Response to ESB electric vehicle smart charging issues paper.

August 2022

Introduction

The Electric Vehicle Council (EVC) is the peak body in Australia representing the interests of manufacturers and suppliers of EVSE, software service providers in the field of EV charging orchestration, and Electric Vehicle manufacturers. We also have a strong partnership amongst energy market participants, including retailers, DNSP, TNSP, and generators.

The EVC is keenly interested in ensuring that uptake of EVs is accelerated, in a manner that is supportive of the overall energy system. To this end, the EVC and EVC members worked with the ESB on the development of the issues paper that the ESB is presently seeking comment on, as an element of their DER implementation plan, within their broader post-2025 market design work:

https://www.datocms-assets.com/32572/1658376992-esb-electric-vehicle-smart-charging-issues-paper-final-for-publication.pdf

We note from page 6 of the paper: “The issues highlighted for consideration in this paper are raised with the intention of enabling the EV charging needs of consumers, both in domestic and public settings”. We observe however, that much of the paper focusses on methods by which consumer freedom can be restricted, in favour of external control being applied over EV charging in the home.

For the avoidance of doubt, the position of the EVC is that it is appropriate at this time to set requirements for EV charging equipment deployed in homes to have communication capability, as a future proofing, no-regrets measure, provided these requirements are:

1) Nationally consistent, and federally managed.
2) Aligned with proven successful international approaches - meaning, OCPP 1.6J at this time, not unique Australian Standards.
3) Supported by a suitable subsidy or rebate in the near term.

It is not appropriate at this point in time to attempt to require all EV charging equipment in homes across the country to be externally controlled. The evidence is clear that this is not necessary.

The paper also considers a range of measures relating to public charging (question 18 onwards), which we respond to. Key issues from the EVC in this respect are:

1) Tariff reform to resolve commercial challenges associated with high-power, low-utilisation charging sites
2) The need in some jurisdictions to reduce the time taken to set up a new high power network connection.

Responses to elements of the paper:

Responses to questions 1-3:

1. ESB welcome stakeholder views and input on smart charging equipment standards settings including any input to inform the likely costs.

2. ESB welcome stakeholder views on the introduction of minimum EVSE equipment standards without remote management, and whether this will provide future optionality for managing peak demand.

3. ESB understands that most EVSEs on the market today come with smart charging as a minimum functionality – is this the case or do stakeholder see this as still an emerging functionality?

Comment to impact of EVs at peak time.

Page 13 of the paper presents AEMO's forecasting of EV impact, which notes that expected proportion of 'convenience charging' under the various scenarios ranges from 66% to 82%.

'Convenience charging' is a concept included in AEMO's work, drawn from CSIRO's work, which presents a range of different charging profiles. The 'Convenience Charging' profile is heavily biased towards EV charging occurring at peak times, aligned with consumers returning home from work and plugging in.

Multiple studies done in the last two years in Australia indicate that this is not how Australian consumers are charging their vehicles. Under BAU conditions in Australia, most EV owners have solar on their roof, and have access to off-peak pricing at night. These elements create a strong financial incentive (or nudge) for the consumer to self-manage their charging away from peak times.

The result of the existing market settings delivering incentivisation to consumers is that average contribution to network peak demand per EV is currently on the order of 250W, not the 1.2kW depicted in the convenience charging profile. Noted clearly in the CSIRO source material is, "If there is no time of day tariff controlling or incentivising when to charge, then vehicle owners charge whenever it is convenient". The AEMO work has picked up the convenience charging usage profile, but has not given due consideration to the presence of existing incentive signals in the market place, or recent studies of actual Australian consumer behaviour in the presence of those signals.

The EVC has published a paper specifically on this issue and is happy to engage further on it:

https://electricvehiclecouncil.com.au/reports/home-ev-charging-and-the-grid-impact-to-2030-in-australia/

Consumer consent

Page 16 of the issues paper laid out several principles relating to the interoperability of CER devices:

- Consumers should be able to share data with service providers.
- Consumers DER assets should have a level of portability between providers.
- Control of and access to consumer devices should be limited to clear use cases.
- Consumers need to receive clear information about the compatibility of their DER assets.

Consumer consent for their appliance to be externally controlled appears to be missing from this list. Consent will be a fundamental consumer expectation for the use case of external orchestration for charging the vehicle. Some consumers will want to opt-out of charging orchestration during a specific event, while others will not want to participate in such a scheme at all. A system design for orchestration of EV charging that steers towards removal of consumer consent is unlikely to be effective, or well received. If a solution of this nature is forced on consumers, it would be reasonable to expect that many will resolve the issue by charging their vehicles with standard 10A-15A power points instead of installing smart charging equipment.

In this respect, it would be appropriate to consider charging of EVs (where the EV is simply a load on the network) and discharging of EVs into the network (V2G), as separate use cases. Acceptance of external orchestration of V2G may prove to be higher than acceptance of external orchestration of charging.

Partly, this stems from the fact that the consumer ultimately still remains in control – if they do not wish to participate in V2G on a particular day, they can refrain from plugging in their car. They're also free to refrain form installing a V2G charger in the first place and opt-out entirely.

Minimum charging equipment standards

Pages 17-20 of the paper talk through possibilities around minimum charging equipment standards.

