leading provider of multi-utility services across electricity, gas and water networks for residential, commercial & industrial, embedded network, solar metering and distributed energy end-consumers. Intellihub is a growing business with over 300 employees working across 8 ANZ office locations per Figure 1.

Intellihub currently has over 1.6 million advanced meters under management.

We are focused on creating business value for energy retailers through the best end-consumer experience for installing advanced meters and afterwards maximising the digital and 'new energy' services that this technology can enable.

#1	Smart metering provider in ANZ by deployment share	1.6m+	Advanced meters under management	20k	Consistently installed each month in ANZ
300+	FTE across ANZ	55+	Retailer relationships	99%+	Consumer coverage, *plus* best field coverage across ANZ

Figure 1 - Intellihub snapshot

To achieve this, we have built a proven business model of partnering closely with our end-consumers. The Intellihub business has created a distinctive culture based on blending the industry 'must haves' on safe and reliable practises with the latest thinking in adopting new technology. Our technologies are designed to facilitate innovation across our whole business covering meters, communications, edge computing, IoT and cloud application hosting.

Our 'Intelli-Suite' enables broader innovation beyond-the-meter and we believe it forms a strong basis for new products & services in the electricity industry – particularly where it relates to distributed energy resources (DER) including solar, batteries, hot water heaters and electric vehicle charging. Intellihub is the only ANZ metering provider that is developing and delivering these innovative metering and distributed energy resources services at scale. Since our inception, we have been investing in foundational infrastructure and capabilities to enable the transition to a decentralised and digitised energy system.

0.1.1 | DER Registration and verification platform

Intellihub's recently acquired GreenSync and their Decentralised Energy Exchange (deX) platform, a proven DER registration and verification platform that is deployed across the world; from remote solar curtailment in South Australia, EV partnerships with Wellington Electricity in New Zealand, to providing a digital marketplace for distributed renewable energy as part of the world's most advanced network control system in the United Kingdom.

GreenSync's deX platform is designed as a DER registration and verification service that can then be controlled by a regulatory authority, retailer and/or network. Intellihub can provide this registration and verification service independently of our smart metering platform.

0.1.2 | EV Charging experience

0.1.2.1 | ARENA Street- Side charging pilot 2021

EV STREET SIDE CHARGING PROJECT

Intellihub is excited to lead an Australian first, public EV street-side charging pilot recently announced by the Federal Minister of Climate change and Energy, Chris Bowen in 2022.

Intellihub is leading an Australian-first, electric vehicle (EV) street side charging project. This ARENA funded project includes installing 50, 7.5kW EV chargers on street side power poles within the Sydney metro area, in partnership with a consortium of partners and local councils. Once installed, the pilot will run for 12 months to achieve project objectives including technical, regulatory, engineering, community and commercial learnings. An ARENA report will be published with these findings.

For further information, please see details on ARENA's website

0.1.2.2 | Destination Charging Across Victoria Program 2021

Intellihub has been awarded funding from Victoria's Government Department of Environment, Land, Water and Planning to install and manage Destination Chargers across some of Melbourne's most iconic locations including but not limited to the National Gallery of Victoria, Melbourne Cricket Ground (MCG), The Royal Children's hospital, Queen Victoria Market and Melbourne Zoo.

For further information, please see details on DELWP's website

0.1.2.3 | EV Connect 2019

GreenSync partnered with Wellington Electricity to demonstrate technology and commercial capabilities for smart electric vehicle charging in 2019. By providing visibility and control of electric vehicle supply equipment to Wellington Electricity, EV Connect established the foundations required to support electric vehicle charging at scale on Wellington Electricity's network.

The partnership delivered a roadmap for the wider adoption and application of the solutions, including market functionality for electricity retailers who will be able to utilise GreenSync's deX platform.

For further information, please see case study on GreenSync's website

EECA green paper response

Improving the performance of electric vehicle chargers

INTELLIHUB

1 | EECA green paper response

1.1 | Engagement principles

Response	
Question	**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?

1.1.1 | What are your thoughts on EECA's suggested engagement principles for EV chargers?

Intellihub response:

Intellihub believes that EECA has created engagement principles that are focused on delivering key outcomes, balancing the needs of the end-consumer (EV owner) to charge the EV, with those of the electricity networks and retailers to manage EV load.

It is critical for EV smart chargers to be deployed in the market to enable EV acceleration. While still allowing the end-consumer control, the load will need to be managed through reduced charging at peak time tariffs and other initiatives.

As the end-consumer has chosen to invest in new, greener technology, for their benefit, as well as the wider community, they should be able to still manage their lifestyle with minimal constraints.

1.1.2 | What would you add or take away?

Intellihub response:

Intellihub is satisfied with EECA's engagement principles for EV charging, there is nothing we would add or remove.

1.1.3 | Is there anything you disagree with?

Intellihub response:

Intellihub does not disagree with anything regarding EECA's proposed engaged principles for EV charging.

1.2 | Proposed 'smart charger' specifications

Response	
Question	**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, why? • What information could you supply to EECA to help inform our thinking about this issue?

1.2.1 | What are your thoughts on the proposed specifications for 'smart' chargers in New Zealand?

Intellihub response:

Intellihub is supportive of EECA establishing a minimum required capability for EV chargers sold in New Zealand as a no-regrets approach. This will ensure that as the population of EV chargers increases over the coming decade, relevant parties will have the capability and means to interact with these devices for monitoring and control services. This will allow asset owners to maximise the value of these assets, while impacts on the network are managed for the benefit of all end-consumers.

1.2.2 | What do you see as most and least important?

Intellihub response:

To mitigate these future challenges, a base level of EV charger capabilities should allow for:

- Registration - Identification of the system, connection and verification of system details
- Management - Remote communications capabilities for core monitoring and control use cases

We broadly agree with EECA's approach and definition of control outcomes. However, we would suggest abstracting some of the details regarding policy and tariffs. The core remote monitoring and control capabilities for EV chargers should be agnostic to the policy and market layers that sit above them, allowing for further innovation and testing in this space before the preferred approach is selected.

Intellihub would be happy to provide further guidance and advice on recommended capabilities.

1.2.3 | What functions would you add or exclude, if any, why?

Intellihub response:

We would recommend that randomisation of delay is not specified as a core requirement. To improve predictability and responsiveness, any required delay or randomisation should be embedded into the requests from the remote party. While randomisation may be effective for managing the fleets of assets over large asset volumes, undesirable impacts may be introduced during insufficient volumes of assets for randomisation at the street/low voltage level.

1.2.4 | What information could you supply to EECA to help inform our thinking about this issue?

Intellihub response:

There is an opportunity to leverage approaches taken by South Australia and Western Australia in Management of Distributed Solar PV. While EVs and PVs are different technologies, the fundamentals and concepts of remote management is transferrable between the asset classes.

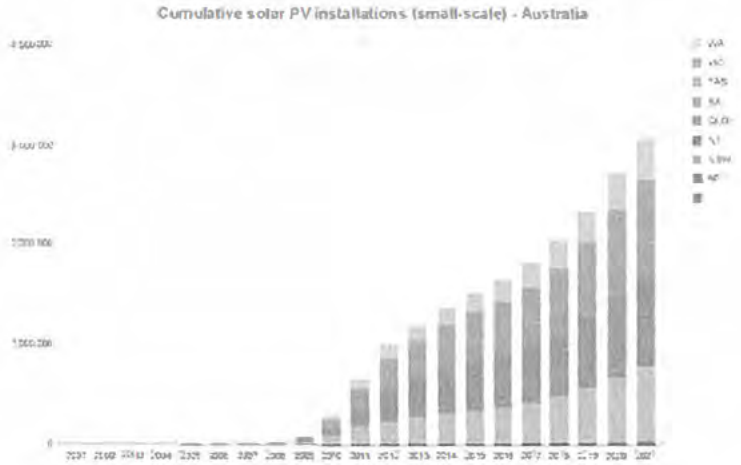


Figure 2 - Clean Energy Regulator, AU Cumulative solar PV installations (small-scale)

Since 2009, there has been approximately 3 million small scale solar photovoltaic (PV) systems installed at end-consumer's homes in Australia, that have a combined capacity of approximately 15 GW.

Until 2020, new installs of PV have not been required to be remotely controllable by any party, for network and system management, and it is unlikely that the vast majority of systems will ever be controllable. Due to the reduction of system demand over time, regions of the National Energy Market (NEM) on the east coast and the Wholesale Energy Market (WEM) in Western Australia have become susceptible to system security risks at times of low demand.

To mitigate these risks, from late 2020 in South Australia and early 2022 in Western Australia, all installed distributed PV must be remotely controllable by an authorised agent. On 14 March 2020, the Australian Energy Market Operator (AEMO) identified that minimum demand of the state exceeded their minimum demand threshold and instructed all relevant agents to action the disconnection of all Solar PV under their scheme.

While these programs relate to the remote shutdown of PV systems, this is now being used as the groundwork for expansion into more sophisticated control outcomes such as Flexible Exports and VPP participation. By requiring remote communications and management capabilities now, this ensures that new installed systems can be used in response to system emergencies, but presents opportunity for expansion into new services and agreements in the future.

