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FlexForum feedback to EECA on smart EV charging

The FlexForum is a cross-industry group

The FlexForum is a cross-industry group established in February 2022 to identify the practical, scalable and least-regret actions needed to integrate distributed energy resources (DER) into the electricity system and markets to maximise the benefits for Aotearoa New Zealand [1].

Standards for smart EV charging, and for flexible DER more generally, are very relevant to the FlexForum's key objectives:

1. identify the minimum specifications of the services that DER can provide, to who, when, where, how, and for how much;
2. identify the practical, scalable, and no regrets steps to use the services that DER can provide; and
3. support ongoing learning and collaboration across the electricity sector on real-world deployment of solutions to realise the benefits of DER, including identifying and resolving barriers.

More information on the FlexForum, its goal, objectives and work to date, is available at: <https://www.araake.co.nz/services-projects/flexforum/>.

Standards are a foundation to harnessing flexibility

Flexibility is a critical feature of the future electricity system. In particular, smart EV charging and, in time, vehicle-to-grid (V2G), have huge potential to provide a range of services, from balancing renewables on the grid to managing localised constraints on distribution networks.

The challenge is that coordination and collaboration are hard. A multi-year effort will be needed across the electricity value chain to deliver the investments, the changes to planning and operational practices, the changes to regulatory settings and the engagement with consumers required to leverage the capability of their DER.

In this context, the FlexForum welcomes the opportunity to submit to the Energy Efficiency and Conservation Authority (EECA) on its green paper, *Improving the performance of electric vehicle chargers*.

The FlexForum has four main points of submission to EECA:

- Standards provide a critical foundation to the delivery of the system-wide benefits from DER flexibility, and we support the option to regulate for a smart EV charger standard. Interoperability, open communications, registration/visibility and appropriate minimum standards are key building blocks to enabling that flexibility and ensuring individual consumers' resources can provide system-wide benefits in the future.
- Any standards set should be developed through wide and transparent consultation, including with suppliers of software/equipment and aggregators, to ensure that they are fit for purpose for all parties. In setting standards, efforts should be made to align with international standards and approaches to limit the potential barriers to adoption of technology in New Zealand.
- EECA should avoid technology-specificity where possible, and consider parallels with other household appliances with similar benefits to the electricity system - for example smart water heating.
- While technology standards provide the foundation for harnessing flexibility, it is likely the value proposition for consumers will require further enhancement in order for uptake to be accelerated. Consumer education about, and buy-in to, the benefits of charging flexibility are going to be critical.

Each of these four points is expanded in turn in the remainder of this submission.

Common standards and terminology are critical

Appropriate minimum standards are key building blocks to enabling flexibility and ensuring the resources can provide system-wide benefits.

For the case of EV chargers, such minimum standards should include:

- **Capability and connection to receive and respond to dynamic system requirements**

This is the most important of the minimum standards. Without this capability, while EV chargers could still operate to timed profiles (for example, preferred charging times entered by the consumer), the ability for chargers to respond to dynamic system requirements would be considerably limited. In order to provide the benefits noted by EECA on p12, that “*EV charging could be reduced during peak demand and increased at times of high renewable electricity supply (off-peak)*”, chargers need to be able to receive requests to respond to those dynamic conditions in accordance with the consumer’s preferences.

Similarly, without connection to a back-end platform designed to provide flexibility services, an EV charger may be capable of being “smart” but have no means of receiving information relating to changes in system conditions. Connection to such a platform is critical to enabling the full value of flexibility from a smart charger, especially once V2G injection becomes more prevalent.

As noted from p14 in EECA’s paper, response from EV chargers can also play a key role in maintaining network and system stability in an emergency situation - an extreme case of a dynamic system requirement. This could be achieved through various means - for example through mandatory settings in the charger itself (as referred to by EECA at the top of p15), and/or through signals passed by the network operator to the party managing the charger on the consumer’s behalf. There are clear analogies and precedents on the transmission network for both approaches, including generator governor response, instructions from the system operator during grid emergencies, and, as a last resort, automatic under-frequency load shedding (AUFLS).

- **Interoperability**

An EV charger should not be locked in to a specific operator. This allows the consumer to switch between different parties who may manage the device on the consumer’s behalf (subject to contractual conditions), and to change *how* the device is managed for them. As with electricity retailing in general, in order to develop thriving competition between these parties, and flourishing innovation, barriers to switching must be low.

- **Open communications protocols**

Relatedly, EV chargers must be able to be remotely accessed without the need for proprietary interfaces or gateways. Note this is distinct from open access; there should still be a requirement for the consumer to approve which party, or parties, are authorised to communicate with their charger.

- **Off-peak charging, by default**

Levels of engagement with the energy market by consumers have traditionally been very low. While the operation of consumers' DER in future will most likely be by third parties, rather than consumers themselves, this still requires consumers to engage with those third parties to initiate the relationship.

As noted by the UK Government, "*mandating the setting of a default charging mode will help mitigate the risk that some users do not engage with smart charging offers, and instead charge during peak times*"[2]. While FlexForum members would like to see as much use made of dynamic flexibility as possible, an off-peak minimum standard will provide a useful first step for some consumers, and potentially a permanent backstop for others.

It would be useful for chargers to be able to easily revert back to these default settings if (for example) the consumer opts out of a smart-charging offer, or another consumer moves into the premises.