With respect to the international examples given, the EVC notes that it is far too early to determine if the measures referenced in other jurisdictions are delivering good consumer outcomes. The approach taken in Great Britain, for example, only went live three weeks before the publication of this issues paper.

Governments and regulators around the world are trying a wide range of different approaches – inevitably, some will work well, and some will fail in exciting and unpredictable ways. Given we are lagging global EV uptake and will not have an EV-related peak demand problem for years, there is limited urgency for us to address this issue. We owe it to Australian consumers to see if these measures work in other jurisdictions before we mimic them.

With respect to individual state-based approaches within Australia, the EVC does not support individual states and territories setting unique requirements of this nature. To the extent that industry can offer consistent solutions across all Australian jurisdictions, costs will be lower, and competition will be enhanced, which will deliver consumer benefit while making delivery against consumer needs easier for industry. The EVC supports nationally consistent approaches with respect to equipment standards, that are aligned with 'proven good and effective' international standards. This is in step with general federal government policy, which leans towards adoption of international standards rather than creation of unique local Australian standards.

In terms of a suitable standard to apply for domestic EV charging equipment, while it is not clear that external orchestration of EV charging will be able to deliver benefits exceeding the cost of implementation, it is plausible that in future this may prove to be the case. In a future where external orchestration of EV charging is commercially viable, it's possible that one of the mechanisms for delivering it will be via a smart charger (other clear options being externally orchestrated control over the charging from the vehicle side, and consumer-in-the-loop control, where the consumer receives a text message or similar requesting an action).

With this in mind, the EVC is supportive of requirements for new EV charging equipment installed to include OCPP 1.6J communications capability, or approved alternative. For the avoidance of doubt, 'or approved alternative' as additive, not subtractive. We do not support a requirement that requires a communications protocol other than OCPP1.6J, and excludes

OCPP 1.6J as a compliance pathway, at this time. This aligns with discussion point 1 on page 19. Specifically, we observe that AS4755 is not likely to be useful in this context, given it is a unique Australian standard, that does not cover EV charging equipment as a product type.

Given there is a moderate cost difference between EVSE with and without OCPP1.6J, the EVC suggests that the federal government provide a subsidy to cover the cost difference associated with this capability in the hardware for a period of time. Assuming the charging equipment is not required to be connected to an external control system at time of installation, the installation cost will be no different, and the hardware cost difference will typically be on the order of $200-$300.

Discussion point 2 on page 19 relates to ensuring active co-ordination of charging infrastructure in the home, positioned as a 'must'. This is not necessary today, will not be necessary through to 2030, and may never be necessary. Regulating for this requirement today could reasonably be expected to:

- present roadblocks to the uptake of EV charging equipment in domestic homes,
- reduce competition amongst EV charging equipment suppliers, thereby driving up cost to consumers (or taxpayers, if subsidised)
- lead to more consumers using power points to charge, rather than EV chargers.

Laying the groundwork for future orchestration, by ensuring that EV charging equipment is communications capable in line with the dominant international protocol, is a reasonable 'no regrets' measure. Distorting the market by creating unique local requirements that may never be necessary is not.

With respect to the notes on Page 20, which suggest:

- minimum functionality for domestic chargers to be installed with built-in scheduling, and
- remote management and consumer over-ride capabilities

"Built in scheduling" implies that the installing electrician will define the charging schedule for the driver at time of equipment installation. This is a feature of the new requirements in the UK, but it's not clear yet how this approach will be met for consumers, or how effective it will be by comparison to giving consumers a price incentive, and leaving them in control, which they would generally prefer. It would be prudent to observe the results of the UK legislation before applying requirements like that here. For reference, if the desire is for a built-in schedule to be created so that the consumer has the ability to change, this could generally be easily done in most vehicles today at point of sale of the car. If the desire is to set a schedule that the consumer ***cannot*** change, then there is a much more significant question around consumer acceptance.

"Remote management and consumer over-ride capabilities" implies that from time of installation, the EV charging equipment can be externally controlled, but that consumers will have the ability to override. This at least makes it clear that consumer consent is a consideration, which is important. The EVC would make the observation here, per above, that system level external orchestration of EV charging is not necessary today, will not be necessary for some time at least, and if necessary in future, may be more efficiently achieved via other methods (such as remote control from the vehicle side). Setting minimum requirements for external orchestration should be a discussion in future, if and when it becomes apparent that it is not possible to sufficiently shape EV load through incentivisation, coupled with ***voluntary*** consumer participation in demand response / orchestration initiatives.

While some EVSE being installed in domestic circumstances today have smart charging capabilities, many do not. For the consumer that wishes to exert control over when charging happens, the most common approach is to do this from the vehicle side, either by setting a

preferred charging time window (which is effectively 'set and forget'), or by using an app. These methods work whether or not there is a dedicated EVSE on the wall – the smarts are in the car.

This said, a requirement for all installed EVSE to have OCPP 1.6J or approved equivalent as a minimum would be relatively easy for industry to meet. There is no shortage of equipment of this type available, and a requirement of this type would lay the groundwork for future remote management, at minimum cost today.

Responses to questions 4 and 5:

4. What are stakeholder views regarding the adoption of these standards in the Australian context? Do stakeholders consider the OCCP1.6(J) the most appropriate international standard to adopt? Are there any additional standards or options that should be considered in the short term?