1.3 | Open Access EV Charging

Response	
Question	**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?

1.3.1 | Do you support EV charging being open access and why/why not?

Intellihub response:

Intellihub supports the approach of remote control of EV charging being open access, in the sense that any party that has the authorisation from an end-consumer to interact with their device should have the ability to do so.

We agree with EECA's assessment that owner's permission is a core requirement for any party to interact with a device – this is fundamental to end-consumer acceptance and buy-in.

The decision to specify particular open standards in this space should be carefully considered. There are several existing and developing remote communication standards in this space that present a range of (and often overlapping) functions including:

- OCCP – Charge Station Management System to EV Supply Equipment
- OSCP – Energy Management System to Charge Station Management System
- IEEE2030.5 – Communications of smart energy messages between a server and a client
- Open ADR - Communications of demand response messages between a server and a client

While these standards present a range of capabilities, the premature specification of a standard introduces the risk of stifling innovation. By focussing on functional outcomes rather than specification of standards, innovation can be encouraged ensuring that end-consumers are able to realise the full value from their assets.

1.3.2 | What information could you supply to EECA to help inform our thinking about this issue?

Intellihub response:

Intellihub recommends reading GreenSync's paper available on AER's website at:

GreenSync - Navigating Standards and Frameworks for Distributed Energy Resources

1.3.3 | Do you think that 'smart' chargers should address issues of cyber security?

Intellihub response:

Where remote communications are involved, the risk of malicious behaviour by bad actors is inherent. To mitigate these risks to end-consumer, network and retailer outcomes, cybersecurity should be considered as core capability for EV chargers.

1.3.4 | How would you suggest this is done?

Intellihub response:

Cyber security capabilities should be assessed from a functional perspective, with the remote communications party being required to demonstrate core capabilities.

1.4 | EV Charging information access

Response	
Question	**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?

1.4.1 | 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?

Intellihub response:

Intellihub believes that a baseline set of device information should be *supported* (but not necessarily enabled) for transmission from the device. This could include:

- Device asset information (rating, model etc.);
- Device monitoring and event data;
- Supported capabilities;
- Control instruction status updates.

This could also be used as mechanism for providing incentives to end-consumers, where their installed equipment has been remotely verified as being connected, controllable and meeting other eligibility requirements.

Any third party that has established a suitable agreement with the EV charger owner should have the ability to receive this information from the remote system. This would include relevant information from the EV smart charger to confirm the tariff or service has been delivered.

1.4.2 | Who should be able to access this information?

Intellihub response:

Third parties (such as network operators and retailers) should only have access to specified end-consumer data where there is an explicit agreement between the end-consumer and that party to do so. The end-consumer should have the ability to request the details of all data that has been received and stored by that party.

1.4.3 | In what form should it be transmitted?

Intellihub response:

Data transmission to remote systems may be sent over the internet via a proprietary communications protocol. Any internet communications should meet security requirements.

1.4.4 | What processes should be in place to safeguard the data?

Intellihub response:

End-consumer data is currently covered under the Privacy Act 2020. Once transmitted, data should be stored with appropriate security in place to prevent access by unauthorised parties (see 1.3.3).

1.4.5 | Is there any other way this data might be captured?

Intellihub response:

EV load monitoring data might be captured by wiring the charge point to a separate circuit and mapping to a specific channel on the meter. As this is using existing technologies that have had accuracy certified, this would potentially provide a solution for a more homogenous and higher quality set of measurements than using native metering on the EV Supply Equipment.

One challenge with this approach is that the Metering Equipment Provider (MEP) has no access to the end-consumers premises, only to the meter board. Once the site has been configured there is no guarantee that that particular site configuration would continue to provide monitoring for the EV charger's load. This approach would not provide any ability to manage the rate of charge.

1.5 | EV Charging monitoring and recording

Response	
Question	**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?

1.5.1 | 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?

Intellihub response:

There is some discussion that is leaning towards the measurement of this electricity data to not meet the current electricity meter compliance requirements. Recently the California Regulators have released a paper (California becomes first state to roll out submetering technology to spur EV adoption) for EV sub-metering requirements. This is something that may require further discussion within the industry and with other regulatory entities, to agree the compliance requirements for sub-metering measurement of electricity for import or export consumption data.

Third parties (such as network operators and retailers) should only have access to specified end-consumer data where there is an explicit agreement between the end-consumer and that party to do so.

As a core principle, end-consumers should have the ability to access or request data that pertains to their usage. This may be via the existing relationship that they have with their retailer (where there is dedicated sub-metering), or via the technology provider responsible for managing the remote connections to the EV charger. There is a key decision to be made, as to the party that is responsible for retaining and making this information available to the end-consumer.

1.5.2 | What other information may be valuable to the EV owner?

Intellihub response:

If a decision needs to be made by the end-consumer, then it should be clearly understood for the context of the decision or if they want to check other services/tariffs available then provide the relevant information needed to validate the various offers/services available.

The core information that should be available to the end-consumer to meet this requirement could include:

1. Charging behaviour for their connection (average vehicle charge rates).
2. Charge rate limits applied by the network operator.
3. Charge events (when EV is connected/disconnected and when charging starts/stops).

1.5.3 | What format should be used for this information if this requirement is adopted?

Intellihub response:

The data should be made available in a format that allows them to understand and analyse their own behaviour to inform decision making. Specifically, a format that can be ingested by spreadsheet applications or other software would meet this requirement (e.g. CSV).

While there are likely options for standardisation of the structure of this data in the longer term, in-line with our previous comments on standardisation, we suggest that initially the requirements are defined, but the specific structure is left up to the parties that are providing this data.

1.6 | EV mandated power and control settings

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

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

Intellihub response:

In addition to the remote communications capabilities, EV chargers should have a baseline level of autonomous power quality response capability.

This would include response modes such as volt-var, and volt-watt. Some work has been undertaken recently to assess what is required for EV chargers to be certified against AS/NZS 4777.2, which has identified that there are some gaps in the existing standard to be filled.

See Realising electric vehicle to grid services lessons learnt 2 - Charger Certification Against AS4777.2:2020.

1.7 | Regulating energy efficiency

Response	
Question	**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?

1.7.1 | What are your thoughts on regulating the energy efficiency of onboard EV chargers?

Intellihub response:

Intellihub believes that providing the end-consumer with clear information on various EV chargers, functions, security, and cost to use, allows them to make an informed choice. We think further work by EECA is needed to progress this thinking and further collaboration globally to review potential efficiency approaches and requirements.

1.7.2 | What information could you supply to EECA to inform this issue?

Intellihub response:

Intellihub has no further information to share on this issue at this stage.

1.7.3 | What challenges, if any, do you see in regulating in this area?

Intellihub response:

As there are a range of options that may be adopted, further investigation, consideration and consultation with the industry will be required as further developments are made globally.

1.8 | Labelling of aftermarket EV chargers

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

1.8.1 | What are your thoughts on labelling aftermarket AC EV chargers?

Intellihub response:

Intellihub supports the requirement for information and/or labelling that improves an end-consumer's ability to make an informed decision on a prospective product. Providing information and educating end-consumers on the benefits of an aftermarket/wall-mounted Smart EV charger (coupled with a suitable incentive program) is critical to ensure that universal coverage and registration of EV loads is achieved.

Failure to provide end-consumers with a clear understanding of what changes are being made, why, and how they will benefit may risk alienating end-consumers and result in program objectives being undermined.

1.9 | Smart charging cables

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

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

Intellihub response:

Intellihub is of the opinion that this may introduce further complexity to the outcome EECA is looking to achieve, as:

1. This would potentially add a second point within a system that monitoring and control is targeted. This introduces an additional layer of complexity as the responsibilities of the EV charger and the cable should be clearly defined.
2. The charging cable is not necessarily a fixed device. As the cable could potentially move with the car it would not be possible to associate the cable to a fixed ICP. This introduces challenges for network operators that are looking to manage network issues that are associated with the loading of the network by ICPs.

Provided that the EV charger provides all required monitoring and control capabilities through a remote interface, there should be no reason to remotely interact with a specific cable. However, it may make sense for EECA to consider the required minimum capabilities of cables, to ensure that those outcomes can be achieved by the combined capabilities of the EV charger and cable.

1.10 | 'Do nothing' options for EV chargers in NZ

Response	
Question	**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?

1.10.1 | What are your thoughts on the 'do nothing' option for EV chargers in New Zealand?

Intellihub response:

Proceeding with the do-nothing option would result in a significant increase in uncontrolled load on the network and would likely require tens of billions of dollars of network investment. Intellihub supports EECA's proposal to support the establishment of a population of EV chargers that can best respond to the challenges in the electricity sector and believes that this no-regrets approach will ensure that there is sufficient capability at the time that it is needed.

1.10.2 | Do you think the market can adequately address this issue without the need for government intervention?

Intellihub response:

While market forces and natural adoption of solutions may result in some outcomes being realised, this approach has significant risks:

1. As highlighted above, end-consumers may continue to purchase and install uncontrollable EV chargers, that can no longer be leverage for demand response services;
2. Inconsistency in capabilities, may result in some end-consumers losing out from future opportunities;
3. Lack of interoperability may result in end-consumers being locked in with a single provider.