- **Randomised delay**

We note the appeal of this setting as a means of mitigating the risk of unmanageable secondary peaks on electricity networks caused by synchronised behaviour from default timers (i.e. all chargers begin charging simultaneously at the end of a peak period). However it is worth noting that a material proportion of today's EV owners have invested in smart chargers to take advantage of retail offerings that change hour-by-hour (such as Electric Kiwi's Hour of Power). Restricting consumers' ability to take advantage of the full hour could lead to consumer pushback, harming the industry's efforts to earn the social licence required for widespread uptake of managed charging. Instead, randomised delay could be a default setting to go hand-in-hand with default off-peak charging. This could be a useful long-term setting for many consumers, but could be overridden by a more dynamic smart-charging offering.

While not a standard per se, we consider registration and visibility of the presence of a smart EV charger to be critical to enabling third parties the ability to assess the full potential benefits of that charger. In particular, it is essential that network operators have visibility of where a charger is, and the characteristics of that charger. Charging behaviour can then be inferred from the half-hourly consumption data the distributor has (or soon should have) access to.

Adding new fields and flags to the existing electricity registry could be a straightforward means of storing and sharing this information within the industry. We encourage EECA to work with the Electricity Authority on such a solution. As EECA notes on p12, a V2G-enabled charger would already need to be recorded in the registry under the rules of Part 6 of the Code.

Any standards set should be developed in wide and transparent consultation

EECA's green paper is an excellent means of coalescing the multiple ongoing conversations relating to EV charging, and ultimately to advance regulation for a standard on smart EV charging. Further to this necessary immediate action, this should be the start of a single, combined conversation on standards, including wide consultation on their development. We applaud EECA for taking a lead in this area.

Any standards set should be developed in wide and transparent consultation, including with suppliers of software/equipment and aggregators, to ensure that they are fit for purpose for all affected parties. The flexibility value chain requires multiple different links to work together, each involving a wide range of actors. All of them have an interest in making sure the benefits of flexibility to consumers are maximised, and all will add useful perspectives.

In setting standards, efforts should be made to align with international standards and approaches wherever possible, to leverage learnings and avoid barriers to adoption of overseas technology. Other countries are further ahead than New Zealand in the uptake and use of DER. This includes in relation to open communications protocols. We note that OpenADR is mentioned specifically by EECA, but the development and application of IEEE 2030.5 in Australia should also be considered closely.

EECA should avoid technology-specificity where possible

The future energy ecosystem, and flexibility resources more specifically, will be characterised by an extremely wide range of DER providing a number of different services. It is too soon at this point to be able to say which DER will materialise the fastest and which will provide the most useful services.

In relation to smart EV chargers, this means there will likely be a range of options for consumers to choose from, meeting a range of different needs. For some consumers, a smart EV charger on the wall of their house or garage will make the most sense. For others, smart capabilities may best be provided in the charging cable (to the extent possible). Onboard smarts within the EV may make sense for others. In-home charging will be part of a broader, national charging system including a wide variety of public charging options. Having a range of charging options available to consumers provides a further source of flexibility.

It is too early to say at this point how consumers will choose to make use of public and in-home charging, and which technologies consumers will invest in. EECA should avoid picking winners in the future technology mix, and ensure that the benefits of flexibility will be realised no matter which technologies and behaviours prevail.

Similarly, much of the paper's content could apply equally to other connected consumer technologies, such as smart, individualised management of water heating (an evolution of the ripple system), which have the potential to provide significant quantities of flexibility [3]. The FlexForum would be interested to see EECA proactively take a lead in ensuring these resources also deliver long-term benefits to consumers.

The consumer value proposition may require enhancement to accelerate uptake of smart chargers

As expressed above, technology standards are a critical enabler for unlocking value from the flexibility in EV charging. However, standards alone cannot unlock the value for consumers, and it will be consumers who ultimately decide whether to take up smart chargers for their homes. Consumer education about, and buy-in to, the benefits of charging flexibility will be critical. EECA needs to play leading roles in providing consumers with information to inform the choices they make, and building widespread support for smart charging. Given consumers are making investment decisions today, the earlier this education begins, the better.

Value from flexibility in smart chargers accrues from avoiding costs in multiple parts of the electricity value chain, from generation and ancillary services through transmission and distribution. The FlexForum has worked since the start of the year to identify actions that can help unlock that value, enable that value to be 'stacked' and thereby enhance the proposition for the consumer considering installing a smart charger.

The end state foreseen by the FlexForum is a series of flourishing interconnected national and local markets for flexibility, delivering direct value for consumers who own DER and indirect benefits to those who do not. However, it will take some time, and a great deal of hard work and patience, for that vision to be realised. EECA should consider incentives that stimulate the development of sustainable and scalable market mechanisms to bridge the gap until these are economically viable.

FlexForum members are collaborating together and across the wider sector to develop projects that enable value stacking, to strengthen investment in DER and flexibility. However, there appears to be a gap in innovation funding available in New Zealand for projects that stimulate the development of flexibility markets and smart charging incentives. Innovation funding that enables a greater focus on customer desirability and commercial viability, in addition to technical feasibility, is required to develop scalable solutions. We would encourage EECA to consider and advocate for sufficient funding to enable the potential benefits to consumers to be realised.

[1] The benefits available to households and businesses from DER and flexibility over time should include lower energy costs, a more resilient power supply, and more rapid decarbonisation

[2] UK Government. *Electric Vehicle Smart Charging: Government Response to the 2019 Consultation on Electric Vehicle Smart Charging*, July 2021

[3] Concept Consulting's 2021 report, *Shifting gear: How New Zealand can accelerate the uptake of low emission vehicles - Report 2: Consumer electricity supply arrangements*, showed that management of electric water heating provided the second-largest potential source of flexibility after EV charging. While 'ripple control' of hot water heating in return for a discounted electricity rate is a particularly mature use of flexibility, the FlexForum has noted that the evolution of a flexibility market requires distributors transitioning away from direct control of household hot water.