5. Is there a need for EV to EVSE communications (such as ISO 15118) to be minimum functionality, alongside the communications protocol from the Charge Point Operator to the EVSE (such as OCPP)?

The ESB welcomes stakeholder views on why this might be necessary.

If we're setting a minimum requirement today, OCPP 1.6J is the right one to set, while leaving room for other standards in future should they emerge and prove more suitable for the use case (for example OCPP 2.0, IEC63110, etc). There is no other standard that it would be important to specify today as a potential compliance pathway.

EV to EVSE communications in a domestic context (where supply to the vehicle is AC, rather than DC) typically relies on IEC61851-1, which is simple, universal and effective, and has been adopted by all global charging equipment manufacturers and vehicle manufacturers with products coming into the Australian market.

ISO15118 is more applicable to public DC charging, and will likely also be relevant in vehicle to grid implementations. ISO15118 also addresses roaming, which we discuss later in this submission.

For the avoidance of doubt, we should not be requiring ISO15118 in a domestic context or for AC charging in a public context at this time. It may be appropriate to require ISO15118 for DC charging in future, subject to further consideration.

Response to question 6:

6. The ESB welcome stakeholder views on requiring default tariffs at the point of installation of a charging system. Do stakeholders have views on the merits of using network specific windows of time, or are state-wide defaults more appropriate?

It is too early to be setting mandatory requirements for default installation settings around timing of charging.

While it would be technically easy to execute, and require no ongoing external communication or connectivity to deliver, it is very easy to predict that an approach like this could be counter-productive from a network security standpoint, delivering a large co-incident spike at a specific time in the network – electric hot water heating in South Australia is the go-to example for this.

It's also very easy to predict that some consumers will have negative experiences if this requirement were brought in. Shift workers are an obvious category, as are residents in apartment complexes where building-level orchestration needs to take precedence over network-level orchestration.

Achieving an outcome where EV charging is deferred until off-peak time by way of incentivisation, in the presence of many competing retailers offering slightly different ToU products, is far more likely to deliver a widely diversified start time for overnight EV charging.

It's also clear that consumers will expect the ability to override in order to secure consent to external orchestration. If they've got the ability to override, it likely makes sense to simply stop at incentivisation, which is proven effective and acceptable to consumer, rather than seeking control as a mandated minimum.

Response to question 7:

7. The ESB welcomes stakeholder views on the appropriate timing considerations to enable a roll out of minimum technical standards for domestic EV charging systems. Do stakeholders see other considerations that need to be taken into account to facilitate jurisdictional policy settings?

Rolling out requirements for domestically installed EV chargers to have OCPP 1.6J or approved equivalent could be done in relatively short order without significant impact.

The EVC would suggest consideration of making this a requirement from mid-2024, with subsidy to cover the cost difference between EVSE that is not communications enabled, and EVSE which is OCPP 1.6J enabled, for a period of 5 years, or for 50,000 chargers installed, whichever happens first. From this point onwards, the requirement for OCPP 1.6J or approved equivalent would be a regulatory minimum standard, enforced without subsidy.

It would be the EVC's strong preference for this to be a federally managed requirement, rather than a state level requirement, to ensure consistency. The EVC notes that a suitable legislative and regulatory framework to achieve this outcome would likely need to be developed, or an existing framework such as the GEMS act modified through legislative process, in order to achieve this outcome. While it might be tempting to attempt to move faster than this by using a variety of state-based instruments, the entirely predictable result of that approach will be that the states will set differing requirements, and we'll end up with a hodge-podge of different requirements across the country. This has happened many times before in analogous cases and is in the process of happening in the EV charging space in South Australia. Given there is no urgency associated with this issue, we can afford to take the time necessary to do it well, rather than making a mess of it.

Other measures contemplated here should wait, pending detailed analysis of actual consumer behaviour with respect to EV charging at home over time. Early indications from studies in Australia in the last two years indicate that the vast bulk of the available network benefit associated with orchestrating EV charging is available through incentivisation, while leaving consumers in control. It may be that orchestration of EV charging by way of external control of the charging equipment (as opposed to orchestration by way of the car, or by way of incentive) in the home is never commercially viable, but against the possibility that it may become viable at some point after 2030, future-proofing the installed EV charging equipment base by making it communications capable is a reasonable no-regrets measure.

The introduction of stronger measures in this domain should wait until we have a clearer picture of the challenge we're facing, and the effectiveness of measures intended to address these challenges in other markets can be clearly assessed. There is no merit in adopting a brand new and unproven approach from another market, to solve a problem we don't have, and do not reasonably expect to potentially have for years to come.

Response to questions 8:

8. What are stakeholder views regarding the potential costs and benefits of requiring consumers to participate in remote coordination capabilities for smart EV charging?

Requiring consumers to accept that the EV charger has built in communications capability that will enable it to connect to an orchestration solution in the future, should they consent to this, would not be expected by industry to cause significant concern. This would especially be the case if the cost difference were covered by a subsidy.

Requiring that consumers accept external orchestration at the time of connection would be embraced by a small cohort of consumers, and a small group of industry participants who would stand to benefit from such a move, and would be loudly opposed by many. The EVC and TOCA ran a survey recently which asked many questions – one of them was, "on a scale of 1-10, how likely would you be to accept external control of your EV charging in exchange for lower energy costs?". The answers were quite polarised – a significant number at each end of the scale, with a sizeable cohort in the middle that weren't sure, but clearly weren't entirely ready to give up control.