To mitigate these risks, Intellihub proposes that the best path forward would be the definition of, and requirement for baseline capabilities, coupled with end-consumer incentives for meeting those requirements. By leveraging remote registration and verification technologies, end-consumers can be provided with incentives once the EV charger capabilities have been verified.

This will also allow the identification of the EV load and for that EV charger to be available for participation in future services and opportunities through network operators, retailers and other parties as they mature.

1.10.3 | What information could you provide to EECA to inform this issue?

Intellihub response:

Australia's history with solar photovoltaics may serve as a useful reference for the impacts of acting late to enable control for residential assets.

Since 2009, there has been approximately 3 million small scale solar photovoltaic (PV) systems installed at end-consumer's homes in Australia, that have a combined capacity of approximately 15 GW.

Until 2020, new installs of PV have not been required to be remotely controllable by any party, for network and system management, and it is unlikely that the vast majority of systems will ever be controllable. Due to the reduction of system demand over time, regions of the National Energy Market (NEM) on the east coast and the Wholesale Energy Market (WEM) in Western Australia have become susceptible to system security risks at times of low demand.

To mitigate these risks, from late 2020 in South Australia and early 2022 in Western Australia, all installed distributed PV must be remotely controllable by an authorised agent. On 14 March 2020, the Australian Energy Market Operator (AEMO) identified that minimum demand of the state exceeded their minimum demand threshold and instructed all relevant agents to action the disconnection of all Solar PV under their scheme.

While these programs relate to the remote shutdown of PV systems, this is now being used as the groundwork for expansion into more sophisticated control outcomes such as Flexible Exports and VPP participation. By requiring remote communications and management capabilities now, this ensures that new installed systems can be used in response to system emergencies, but presents opportunity for expansion into new services and agreements in the future.

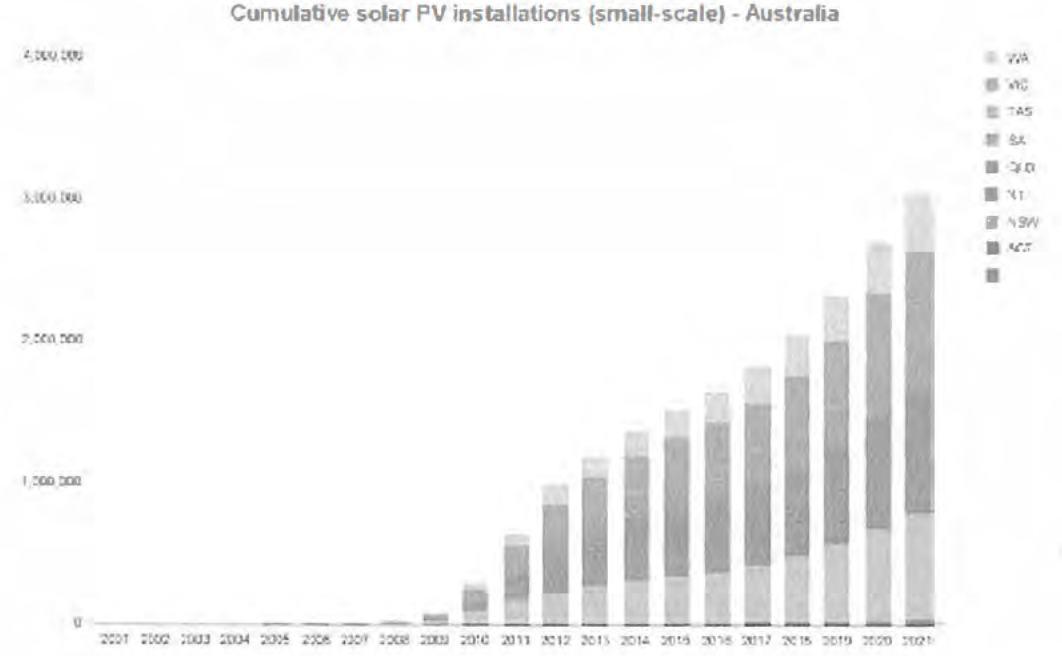


Figure 3 – Clean Energy Regulator, AU Cumulative solar PV installations (small-scale)

1.11 | Labelling effectiveness

Response	
Question	**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?

1.11.1 | What are your thoughts on the likely effectiveness of information, education and labelling to improve the uptake of 'smart' EV chargers?

Intellihub response:

Intellihub supports the requirement for information and/or labelling that improves an end-consumer's ability to make an informed decision on a prospective product. Providing information and educating end-consumers on the benefits of a wall-mounted Smart EV charger (coupled with a suitable incentive program) is critical to ensure that universal coverage and registration of EV loads is achieved.

Failure to provide end-consumers with a clear understanding of what changes are being made, why, and how they will benefit may risk alienating end-consumers and result in program objectives being undermined.

1.11.2 | What information could you provide to support your position?

Intellihub response:

Intellihub does not have supporting information to provide at this time.

1.12 | Incentives for EV charging acceleration

Response	
Question	**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?

1.12.1 | What are your thoughts on the use of incentives to encourage the uptake of 'smart' EV chargers?

Intellihub response:

Intellihub believes an incentive for the purchase and installation of an EV smart charger is likely to be the best path for achieving universal coverage of EV chargers that have required minimum capabilities.

Critically, this should also include registration remote verification to confirm that the installed system has been configured to deliver the outcomes described in Question 2.

1.12.2 | What incentives do you think would be effective and who should provide these?

Intellihub response:

Incentives should be available as a rebate on the cost of purchase and installation of a wall mounted EV charger. They should be coupled to a published set of requirements defined by EECA, and available once the installed system has been remotely verified.

Intellihub believes that verifying the installation of the EV charger is an essential step to receiving the incentive, in order to ensure the benefits of having smart chargers deployed are able to be realised.

Intellihub does not have a view on the specific party responsible for delivering the incentive.

1.12.3 | What other incentives might be valuable beyond financial incentives

Intellihub response:

Other incentives beyond financial, would be the value that can be derived from an EV charger with additional capabilities. These incentives are inherent in an EV charger having required capabilities and being connected through remote systems, so this is largely an education activity. Over time, these capabilities will allow for EVs to be utilised for other purposes, including provision of energy services.

1.13 | Regulating EV Charger 'Smartness' in NZ

Response	
Question	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?

1.13.1 | What are your thoughts on regulating the 'smartness' of EV chargers in New Zealand?

Intellihub response:

Intellihub supports the approach for specifying a minimum level of capability for EV chargers in New Zealand. As highlighted in our response to Question 2, this should be founded on a functionality and outcome driven approach rather than the specification of a specific standard or protocol. This will ensure that:

1. The capabilities of new EV chargers to provide data and energy services are verified, and available for participation on future markets and services.
2. Decisions on the specific operational model and communications protocol are not made prematurely, locking New Zealand into a specific approach

1.13.2 | What do you think of New Zealand adopting the approach being undertaken in the UK?

Intellihub response:

The development and rollout of PAS1878 and PAS1879 in the UK is one specific approach to solving the problem. While there has been a significant amount of work done in this space, this approach does pre-empt and make decisions around the best operational model and does not provide flexibility for other approaches.

Specifically, the PAS is built on the OpenADR specification, and defines a workflow for a DSRSP to provide demand responses services through a market mechanism. A number of questions remain to be answered, about the UK approach and Intellihub welcomes the opportunity to discuss these further with you.

Intellihub supports the trial and piloting technologies and approaches for management of EV load, including those being adopted in the UK. The core remote monitoring and control capabilities for EV chargers should be agnostic to the policy and market layers that sit above them, allowing for further innovation and testing in this space, before the preferred approach is selected.

1.13.3 | What information could you provide to support your position?

Intellihub response:

Networks and regulators across the world are looking to resolves these challenges, each with a different approach with their inherent risks and advantages. As at this time, no clear standardised approach has yet emerged leaving New Zealand with an opportunity to pick the best elements from each case study.

1.14 | PAS for EV charger regulation and incentives

Response	
Question	**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?

1.14.1 | What are your thoughts on using the PAS for residential EV chargers to underpin regulation/incentives?

Intellihub response:

As a principal, Intellihub supports the use of the PAS for residential EV chargers to underpin regulation and incentives.

1.14.2 | What parts would you exclude or change?

Intellihub response:

Intellihub would propose the following changes:

1. Modification to reference demand response as being *one* mechanism for achieving the required outcomes for network management.
2. Addition of network capacity allocation (including capacity purchase) as another mechanism for achieving the desired outcomes, and to be used as a comparison to demand response.
3. Under 3.4.4 Smart Charging requirements, update the language to require that a set of capabilities are made available. OCPP 1.6 could be one way for this to be achieved by an equipment manufacturer.

1.14.3 | Does the PAS cover all the important issues?

Intellihub response:

The PAS should incorporate key suggestions made in response to Question 2, relating to the core capabilities of Registration and Management of the EV charging equipment.

1.14.4 | What other resources may be useful for New Zealand?

Intellihub response:

Networks and regulators across the world are looking to resolves these challenges, each with a different approach with their inherent risks and advantages. As at this time, no clear standardised approach has yet emerged leaving New Zealand with an opportunity to pick the best elements from each case study.

