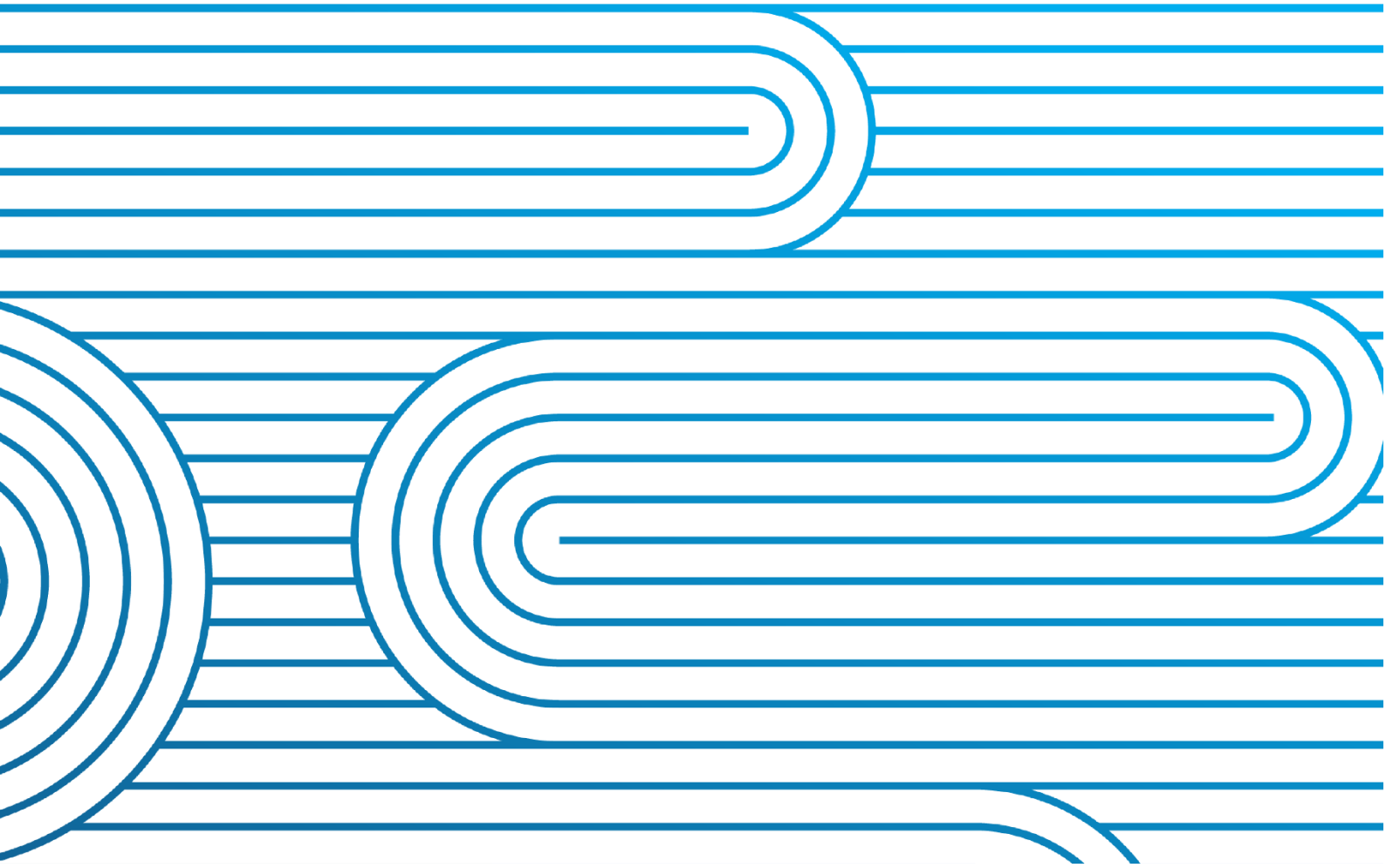
TRANSPOWER

# 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

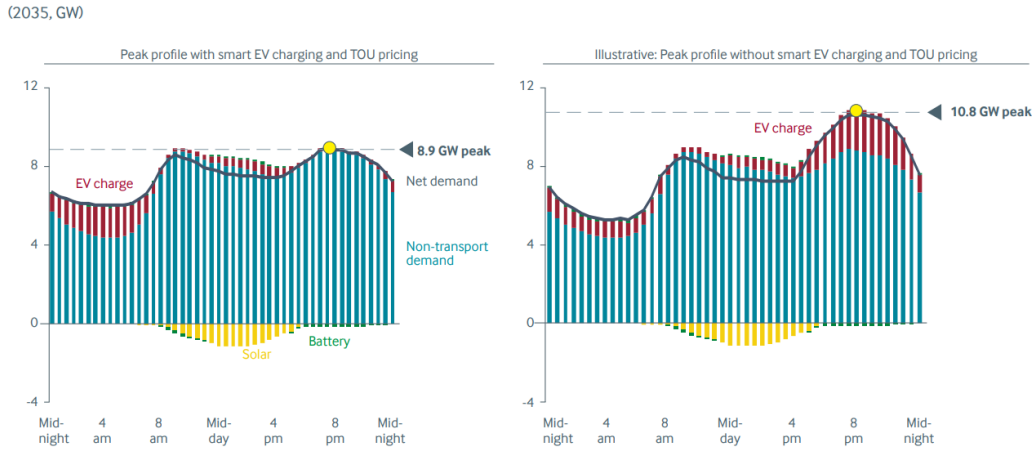
Through our submission, we want to emphasize that:

- 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**



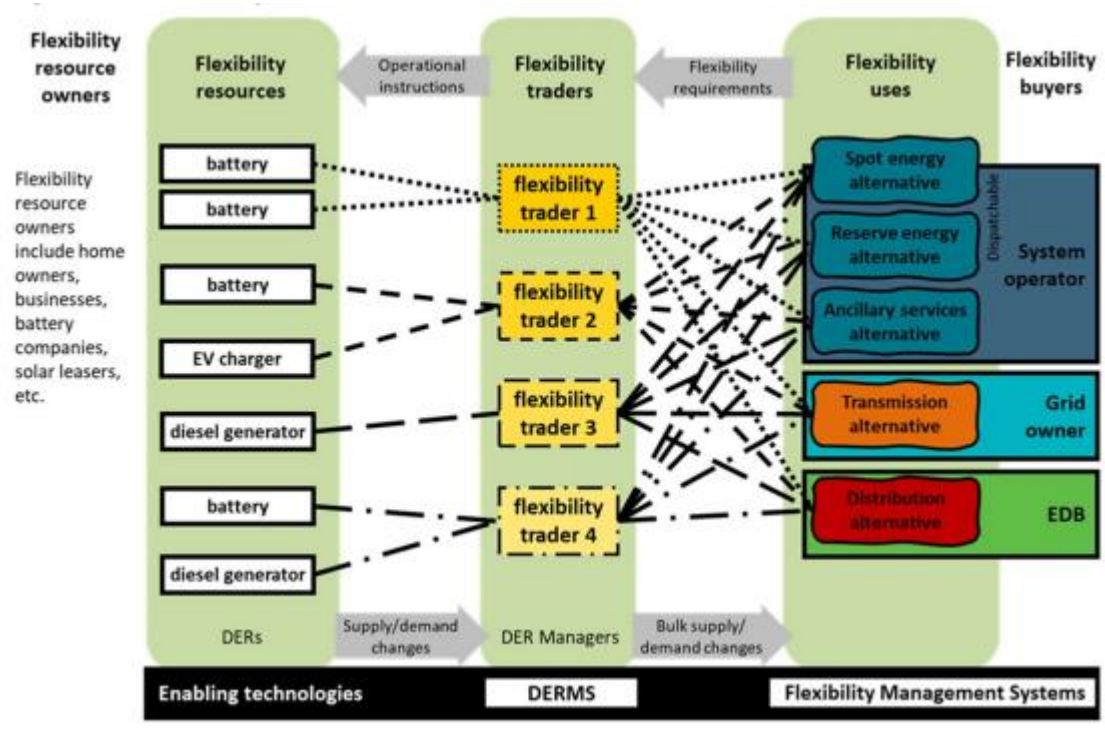
These findings were supported by an independent report commissioned by the System Operator - Distributed energy resources: Understanding the potential. The majority of these benefits are derived from DERs' contribution to resource adequacy, both as virtual peaking generation and as a means to manage 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 […]*

[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 (nicolas.vessiot@transpower.co.nz) 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?

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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.

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