For the avoidance of doubt, the majority of the EV industry would oppose a move to mandate external orchestration of EV charging in the home at time of connection. We are already running last in the OECD on EV uptake, a move like this could be expected to dampen demand for EVs, when we need to be doing the opposite.

There is a very clear and bright line between these two positions. Before we contemplate mandatory external control of specific loads in consumers homes, we need to learn more about the impacts of those loads, under existing conditions.

From the point of view of unintended consequences – if the rules change to require external orchestration over installed EVSE, and the consumer does not want an externally controlled charger, they may opt for a 10A or 15A powerpoint instead. A 15A powerpoint will deliver a 200km range recharge overnight… it's more than enough for the vast majority of drivers. The issues paper notes that a vehicle charging at 2.4kW represents one third of the load, but misses the point that it then runs for three times as long. The total energy required by the on-road electric vehicles on a daily basis remains the same, regardless of the power level of the charger.

The load will be diversified, but if a consumer has done a 200km drive on a particular day, and is looking to fully recharge overnight, then with a 7kW charger they can achieve this between midnight and 6am. If they're using a powerpoint, they need 12-20 hours – which means, they're much more likely to be presenting load at peak times on that day. Mandating external orchestration of charging could plausibly have the opposite of the intended effect, among consumers who do not wish to accept external control.

Responses to questions 9 & 10:

9. What are stakeholder views in regard to the use of CPOs for residential charging? What are stakeholder views on which parties (Traders, retailers, aggregators), DNSPs, OEMs, other parties) should be able to take on the function of CPO? Should the requirement for a CPO be mandatory?

10. What are stakeholder views in respect of the relevant and appropriate responsibilities that should be taken on by CPO: e.g., ensuring rate limits, customer support, etc?

CPOs do most of their work in public EV charging, providing management of public charging equipment, including maintenance, user interaction, authentication, payment, and so forth. In this context, they are very similar to petrol station operators which compete with each

other to service the needs of drivers. In the setting of public EV charging, consumer protections that CPOs are expected to comply with are generally limited to Australian Consumer Law, which has proven to be adequate to this point.

CPOs undertaking orchestration of EV charging in the home is a different kettle of fish, because it's a different environment.

Existing CPOs in the market are capable of managing widely distributed EV charging locations, using the industry standard OCPP 1.6J protocol. This approach has been extensively demonstrated overseas, and demonstrated locally in multiple ARENA-funded trials, with existing Australian CPOs. Going forward, if orchestration of EV charging becomes more mainstream, it is reasonable to assume that retailers could partner with CPOs in some instances to deliver this outcome, or may 'in-house' the capability. The work undertaken in the ARENA trials tends to lean in the direction of this approach.

It is also possible that orchestration of EV charging in the home could be executed via a home energy management system (HEMS). Systems of this nature draw together multiple appliances (typically hot water, heating/cooling, pool pump controller, home battery, solar, etc) and manage the total load of the home with reference to relevant external signals such as dynamic operating envelopes, pricing signals, or instructions from demand response aggregators.

The retailers are better placed than the DNSPs to execute on this function, because they already have the relationship with the end consumer, and they are exposed to the wholesale price as well as the network costs, which enables improved value stacking. They're also competitive by nature, which resolves the ring-fencing concerns. This is not to say that DNSPs cannot deliver systems of this nature – United Energy's Summer Saver, and Energy Queensland's PeakSmart are examples of network-delivered consumer demand response that are active in Australia today.

The EVC considers that enabling retailers to offer managed EV charging as an element of a retail contract to a home, ***on the basis of consumer opt-in***, is reasonable today. This could be done with the retailer partnering with a CPO, 'in-housing' the CPO function, or offering a HEMS solution. It should not be mandated.

Assuming models of this nature emerge outside of trial programs, adequate care will be needed to manage the risk of lock-in contracts. For example, if the offer is a zero-cost installation of an EV charger, followed by a fixed term over which the consumer cannot change retailers, there is a clear need for an adequate consumer protection framework. We understand that the work presently being undertaken between AEMO and the National Measurement Institute around Private Metering Arrangements is considering this.

Whomever is undertaking the service delivery will need to be responsive to any reasonable consumer concern, inclusive of equipment maintenance, equipment operation, and so on.

For the avoidance of doubt, the view of the EVC is that the requirement for a CPO, or CPO-like services such as HEMS with external management, should not be made mandatory in the residential context. There may be merit in making a CPO capability mandatory for public charging above a particular power level, for example 50kW, in furtherance of the goal of ensuring adequate availability of public charging.

<u>Responses to questions 11 and 12:</u>

11. What functions would CPOs be required to perform on behalf of customers? e.g. off peak charging.

12. What obligations would be required by CPOs to ensures there are adequate protections for end consumers?

CPOs, or retailers executing the CPO function, would be expected to manage the operation of the EVSE, both in real time with input from the consumer and other stakeholders, and in response to any issues such as maintenance or transfer of functionality to an alternative CPO or retailer.

Obligations on the CPOs with respect to adequate protections for consumers using public charging equipment are adequate. They will need further working through if the intention is to extend the CPO function into the home at scale.