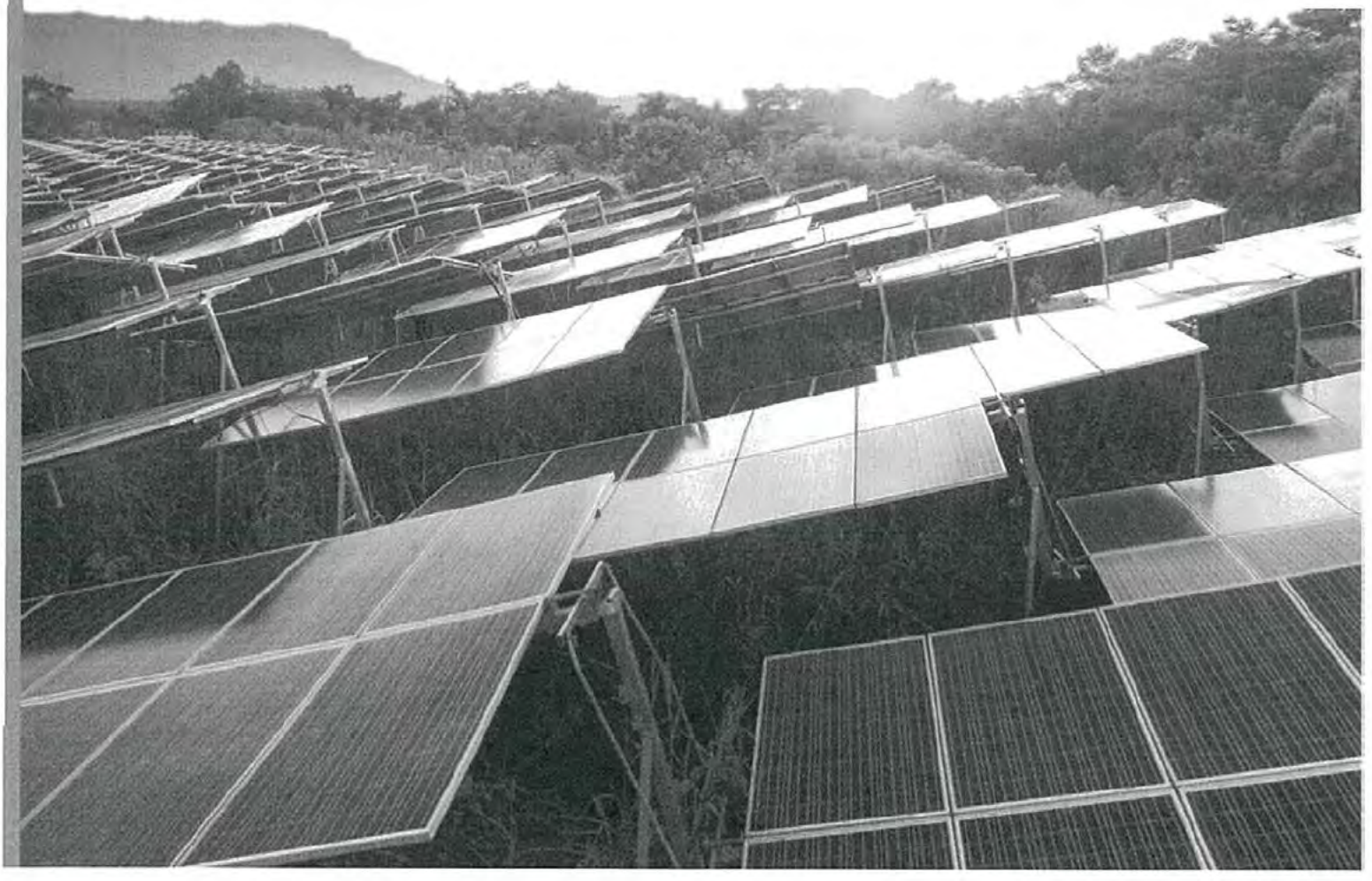
1.15 | Energy Performance outside of EECA involvement

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

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

Intellihub response:

As EECA has stated there are other parties who have an interest in the management of EV charging equipment including distribution network operators, retailers and other 3rd-parties. The Electricity Authority also has the mandate to focus their work for the long-term benefit of end-consumers, and will be working to ensure that the end-consumer has the ability to realise the benefits of new technology while managing the impacts on the network and other New Zealand end-consumers.



ElectroNet TECHNOLOGY

Dear Madam or Sir,

Greymouth, 5/9/2022

Please find attached answers to questions raised in your "Green Paper on improving the performance of electric vehicle chargers"

Regards

Anna Doerr

Operations Manager

[redacted]

Web: www.powerpilot.io

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 as outlined. BUT we think that the landscape outlined above will change over the next few years:

A) The amount of home charging will reduce as public charging will become more prolific, so public chargers also need to be "SMART"

B) Smart cities with autonomous control over flexibility load will increase – again possibly sooner rather than later. There is no reason that automated load control managed by smart sensors further up the distribution chain can not control flexibility load under certain circumstances.

C) The new Transpower pricing regime effectively discourages significant use of ripple signals by removing sufficient pricing incentives, thus reducing one control mechanism previously available.

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, why?
   - What information could you supply to EECA to help inform our thinking about this issue?

A) *As a minimum randomises charging during network peak hours are essential as a start, to be followed by randomised charging constrains during energy peak hours. Both constrains vary by geographical location across the country and need to be able to be varied by both parties – Distributor and retailer, possibly with involvement of Transpower.*

B) *The introduction of more targeted control by new identities – DSO and/or Flexibility trader needs to be introduced.*

C) *In all instances, the customer will need the ability to override the control signal – commercial arrangements to be worked through.*

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?

A) *Support for open access and protocols*

B) *Consideration must be given to the fact that the charging unit and the control unit might be separate*

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?

A) *Location and real time load information needs to be available to DSOs and flexibility traders, but should be covered by commercial arrangements*

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?

A) *Location and real time load information needs to be available to DSOs, flexibility traders and EV owners/customers, but should be covered by commercial arrangements.*

B) *Consideration must be given that EV owners might not charge at their ICP/residence and the trader relationship might be with the EV owner, but the DSO relationship might be with the location.*

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

A) *Minimum standards need to be set, the details of which will be evolving over time, so should be stable enough to allow technology to be developed, but flexible enough to allow new developments and innovation.*

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?

A) *Minimum standards need to be set, the details of which will be evolving over time, so should be stable enough to allow technology to be developed, but flexible enough to allow new developments and innovation*

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

A) *Minimum standards need to be set, the details of which will be evolving over time, so should be stable enough to allow technology to be developed, but flexible enough to allow new developments and innovation*

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

A) Yes

10. What are your thoughts on the 'do nothing' option for EV chargers in New Zealand? 25 Green paper on improving the performance of electric vehicle chargers

- 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?

A) Purely relaying on market forces is unlikely to achieve results even in the medium term.

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?

A) This should most certainly be done as first steps, but I do not think that this will be sufficient.

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?

A) Small financial incentives alone will not suffice to allow external control of load for a larger part of the population see voluntary uptake of TOU tariffs for domestic ICPs

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?

A) As usual, the UK jumps into regulation with quite defined expectations quite early on. To encourage innovation, we prefer a more organic approach where regs are being developed over a longer timeframe and refined as technology evolves. Only high level requirements (the what) should be defined early on to ensure that innovative solutions will not end up in wasted efforts by trying to comply with ill defined "how"

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?

A) Great starter for 10 more consultation would be needed to work through more of the details and it should be run voluntarily to allow for fine tuning

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

A) The Electricity Authority is working on similar workstream around DER - can EECA and EA work on this challenge collaboratively?

Green paper on improving the performance of electric vehicle chargers

Background Information to assist this Questionnaire.

Gaia Energy Ltd is an NZ registered company with an office in Nelson and Lab. In Hungary. We have successfully developed the generation of electricity without rotating a turbine. This portable generation system can keep batteries charged for E.V. and homes without the need for power from the main grid. Recently presented at a conference in California, it will be validated by Prof. David Nagel at George Washington University in October.

This is a unique technology and gives a paradigm change to the opportunities available to EECA, following validation. This tech. has received previous successful validation. Energy is supplied from the catalytic transmutation of hydrogen gas. It is expected that the small gas requirement will need refuelling every one to two years. Please copy and paste this file.

https://drive.google.com/file/d/1ACxaGs9j1hQ4a3Jo6Qn4px5e5eDdodA8/view?usp=sharing.

The advantages of the Gaia Energy Generation (GEG) system to EECA and the NZ electrical network system, are noted in green for consideration.

Consultation Questions.

Q1. In detail. Q2 to 10 are in brief.

- minimizing energy emissions and encouraging EV uptake; GEG has zero emissions, and the electricity is free of production costs.
- alleviating the costs of decarbonisation on NZ households; GEG produces no carbon and has a minimum carbon footprint
- reducing electricity disruptions for consumers; Consumers are not connected to the grid. They are responsible for their own GEG ownership and electricity generation.
- maximizing energy and electricity system security, reliability, and stability;

GEG has no dependency on the grid. Security, reliability, and stability are not affected. They are the responsibility of the GEG owner/ consumer.