Energy supply to vehicles is less essential than energy supply to premises, so it may be that the ACL is sufficient, depending on the nature of the arrangement. The NECF is more substantial, but likely overkill in terms of the necessary level of protection for the consumer.

Cybersecurity is raised in the issues paper at question 15, and is a critical element for consideration in this context. It is likely more important in terms of ensuring we avoid extremely negative consumer outcomes than the questions relating to ACL vs NECF.

With respect to section 3.1.3, and AS4755:

We note the reference to the then COAG Energy Council decision around AS4755 on EV charging equipment, which can be seen here:

https://www.energyrating.gov.au/document/regulation-impact-statement-decision-smart-demand-response-capabilities-selected-appliances

This decision was badly flawed in many ways, and was almost immediately responded to by the federal government OBPR, who identified that the decision was non-compliant with best practice regulation requirements:

https://obpr.pmc.gov.au/published-impact-analyses-and-reports/smart-demand-response-capabilities-selected-appliances-0

From a legal standpoint, it does not appear that the GEMS Act as currently written is in a position to enforce this requirement. Advice given to the EVC is that change to the legislation would be needed.

Despite this, we have seen the South Australian state government seek to accelerate the implementation of the mandatory application of the AS4755 standard across a range of appliance types, in unique state-based regulation.

The standard invoked, AS4755, did not then, and does not now, cover EV charging. The only products in market that have AS4755 compliance currently are air conditioners, used in the Peaksmart program in Queensland. It remains to be seen if the new AS4755 standard, AS4755.2, will be effective with regard to demand response across any of the products it will cover, once it is published.

Further, suggesting that the industry has a 6 year preparation period is deceptive at best. It has been almost three years since the COAG decision, and the most recently published public comment draft of AS4755.2 does not address EV charging as a product category. It is not clear at this time when this standard will be published, but it seems highly unlikely that the next published version will include EV charging.

The EVC is of the view that OCPP 1.6J has been repeatedly proven in the real world, in many countries, to be adequate for the task of EV charger orchestration without the need for a unique additional Australian standard.

In alignment with existing federal government policy, we should not be creating and mandating unique Australian Standards where they are not needed, and alignment with international approaches will meet our requirements.

Response to question 13:

13. Should there be a minimum requirement to capture installation of EVSE, to assist with effective planning and operational management, similar to that already in place for solar?

Identifying locations of EV charging within the networks will be important, to aid in detection of clustering. It is to be expected that EVs will not turn up uniformly in the grid, and if a given part of the network experiences rapid EV uptake, coupled with a failure on the part of those individuals to take advantage of pricing signals that incentivise charging at non-peak times, localised network impacts may occur.

For this reason, the EVC supports the desire for locations where EV chargers are installed to be captured at the NMI level, in order to aid network planning. For example, if a network finds through this process that a large number of EV chargers are installed downstream of a specific pole-mounted transformer, they may elect to monitor that transformer more closely, in the event that it needs to be upgraded ahead of schedule.

In addition to this, we area aware that many consumers will elect to charge their cars with power points, rather than installing dedicated EVSE in their homes. To capture these instances, there will be merit in the vehicle registration bodies undertaking limited data sharing with DNSPs, specifically to aid in the identification of potential clustering locations, per above.

Due consideration will need to be given to privacy, and the permitted uses of this information by the DNSPs.

It is to be expected that the mechanisms of capturing and sharing this data will vary significantly by state and territory, because the bodies that administer electrical installations and vehicle registrations are all state and territory bodies rather than federal ones.

Response to question 14:

14. Are there any minimum technical requirements that should be considered for EVSE interoperability?

Minimum technical requirements for EVSE, and installation of EVSE, are well covered in a variety of standards and documents. RCM marking for the hardware is required throughout Australia, and installations are required to comply with AS/NZS3000:2018, as well as local SIRs that vary state-by-state. Additional minimum technical requirements are not needed at this time.

Response to question 15:

15. Do stakeholders have any views on aspects of cybersecurity for EV charging that are specific to Australia, or that would require a departure from European and/or US standards?

Cybersecurity is a crucial consideration in this matter. In a future where EV charging scheduling is managed individually by consumers, in response to long-run price signals, cybersecurity is much less of a concern, because the architecture does not create a new vector for large scale attack. Based on data seen so far, the shape of the load is complementary to the existing duck curve, well distributed temporally, with peaks following the incentive signals provided. It can be expected to change slowly enough (from a national/system viewpoint) to permit the system to monitor behaviour and respond. In ten

years time, we may have 1.5 million passenger EVs on the road, contributing an additional ~1% to peak demand, under this model.

If we contemplate the effect of a malicious actor turning all EV charging on, the effect could be relatively significant. Assuming a future in ten years with 1.5 million passenger electric cars on the road, with 1 million of them plugged into 7kW chargers at a particular time, a malicious actor simultaneously turning them on would yield a distributed load of 7GW. Were this to occur at time of peak demand, switchboards in individual households would generally be able to support the load, but the transformers in the street would not. The result would be transformer fuses blowing in thousands of streets across the country, with wide scale power outages lasting days or weeks.

If we consider a longer term future (out to 2050 or so), with a near 100% transition of the light vehicle fleet achieved, the impact on peak demand of consumer-managed passenger vehicle charging may be perhaps 10%. The impact of two thirds of the passenger vehicle fleet (10 million cars) being simultaneously switched on at 7kW would be 70GW. This is roughly double the current peak demand of the NEM, independent of any other load present at the time.