- minimizing network investment using demand management

Each GEG is privately owned, eliminating network investment and management.

EECA has developed the following principles to guide its engagement with residential EV charging:

- Manage EV charging in a way that provides net positive societal outcomes;

GEG could supply electricity back to the grid, like solar at no capital outlay to the network.

• Identify and address the impacts of EV uptake on the energy system early on (where practical); With GEG system, the fast uptake of E.V. is the best thing that can happen to NZ's aging electrical system. NZ could become the first country to support pollution-free electricity for transportation of all types.

As GEG is a portable onboard generator, charging an E.V. battery bank while in service and home batteries when parked. Transmission requirement to charging stations throughout the country is eliminated. Some of these savings could go toward a subsidy for GEG purchases. Expected retail at approx. $6,000 each per 30Kw generator. No other generating system can compete with a $200.00 capital outlay per 1Kw and supply the electricity for free.

• EV owners should receive the utility they require from their EVs and EV chargers; E.V. owners would be GEG owners, supplying their own charging needs with no obligations from the network, unless the GEG supplies electricity back to the network.

• EV chargers should have a level of smartness and energy efficiency that is cost-effective and provides the greatest net benefit; and

The network may choose to supply GEG chargers, but there is no need to control GEG chargers. The network will not need to supply transmission to a GEG charger, eliminating peak loading.

• Improvements to the energy performance of EV chargers should encourage the development of
a robust, fair and effective demand flexibility market
To achieve this, EECA will:

• intervene to the minimum extent necessary;

• work with other regulators to identify interagency gaps and overlaps to avoid duplication and unnecessary complexity;

• encourage market innovation and avoid path dependency; and

• ensure the costs and benefits of smart EV chargers are equally accredited to both electricity providers and consumers.

Electricity providers may become the distributors of GEG. Buying back surplus power from the GEG chargers, rather than selling it to them. NZ could go from a future 40% electrical requirement to a surplus for small users, and without any capital outlay, compared to the expected $1.7Bn. Leaving hydro, geothermal, etc for heavy industry.

Q2. Present network supplied system will require proposed Smart chargers to control peak power. If GEG generation is considered, peak power will be eliminated, so eliminating the need for Smart Chargers and power shortage.

Q3. I support EV charging being open access by GEG owners generating their own electricity for their own needs.

Smart Chargers will need to be controlled for peak power. This brings security, location, and privacy issues that could be breached. This is not needed with GEG electricity system.

Q4. Whenever Smart Chargers transmit information, an expensive method of control will be required. GEG electricity will not need information transmission for payment or control. Eliminate the need for transmission with GEG system.

Q5. Electricity consumed will be recorded on the account so no further information is required by the consumer. With GEG system, no external information is required unless a GEG is supplying electricity to the network.

Q6. With the GEG system, an owner is protected by the Consumer Guarantee system so no need for further mandated performance.

Q7. Regulation of energy efficiency for onboard chargers is not needed with GEG system as the COP of the unit exceeds 20. No other power system can supply +20 times energy out to energy in.

Q8. Aftermarket AC chargers need labelling and certifying for safety. GEG is a direct DC system attached to the battery.

Q9. Not understood.

Q10. Doing nothing is not an option.

Using the GEG greatly extends the life of batteries by keeping them charged in the top quarter of their chargeable range, as required. Compared to running the batteries low and then stopping to fast charge them back up, the GEG system gives a preferred carbon footprint.

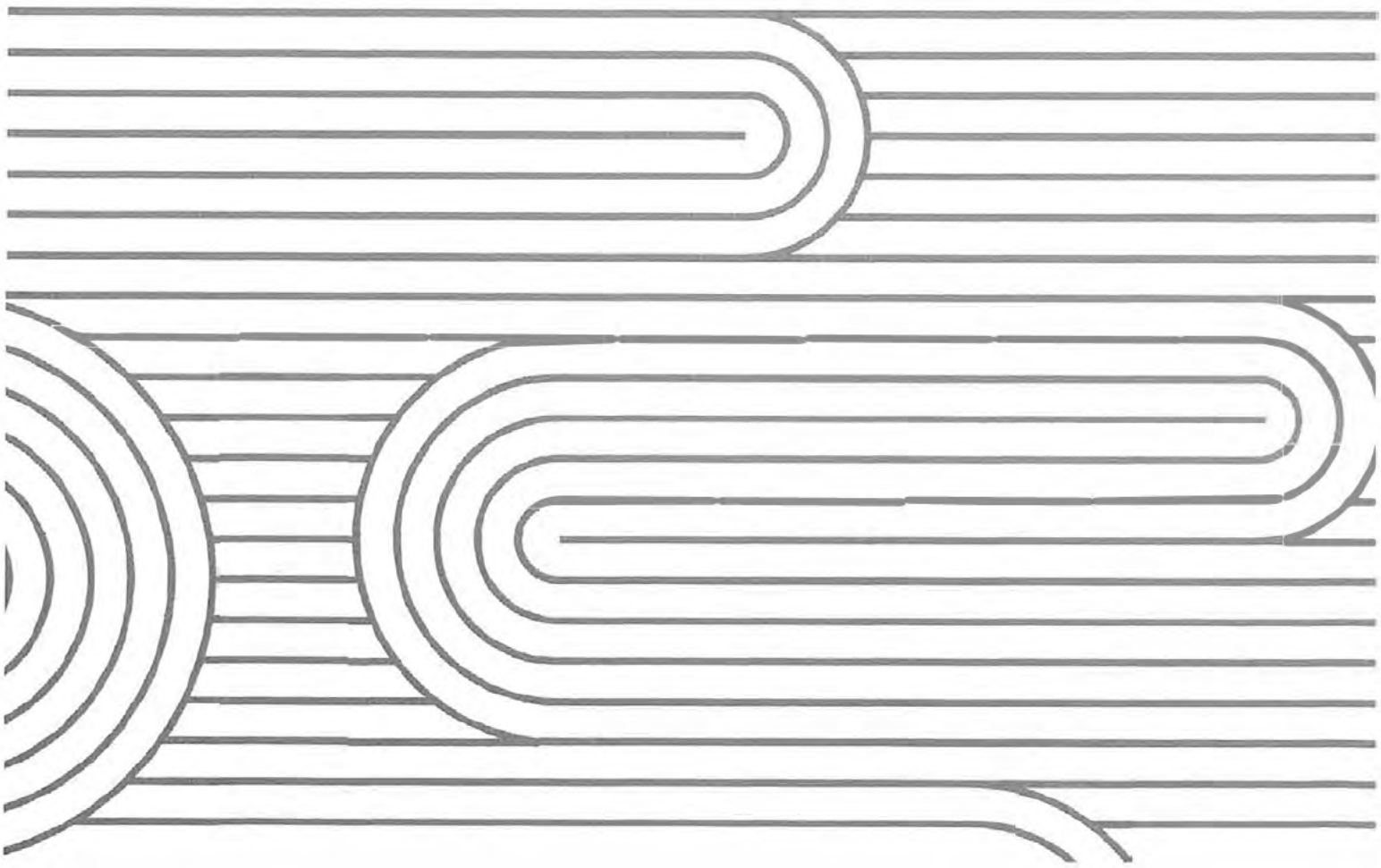
With the present battery system, a large battery bank is required to extend the distance between recharging. With the GEG system, the batteries are continually being charged while in service, so the battery bank can be reduced by up to 50%. This can provide a major reduction to the cost of the E.V. so further promoting the use of environmental travel.

TRANSPOWER

Submission to EECA

On the Green Paper consultation on Improving the performance of electric vehicle chargers

05 September 2022



Summary

Transpower welcomes the opportunity to submit on EECA's green paper on Improving the performance of electric vehicle (EV) chargers. Our submission is a summary of our thinking to date and builds on:

- Our Electrification Roadmap and its companion document on decarbonising transport
- Our submission to the Ministry of Transport on Transport Emissions: Pathway to Net Zero by 2050
- Our submission to the Electricity Authority on Updating the Regulatory Settings for Distribution Networks

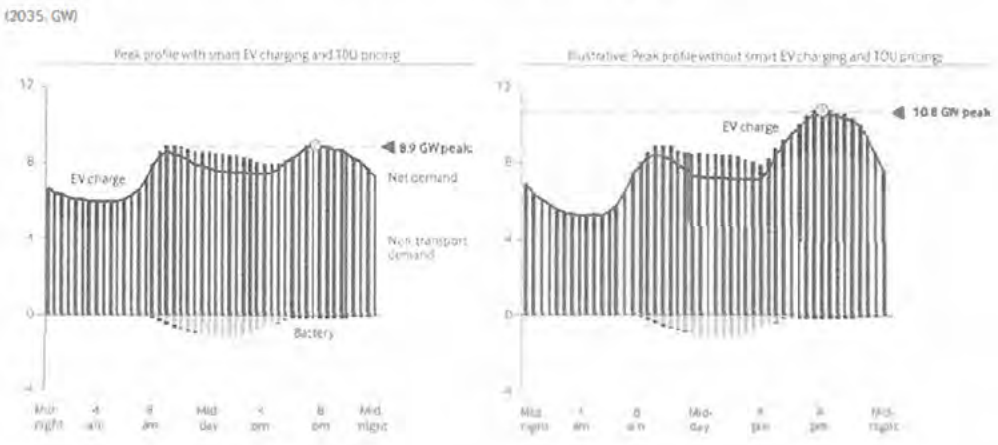
Through our submission, we want to emphasize that:

- Demand management of EV charging is key to avoid overbuilding electricity infrastructure
- Smart charging standards should be considered within the wider lens of flexibility markets
- Standards should mandate smart charging capability and communication protocols to enable demand response. The means to achieve it (through smart chargers or some other technology) should be left to the market
- More clarity about roles and responsibilities across government agencies and industry is required. This green paper offers an opportunity to develop a whole-of-system roadmap

Demand management of EV charging is key to avoid overbuilding electricity infrastructure

We agree that managed charging, alongside the use of other Distributed Energy Resources (DER), will play a vital role in ensuring that New Zealand's energy transition is made at the lowest possible cost, and with the highest benefit to consumers. We elaborate on this position in Whakamana i Te Mauri Hiko in which we estimated that for every GW of avoided peak demand, consumers would save approximately $1.5B leading to potential savings of over $3B by 2050.