The EVC is not sufficiently expert in cybersecurity to provide further detail comment to this point, except to say – we should be more concerned about the cyber security aspect of orchestration of EV charging in domestic contexts than the peak load issue. The system-wide impact on peak load from EVs can be expected to be relatively minor over the next 10 years, to build slowly over time thereafter, and to be visible at many levels of the network while it does so. It is also amenable to a host of corrective approaches. The cybersecurity aspect of widely deployed externally orchestrated EV charging has the potential to stay dormant and invisible for decades, and then take us by surprise in a catastrophic manner.

Before we embark on wide scale domestic orchestration of EV charging, Australian cybersecurity experts should be satisfied that the systems and architectures proposed for use are sufficiently secure. If the globally standard systems and architectures for orchestration by way of smart EV chargers are not sufficiently secure, this does not mean that we should develop unique Australian systems – we should instead rely on other proven methods to mitigate peak demand impacts, and augment the networks to cover the residual impact.

Response to question 16:

16. The ESB welcomes stakeholder views on barriers in existing regulatory and legislative frameworks that may be acting to limit the introduction of more advanced EV services such as Vehicle-to-Home (V2H), Vehicle-to-Grid (V2G), and Vehicle-to-Anything (V2X)?

Vehicle to load (V2L) is reasonably well understood – the concept is that the vehicle has a power outlet, which can be used to run appliances. In this example, the inverter is in the car, and generates ~50Hz single phase AC at ~230V. No grid synchronisation is needed, and no grid connection is contemplated, so AS4777 does not apply. Various electrical safety regulations will apply.

Vehicle to home (V2H) can potentially be executed with the home acting as the load in the V2L example. This would require a changeover or transfer switch in the main switchboard. This is similar in many respects to the electrical installation approach used for a homeowner who wants the ability to run their home from a petrol generator if the grid fails, which is quite common in regional Australia. We'll call this V2H-AC.

Vehicle to grid (V2G) requires not just DC to AC conversion, but also synchronisation with the grid, and compliance to AS4777. This is typically achieved with an inverter package outside the EV, drawing DC from the vehicle. V2H can also be implemented in this manner – we'll call this V2H-DC.

Implementation of V2L and V2H-AC (where the vehicle is exporting AC, and the grid is not connected) is presently limited by availability of vehicles with the feature set but is not expected to be significantly impeded by existing regulatory or legislative frameworks. In the case of V2L, the consumer simply plugs in their appliances. For V2H-AC, the electrician can execute an installation of a type they are already entirely familiar with.

The list of challenges associated with V2G, and V2H-DC implementation in Australia is long. The REVs project encountered many of them, we'd suggest the ESB engage closely with the REVs team to understand the issues. In the first instance, at minimum AS4777 will need review, and we'll need harmonisation of requirements across jurisdictions to encourage industry to bring suitable products to market.

In terms of the current status of AS4777, it is the understanding of the EVC that AS4777.1 and AS4777.2 will both be reviewed in the near term, with a view to addressing some of these issues.

With regard to individual jurisdictional approaches, the OTR in South Australia recently published unique state-based technical requirements associated with V2G hardware that suppliers will be expected to comply with from July 2024:

https://www.energymining.sa.gov.au/industry/modern-energy/electric-vehicles/smart-charging-trials/electric-vehicle-supply-equipment-evse-standards

Anecdotally, businesses trying to bring V2G apparatus into Australia have had to negotiate individually with each DNSP for approval, rather than complying with a single national standard or a single national process. It's reasonably clear that faced with that sort of regulatory burden, many potential suppliers will refrain from entering the local market until it grows much larger, which will reduce competition and consumer choice, and drive up prices.

Response to questions 17:

17. The ESB welcomes stakeholder views on the issues raised in respect of residential charging, including whether there are further issues that should be considered?

Relating to "If remote management policies are too onerous or aggressive, consumers may choose to use EVSE wall plugs and not use their 7-22kW charge points? How might we strike the right balance so not to push consumers away from 7kW-22kW charging?"

A significant proportion of consumers will do this anyway. The 10A or 15A wall outlet is generally already present in the garage or on the outside wall of the house next to the driveway, so costs the consumer nothing. If it's not there already, installation of a weatherproof 10-15A outlet costs on the order of $100-$400, the higher end of the scale corresponding with a 15A outlet on a dedicated circuit. A 10A outlet will give the consumer 120km of recharge overnight, while a 15A outlet will deliver 200km of recharge overnight – very few consumers will actually need more than this.

To the extent that consumers do not like the policies contemplated for mandatory application in this issues paper, or simply want to save money, they will refrain from installing EVSE, and will instead use power points. This will especially be the case in rental houses, where the tenant has an EV, the garage or driveway has a powerpoint, and neither the landlord nor the tenant is inclined to pay for an EVSE in the dwelling.

Ensuring DNSPs and retailers work together to create and secure the voluntary consumer adoption of retail products designed to incentivise EV charging behaviour that is beneficial to the energy system as a whole is likely to be the best way to address the grid impact question for cases where the driver is using a power point, rather than an EVSE. It will also work in the case of consumers who elect to install an EVSE.

Striking the right balance means not trying to take control away from consumers when it isn't necessary. Requiring that EVSE hardware be communications enabled, and therefore ready for implementation of external control makes sense. Trying to enforce that external control at the time of installation today does not.

Relating to strata dwellings, load management will likely be necessary, but will be managed specifically to keep the building load profile within the capability of the building electrical reticulation and building network connection, while meeting the needs of drivers. External orchestration will not generally be appropriate in these settings, because the principal limitation being managed for is the electrical installation in the building, not the wider energy system. This said, the outcome of the building managing the charging can be expected to align with broader energy system requirements, given it will be to push EV charging activity into times when the building has spare capacity (ie, middle of day and middle of night). Requirements for all installed EVSE to be OCPP1.6J capable will be consistent with this objective; requirements for installed EVSE to be connected to external remote orchestration will not be.

Relating to technical standards being independently developed in individual jurisdictions with respect to EV as DER – this is not generally useful. National consistency will bring better outcomes for industry and consumers, even if it takes a little while. Solar is creating problems today, because it as a whole generates at the same time, consumers have little practical control over it and no incentive to limit exports, and it has been allowed to grow to multi-GW scale without adequate control or regulatory intervention. Home EV charging, being a temporally distributed load that consumers have the easy ability and clear incentive to time shift, is not the same, and should not be treated as such.

Response to question 18:

18. What are stakeholder views on the use of technology specific tariffs, approved by the regulator, but operate under different metrics. Would there be any unintended consequences of introducing EV CPO specific tariffs?

The EVC notes that multiple DNSPs are opposed to the principle of setting technology specific tariff structures, out of a belief that network tariffs should be agnostic with respect for technology. As an industry body, we observe that while development of a tariff structure specifically designed for high power EV charging locations might prove beneficial, it would also create room and precedent for punitive tariff structures to be developed, which are then mandatorily applied to a specific customer type.

By way of example, Western Power was recently instructed by the ERA to develop a specific tariff structure to support high power EV charging locations. In response to this instruction, Western Power developed a tariff structure featuring kVA components that creates costs roughly an order of magnitude higher than the general business tariff structures (which do not contain kVA components) that would otherwise apply to CPOs using less than 160MWh/annum. At time of writing, CPOs are still working to understand if they are to be mandatorily assigned to this new high-cost industry-specific tariff, or if they will remain able to access the tariff structures available to the rest of the business community.

In short – we have DNSPs who do not want to develop technology specific tariffs, some CPOs who would like to see technology specific tariffs developed for high power EV charging stations, and some CPOs who do not trust DNSPs to develop specific tariffs that will solve these challenges without selectively penalising the CPOs.

The EVC's overall position is that while the development of technology specific tariffs has the potential to support public DC charging, we do not require technology specific tariffs to support public EV charging. What is needed is for high power charging locations to be

exempted from kW-based or kVA-based charges while their utilisation is low. The specific ask from the EVC is that a volumetric level of 160MWh/annum is applied, below which consumers (including CPOs) can opt out of demand and capacity tariffs. We use this level because an ability to opt out of kVA-based charges for consumers using below 160MWh/annum is the status quo in 11 of 16 DNSP jurisdictions today. It is demonstrably working already at scale, across all consumer types, and while it is not a perfect solution, it solves neatly for the worst of the problems associated with kVA-based charges being applied to low-utilisation EV charging locations.

Response to question 19:

19. What measures might be helpful to consider to streamline the connections process for public charging infrastructure?

CPOs seeking to deploy high power charging locations often experience significant delays in securing confirmation from the DNSP of the ability to connect at a particular power level at a particular location. While it is clearly necessary for DNSPs to have robust processes around new connections, the experience of the CPOs is that it can take 12 months or more from initial application to energisation, which is far longer than the global norm.

The EVC is working with some of our members on this issue at present. It appears in some instances that the DNSP processes could do with improvement. We're presently looking into a claim from a CPO that a DNSP is permitted 65 business days (approximately 3 months) from initial request before responding to the applicant, not with an offer of connection, but with initial acknowledgment of the application.

A more structural part of the problem is lack of good data. The LV distribution network is not generally well instrumented, by comparison to the HV distribution network, or the transmission network – it can be difficult for the DNSP to readily ascertain if there is spare capacity in a particular place. The EVC supports efforts by the DNSPs to improve network visibility, with the objective of securing and presenting better data, to serve the dual goals of improved network management and more rapid connection processes.

Another pathway to accelerated deployment of high power charging stations is for the CPOs to connect to the HV network, rather than the LV network. This will be appropriate for the larger sites, 500kVA and above. Visibility of spare capacity on the network side can be improved this way. Delays associated with procurement of DNSP-approved transformers can also be solved in this manner, because the transformer becomes a CPO-owned and maintained asset rather than a DNSP-owned and maintained asset. The key limitation to this approach is that HV network tariffs do not typically provide the opt-out from demand and capacity charges at low utilisation levels that high-power charging stations will require, per question 18. For this solution pathway to be viable, DNSPs will need to create HV tariffs that exclude kVA components below a particular volumetric level, such as the 160MWh/annum identified in our response to Q18 above.