Figure 1: Peak profile loads with and without smart EV charging



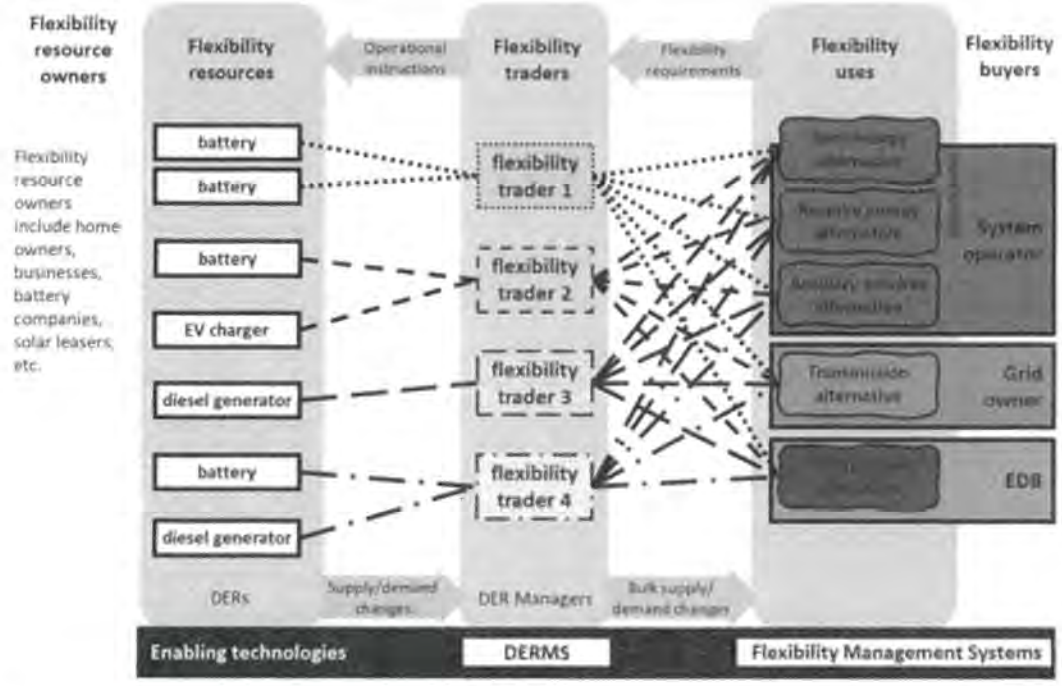
These findings were supported by an independent report commissioned by the System Operator - Distributed energy resources: Understanding the potential. The majority of these benefits are derived from DERs' contribution to resource adequacy, both as virtual peaking generation and as a means to manage constraints on networks.

Smart charging standards should be considered within the wider lens of flexibility markets

While we agree that EV charging should be able to offer demand response, it is important to acknowledge they are but one type of DER technology that needs to be enabled to the benefit of the entire electricity system. Smart heat pumps, controlled hot water cylinders, and batteries are other types of DER that must be able to be recognised as means to offer demand response.

The Electricity Authority (the Authority) recognises the value of flexibility markets and the importance of value stacking to maximise the benefits to consumers. As part of its work programme *Updating regulatory settings for distribution networks*, it showed that flexibility presents a net consumer and producer surplus of $6.9b for the 2021-2050 time horizon. It relies on the model being pursued by the Authority in its work programme, where DERs are controlled by flexibility traders as shown in Figure 2 below. The Authority's design for a dispatchable demand product as part of the Real-Time Pricing implementation also reflects this model[1].

Figure 2: Flexibility market structure (source: Electricity Authority)



Key to the success of this model is the visibility of DER capability connected to the networks. As the number of DER grows, it becomes more and more important for network operators and owners

[1] Real-time pricing will allow price signals to be sent to participants (in this case, the flexibility traders) who can choose to disconnect demand if the price goes over a threshold.

(including to Transpower as the System Operator) to have the right level of visibility through the flexibility traders.

This model has been proven successful in other jurisdictions, such as the UK and Australia. Any standard or regulatory intervention should therefore be designed with this end state in mind.

Standards should mandate smart charging capability and communication protocols to enable demand response. The means to achieve it should be left to the market

We disagree with the idea implied in the green paper that smart chargers should be made mandatory when the cost to procure and install a smart charger can represent an additional barrier for consumers to adopt EVs.

Research continues to show that the upfront cost of purchase is a barrier to EV uptake. At the time of writing, the cheapest available new electric vehicle is about $50k[2]. An installed smart charger is about $3-5k[3] – or about 10% the cost of purchase. When considering a used car, the cost of installing a smart charger becomes disproportionally large. As long as a low-cost alternative exist, they should not be forced to buy a dedicated wired-in smart charger.

We are proposing that the regulations focus on mandating smart charging capability as opposed to mandating smart chargers. This includes having standard communication protocols so the EV can participate into a demand response programme by having means of communicating with flexibility traders and network operators (distribution and system operator).

We are also proposing that smart charging contains some failsafe mechanism allowing the charge to be discontinued in case the electricity networks are under stress. By measuring voltage and frequency of the supply point, the charge could be interrupted quickly to preserve the integrity of the network. The alternative, based on a command sent to the charger to disconnect would require very low latency and high reliability communication protocols that is unlikely to be suitable for consumer equipment.

More clarity about roles and responsibilities across government agencies and industry is required. This green paper offers an opportunity to develop a whole-of-system roadmap

We agree that government agencies, regulators and industry play a key role not only to encourage smart charging, but first and foremost to unlock the value from DER through flexibility markets and enabling distribution level capabilities. We are aware of several working groups looking into the development and operationalisation of flexibility services, including the Industry Participation Advisory Group (IPAG), the South Island Distribution System Operator group, Flexforum, and the Electricity Network Association's Smart Technology Working Group.

We note that EECA has consulted with the Authority and MBIE to write this consultation paper. While we acknowledge that the purpose of this paper is to *seek further information [...] about [...]*

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[2] Source: EECA's total cost of ownership tool (Vehicle Total Cost of Ownership Calculator | Gen Less)

[3] Transpower's estimate for a 7.2kW Mode 2 EVSE with associated electrical work

and potential role for EECA in [the EV charging] space, further clarity is necessary to understand how the coordination between agencies and industry can take place moving forward.

For example, some of the questions in the green paper are seeking the same information requested by the Authority in its July 2021 consultation paper *Updating the regulatory settings for distribution networks*. More specifically, the Authority asked:

- *Is there a case to be made for minimum mandatory equipment standards for DER equipment, specifically inverter connected DER?* (Question 7); and
- *What standards should be considered to help address reliability and connectivity issues?* (Question 8)

With the different work streams described above that are currently underway, we suggest that EECA adopts a coordinating role with the different agencies, industry players including consumers, car and charging equipment manufacturers, and flexibility traders and other existing industry groups to bring alignment and drive to implementation.

The development of an industry roadmap, led by the Authority, MBIE or EECA could help bring some clarity, with a whole-of-industry workshop being the first step in this engagement.

We welcome further discussion

If you would like to discuss our submission in more details, please contact Nicolas Vessiot [redacted] in the first instance.

Response to 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 most principles, noting that the development of flexibility markets to enable all type of DER will have a bigger impact than focusing solely on EV charging.

In the short-term, we question the need to focus energy efficiency when the immediate priority is to displace internal combustion engines vehicle. Although this is an important issue, this might slow down the uptake of EVs and put our carbon reduction targets at risk.

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, why?
    - What information could you supply to EECA to help inform our thinking about this issue?

From an electricity network perspective, the impact of smart charging can be mitigated through different mechanisms. The simplest way is to minimise the charging current by spreading the load across a long period. Most networks are sized using an After Diversity Maximum Demand (ADMD) of 3 to 4 kW per residential Installation Control Point (ICP). Providing that the EV charging load combined with other load at the ICP remains under this value, the risk of network congestion will be low. With the majority of in-home charging requiring less than 10-12kWh each day the demand if controllable could be accommodated with a range of charging solutions. Therefore, the ability to randomise the start of the charge, combined with a limit on the speed of charge, although quite rudimentary, might be sufficient for most charging applications. This can be achieved in a number of ways, including using a three-pin plugs and the car's in-built charging management system through to domestic socket plug in smart devices and smart cables and finally wired in smart chargers .

From a whole-of-system electricity demand however, it is more efficient to charge at times when overall demand is at its lowest and available generation is at its peak. This can prevent the additional build of generation, transmission and distribution infrastructure necessary to move the energy. In this case, the ability of the charging vehicle to modulate its charging based on time of the day and overall electricity demand will reduce costs by improving asset utilisation and reducing the need for additional build.

Flexibility markets can deal with both network constraints and additional infrastructure build. Minimum EV charging specifications should therefore be designed so EVs can be treated the same way as any other flexible DER resources. In short, smart charging should have the ability to control the charge (both time and intensity) when requested by a consumer, their agent (e.g. flexibility trader), or a network or system operator (distribution or transmission).

When the charging is managed at an aggregated level, the effect on the power system can be significant. We are proposing that any party wanting to command flexibility are subject to a set of rules to maintain the security of the system. For example, a flexibility trader who would control a

significant localised load could have requirements similar to the existing asset owner obligations to avoid a sudden change on the network.

We are also proposing that smart charging contains some failsafe mechanism allowing the charge to be discontinued in case the electricity networks are under stress. By measuring voltage and frequency of the supply point, the charge could be interrupted quickly to preserve the integrity of the network. The alternative, based on a command sent to the charger to disconnect would require very low latency and high reliability communication protocols that is unlikely to be suitable for consumer equipment.

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 EV charging arrangements that will allow consumers to maximise the value they can receive through flexibility services.

For example, the direct control of EV charging can be restricted by a party to interact with their proprietary platform, as long as they offer seamless integration with a flexibility trader who can then send control orders to the charger through the platform (e.g. using an API), and offer visibility to network owner and operators (including to Transpower as the System Operator).

Cybersecurity is an ongoing area of concern with controllable devices and should be addressed by appropriate standards.

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?

Key for demand management is data reflecting the status, capability and use of the DER itself, i.e. the EV, not a generic charging device.

This information should include at a minimum:

- The location of the EV being charged to assign it to a network
- The minimum, maximum and current charging capacity of the EV connected to the network
- The expecting start time and stop time of the current or upcoming charging session

This data should be made available to flexibility traders, and network and system operators, and mechanisms to ensure the data is accurate should be put in place. We suggest that the responsibility to collect the data and guarantees its accuracy ultimately falls with flexibility traders. This could be achieved through minimum performance requirements embedded through the design of flexibility market rules.

DERs create an opportunity for network and system operators to have access to more data that will lead to better management of the power system. Industry research continues to identify the right

level of granularity by different parties required to optimise the electricity supply chain. Any data requirement put in place should remain flexible until this work is complete.

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?

The data should be made available to the EV owner so they can better understand their energy usage and potentially shift their habits to maximise the value they receive from flexibility.

The additional cost of having monitoring and recording requirements on the chargers should be weighed against the availability of this data through other means including the vehicle itself, or the metering installation.

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

We agree that some form of failsafe system capable of turning off the supply to the vehicle in case frequency or voltage reaches certain limit is useful for network stability.

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?

At a time where EV adoption to decarbonise our transport fleet is the most pressing issue, this has the potential to bring confusion and slow down the uptake.

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

At a time where EV adoption to decarbonise our transport fleet is the most pressing issue, this has the potential to bring confusion and slow down the uptake.

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

Whatever technology that enables consumers to unlock the full value of their DER by accessing a flexibility market should be considered, while keeping the cost to access the flexibility market as low as possible to avoid creating a barrier to entry. Cables containing a "smart" charging-enabling device is one of them.

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?

The "do nothing" is not an option as flexible charging is necessary to avoid overbuild of electricity networks.

There is a need for government intervention in removing the barriers required to enable flexibility markets, which will encourage the take up of smart charging. These barriers have been identified by the Electricity Authority's Innovation and Participation Advisory Group and should continue to be the focus of government.

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?

At a time where EV adoption to decarbonise our transport fleet is the most pressing issue, this has the potential to bring confusion and slow down the uptake

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?

Smart charging capability for EVs should be mandated through standards and regulations.

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?

We agree that smart charging capability should be regulated through standards. The minimum capability should include:

- The ability to plan the start and the end of a charging session
- The inclusion of a failsafe mechanism to interrupt charging when network stability is compromised
- The provision for EVs to share data across industry participants

More details can be found in our answers to questions 2, 3, 4 and 6.

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?

Any type of standard used to regulate smart charging should be compatible with the overall objective of unlocking the full value of DER for consumers.

This should include:

- Compatibility with energy management systems
- Integration with home energy storage

Although this paper primarily focuses on residential charging, we encourage EECA to consider other form of EV charging that can be flexible. This can include the charging of fleet vehicles that can be moved overnight, and destination charging like airport car parks or hotels.

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

While the energy performance of EV charging is an important issue, at a time where the need to decarbonise the transportation fleet is a priority, we question the need for intervention in the short-term.

TRANSPOWER

TRANSPOWER.CO.NZ

Introduction

bp's purpose is to reimagine energy for people and our planet. Our ambition is to become a net-zero company by 2050; and to help the world get there, too. We are committed to playing our part by delivering progressively more low carbon solutions and providing cleaner, more affordable, and reliable energy. We aim to actively advocate for policies that advance net zero.

As such, bp welcomes an opportunity to provide feedback on EECA's green paper on improving the performance of electric vehicle chargers.

We're on the move in Australia and New Zealand (ANZ)

We have big ambitions to provide the most convenient fast-charging network in ANZ and are beginning by deploying 200 fast charge points split evenly across both countries over the next year, all powered by 100% renewable electricity.

bp has a multi-year contract with Tritium for the supply of EV chargers, including an initial order of almost 1,000 chargers for the UK and ANZ markets. This enables bp's entry to EV fast-charging in ANZ and supports bp's pursuit of 100,000 charge points globally by 2030.

Our initial focus is to provide fast charging where it is most needed, and that's on-the-go, at our bp forecourts. We have more than 1,600 bp sites owned by bp or dealers across Australia and New Zealand.

We intend to install 200 charge points, or 100 fast chargers, by 2023 at locations that best meet the demand from our customers, fleet drivers and businesses. Of course, these sites will have all the usual amenities - lighting, bathrooms, seats, food, and coffee plus we'll offer payment through an app and later our BP Plus (AU)/BP Fuelcard (NZ) card which will cater for fuel and EV charging on one account.

These locations will feature DC chargers potentially providing speeds up to 150kW. Fast charging will allow bp customers to charge their vehicle quickly, adding 100km range in approximately half an hour.

For fleet customers, we are working with transport and fleet operators to understand their needs. We are developing a charging solution for fleet depots to include the provision and installation of charging hardware. Supporting software will help manage charging and optimise costs to support back-to-base charging at depots and at workplaces.

This is only the beginning. We intend to deliver solutions across all locations. We are now developing our strategy across at-home and destination charging, two areas that our colleagues in the UK and Europe have been delivering for some time.

bp's global experience

bp's global Electric Vehicle charging infrastructure brand is bp pulse - operating in the UK, China, Germany and the USA. We are a Charge Point Operator (CPO) in these markets.

We have more than a decade of experience in delivering charging infrastructure. We have published an ambition to install 100,000 charge points worldwide by 2030 and at the time of writing have 16,000. Our strategy is built on a belief that high-speed charging will be the key enabler of any country's electrification of mobility. In Germany, 100% of our network is made up of charge points that can charge at 50kwh or faster, and we are already installing 350kwh chargers in multiple markets. Our China business recently began operating a 'megahub' in Shenzhen with 480 charge points and 30,000 kilowatts of charging capacity.

We are installing charging infrastructure on existing bp operated forecourts, but also building dedicated EV only hubs in strategic, safe, high-demand locations with the value-add services (food & drink, toilets and other amenities) which drivers will demand.

In addition to our 'on the go' charging infrastructure, we are also installing home chargers in the UK and Germany. Most importantly, we are also working with fleets, including the UK's national postal service (Royal Mail) and Uber in multiple countries, installing charging infrastructure in their key locations.

1. Current market position and likely trends

Any commentary on EV charging policy and regulation must be set in the context of the market and likely trends that we have experienced in our global markets. While charging infrastructure – both in terms of location and different rates of charging - will always remain a mixed landscape (with drivers looking for 'different speeds for different needs'), it is highly likely that acceleration of the EV transition will be tightly correlated with the roll-out of fast charging.

a. For those who have access to off-street parking at home, a home charger will undoubtedly be the most convenient option for most of their charging. But those who lack access to driveway home charging will not necessarily be willing or able to charge primarily on slower on-street charge points.

b. While on-street charging has its place and may be the best option for some drivers, it has severe limitations – from low charging speeds and concerns about trailing cables where there is no dedicated charging bay – leading, to the inevitable consequence of parking-challenges and charging-challenges merging. The ability to scale up fast charging is likely to be significantly more important in supporting the EV transition. In the UK we are seeing a strong trend away from slow on-street charging, and in China - one of our more mature global markets there are already questions about whether low-speed street charging points remain viable.

c. The trend in a number of global markets and across multiple operators appears to be for higher speed chargers in hubs, with increasing numbers of chargers per site. We expect this trend to continue.

d. In terms of delivering the energy that electric vehicles need, rapid and ultra-fast chargers already appear to be delivering the majority of all public charging in the UK. On the bp pulse network, rapid and ultra-fast chargers make up around 30% of charge points, but account for around 80% of the energy supplied.

e. Convenient and local ultra-fast charging will be vital for giving people the confidence to switch to electric vehicles, even if they rarely need it. There are too many 'what if' scenarios where access to slower charge points alone would not be a good enough solution for customers – for example, fleet drivers in need of a charge in order to optimise their working day, finding an EV not sufficiently charged in the morning or having had a power outage overnight.

f. While private motorists were the earliest adopters of electric vehicles, one of the most significant sectors driving EV adoption over the 2020s will be fleets and businesses as they transition large numbers of predominantly diesel vehicles to electric. Fleet managers in multiple markets tell us that they will likely want to de-risk their charging strategy, which for on-the-go charging is likely to mean getting vehicles charged with certainty as quickly as possible, rather than facing the uncertainty of their EVs 'doing battle' with the existing fleet of ICE vehicles for on-street parking (and charging) spaces. We believe that ride-hailing and taxi companies will rely especially on this model.

2. Electric vehicle smart charging challenges

a. bp believes electric vehicles transform mobility and contribute significantly to decarbonization goals. However, this will not happen without significant planning to support emission reductions. This must not be delayed any further.

b. bp considers a best practice policy and regulatory framework would include the following:
   - Be market led, responding to demand and need from consumers and fleets who will want to make the transition in the right way for them.
   - Have an appropriate policy environment that stimulates the investment, ensures competition required while ensuring appropriately high standards at the right time.
   - A recognition that grid connectivity is the number one determiner of the ability of a country to roll-out electric vehicle charging infrastructure.
   - Adaptability, enabling all members of the ecosystem (from CPOs and OEMs to regulators and governments) are able to respond quickly to change and demand.

c. At this time, bp believes based on our international experience to date that while technical standards are needed to set the foundation for planning, they must be implemented in step with the market. The more notice the market has of new standards, the more likely it is to hit those deadlines, and phased implementation periods will ensure that existing technology isn't rendered obsolete before value can be extracted from it. Despite the fast-paced nature of the market and increasing demand, supply chains are still constrained however product development can work on long-life cycle patterns.

d. For New Zealand, and in line with what bp Australia has submitted in response to the Energy Security Board's (ESB) Electric Vehicles Smart Charging Issues Paper (August 2022), we recommend aligning with the minimum internationally proven and

demonstrated standards OCPP1.6(J), and allow enough flexibility for technology to evolve with changing customer needs. We believe that ISO15118 is still too new and mandating it today would be premature – as the industry is not ready. We anticipate it will be several years before industry is ready for this by mandate – refer to Appendix A – UK Smart Charging Implementation.

e. Supporting customer choice and enabling interoperability is key. We caution on restricting or controlling customer behaviour too early on the adoption curve as this may discourage EV uptake. Consumers and businesses will willingly go on the electrification journey, but the scale of the transition in behaviour should not be underestimated. Policy makers should be cautious about making the transition period too onerous too soon before customers are ready to engage.

f. Smart charging systems must allow for manual overrides as too many strict controls aimed at efficient charging behaviour will complicate the customer experience, and may have unintended policy outcomes. For example, smart charging is only as good as the internet connectivity available, something out of the CPOs control. In the event of a broadband or mobile internet failure, or areas of weak connectivity in general, customers could in some scenarios be blocked from charging due only to a mandatory 'smart' required. We expect many customers to have a 'plug in, walk away' attitude to charging, and this should be respected as a choice to encourage the EV roll-out.

g. With grid connectivity being the number one determiner of charging infrastructure roll-out, and timely planning, coordination and connection to the networks critical we recommend that the EECA or relevant body place equal (at least) emphasis on this key enabler alongside smart charging. We would be very happy to contribute to a process identifying and anticipating demand hubs for public charging including whether or not there is adequate installed capacity at these locations and if not, what policy, regulatory or other investment incentives may be valuable.

h. CPOs play an important role in the markets we compete in and bp would support a formal CPO role for the New Zealand market and appropriately outlining roles and responsibilities. We believe in a hierarchy of responsibilities for EV charging infrastructure and would recommend consideration to the following:
   - Charge Point Operators (such as bp) are responsible for predicting and then meeting market demand for charging opportunities;
   - Distribution network providers are responsible for delivering the connections that Charge Point Operators therefore require; and
   - the Regulator to be responsible for ensuring that distribution network providers are able to deliver the connections, in a timely, reliable and cost-effective way.

i. We support having roaming bi-lateral agreements between CPO providers instead of mandating roaming to all parties as this increases complexity and costs to business.

bp welcomes well-designed, stable, and long-term policy frameworks to incentivize and support the decarbonization of the transport sector. Now is the time to get the regulatory framework right to support the rapid deployment of electric vehicles including the interface with the electricity system. bp looks forward to working with EECA, officials and the Government as the policy is developed and we roll out EV charging infrastructure across New Zealand and Australia.

Appendix A – UK Smart Charging Implementation

Legislation was passed in December 2021 that required private chargers (home and business below 50kw) to enable additional smart charging features with enhanced security features. The aim of the legislation is to support improved grid demand management by introducing the option for further smart functions with improved security. The regulations are commonly referred to as "smart regs".

The new regulations have two key dates when they come into force:

- June 30, 2022: Enhanced smart features, including:
    - Randomised delay to avoid grid shocks
    - Automatic off peak charging
    - Improved data supply (to encourage demand side response)

- December 31, 2022: Enhanced security features including:
    - Cyber security software enhancements
    - Physical features such as tamper protection barriers and secured boot

For the short period that the smart regs have been available (from December 2021 up until the first enforcement date of 30 June 2022), the business has been working hard to develop technical solutions to the regulation requirements, but the demanding timelines has meant it has not been possible to achieve this in the time available.

bp's experience has been duplicated in large swathes of suppliers, with industry intelligence suggesting that a significant number of companies were not able to meet the deadlines. Following the passage of the first date, we have not been able to identify for certain any company that has managed to comply.

The Government was forced to develop an undertakings process. This means that companies have applied to be able to continue to sell products to the market that are not compliant, but will not face fine or sanction as a result leading to sub-optimal outcomes for both industry and government.

The ability to achieve such undertakings has required a clear pathway to becoming compliant – any product that does not have a pathway to compliance cannot be supplied to the market.

The overarching challenge in the UK has been:

- Technical requirements were not published or shared with industry to give sufficient time to ensure that they were understood, could be clarified, or for unachievable technical challenges to be raised (there may be some requirements still that are not achievable).
- The implementation time frames were a political decision and did not provide sufficient time for businesses to implement necessary technical updates before they came into force. This was despite over 80% of industry making clear that proposed time frames were undeliverable (From receiving technical specifications to delivering a new product, this takes roughly 18 months, we were given under 6).
- Other areas to be wary of are around existing stock and warranty replacements. Guidance here is murky – but UK regulations required any charger replaced would have

to be with a smart charger. This has left us with a lot of useable stock and components. Compounded by the short time scales for implementation meant stock management has been a challenge.

Key learnings:

- Government should engage much more frequently with charge point operators throughout the policy development process. Relying solely on formal stakeholder consultations as the main source of input risks the development of policy which makes sense at a high level, but which lacks the necessary technical input to ensure that it is workable on the ground. Operators have a significant amount of expertise to share which can ensure policy is as strong as it can be, but currently lack opportunities to do so outside of formal "set piece" events. Policymakers should feel empowered to test their policy proposals bilaterally with operators from across the sector, even when policy may be at the ideation stage. This can be informal and need not be time-consuming.

- Government should publish draft regulations as early as possible. The procedure for passing legislation in the UK creates risks for both industry and policymakers. Industry rarely sees draft legislation before it is laid in Parliament, making it very challenging to begin preparations for compliance in advance, whereas policymakers cannot always be confident that their draft text has been rigorously tested. The circulation of draft regulations well in advance of their introduction to Parliament would give industry the opportunity to begin any necessary product development work, and allow policymakers to plug any gaps in their drafting before it is too late.

- Lead times should always be developed in conjunction with industry and strenuously tested. While it is common for stakeholder consultations to ask respondents to provide input on lead times, Government should also continue to test its assumptions throughout the policy development process - particularly when policy positions change and begin to be finalised. The time taken to deliver compliance with legislative requirements can vary significantly depending on the nature of the requirement, and depending on other regulatory obligations which companies may be facing in the UK or elsewhere. Making sure that the lead time(s) in the final legal text reflects these variables is essential for ensuring the Government's vision is delivered.

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