Another pathway to accelerated deployment of fast charging locations is the permitting of second lines of supply to properties. The advantage of this approach from the point of view of the CPO is that it is often easier, cheaper, and less disruptive to build the infrastructure associated with a new electrical connection supporting fast EV charging, than to replace the existing network connection and site electrical infrastructure (such as main switchboard). A typical example site type where this is a consideration is shopping centres with a large outdoor car parking areas. Under current rules, the deployment of fast EV charging in this setting would usually require an upgrade to the existing site network connection and main switchboard, which will often by expensive, time consuming and disruptive, which inhibits the rollout of the infrastructure. The alternative is a new connection in the corner of the carpark where the EV charging equipment is to be located. The case against this practice is

essentially based in safety – there's a reasonable desire from the point of view of people who want to be sure that the property is electrically isolated to have a single point of isolation where possible. The EVC is of the view that it would be beneficial for CPOs and DNSPs to come together on this issue. In some cases, the safety consideration will be reasonable, and a second line of supply will not be appropriate. In other cases (such as a corner of a carpark, remote from the building with the main switchboard in it), a second line of supply is likely to be a highly reasonable proposition, but one which requires some regulatory change in order to support.

Response to question 20:

20. Aside from the grandfathering issues for existing equipment, are there any other metrology issues concerning public charging that should be considered?

Please refer to the EVC submission to the NMI for detail with respect to this question. Industry sees two key risks:

1) retrospective application of metrology standards, requiring the retrofit of metering equipment into charging equipment and electrical installations, not designed to accommodate it
2) perception (whether true or not) on the part of consumers being over-billed for usage based on inaccurate measurement by the DC charging equipment.

For the first point, the EVC encourages the National Measurement Institute to observe the manner in which this challenge is successfully resolved in Europe, and to adopt that approach, without requiring retrofit of equipment deployed up to the point of the new requirements being set in Australia.

For the second point, the EVC suggests that a methodology similar to petrol bowser accuracy modelling could be instituted. An independent inspector (potentially from the NMI) could periodically test public charging equipment with a calibrated testing device, to validate that it is reporting kWh delivered with sufficient accuracy. Devices of this type already exist and are available in Europe.

Response to question 21:

21. What mix of arrangements might facilitate flexibility in charge-point pricing to encourage more drivers to charge during times of excess renewable energy?

We note the comment in text, "To compare to requirements relating to charging for petrol or diesel, the visibility for customers wishing to access EV charging facilities is very opaque"

We disagree with this statement. Petrol station operators vary their pricing from day-to-day and week-to-week, in a manner that consumers cannot accurately predict. While the petrol station displays price via large signage at location, they do not display the pricing of all fuels on this at-location signage, or consistently present this information in real time via an interface that the consumer has ready access to, such as a web browser or app. It is left to third party aggregators to undertake this task for the benefit of the community, on the basis of various data sources.

CPOs, by comparison, present pricing live in real time on smartphone apps, along with charger status. This is typically presented in the format of c/kWh, sometimes with a time-based component, and sometimes with a volumetric split – for example, the first 7kWh for free then a c/kWh cost for additional energy. Unlike petrol prices, which vary substantially

over the course of a week, prices offered by CPOs are typically relatively consistent over time.

Before regulating the manner in which CPOs display pricing, it would be prudent to run some surveys of EV drivers, in order to understand if this is actually an issue from a consumer perspective.

To the specific question, around the encouragement of drivers to use public charging during times of excess renewable generation, it is already the case that the majority usage of fast charging locations occurs between 9am and 3pm. Australian drivers are often using these stations during a lunch stop as a break on a long drive, or during the day while shopping in an urban context.

There will be times when the driver needs to charge outside the optimal time, but if we wanted to further encourage the behaviour of charging during times when solar generation is typically strong, a consumer facing price signal would be an excellent mechanism. This could be as simple as '30c/kWh from 10am to 3pm, 60c/kWh from 5pm to 8pm, 40c/kWh at all other times'.

For this to work, it would be necessary for DNSPs, Retailers, and CPOs to come together to first co-design a network tariff (DNSP), then a retail product (Retailer), and then a consumer-facing pricing structure (CPO). Ideally, these structures would be relatively consistent across jurisdictions, but would still leave room for competition between competitors at each layer, so that we avoid the risk of price fixing, or the perception of price fixing.

The experience of the EVC has been that these three classes of organisation willingly come together in working groups and forums, but we are collectively still working to resolve the nearer-term higher priority issues that cut across these groups. See the answers to questions 18 and 19.

Response to question 22:

22. What do stakeholders view to be important considerations for ensuring protections are fit for purpose for consumers using public EV chargers with regard to payments and any associated disputes?

We note in the text, "where customers turn up to a CPO and are not members, there may be barriers to access what is being deemed as an essential service".

The energy sector has varying degree of essentiality. Supply of energy to private vehicles is not treated with the same degree of essentiality as supply of energy to homes. In the case of an internal combustion engine vehicle, if a consumer is unable to pay immediately on taking the energy, at whatever price is listed that day by the retailer, they have no right to it, and commit an offence if they take it. In the context of energy supply to the home, there is a long and complex disconnection process that is applied if a consumer has taken energy, that they are unable to pay for, before the ongoing supply of energy is stopped. This difference in approach is completely appropriate – significantly more harm typically arises from disconnection of supply to a home than from cessation of supply of fuel for a consumers car, so more stringent protections are appropriate.

We would note in particular that public fast charging stations funded and built by private businesses are free to limit access to those charging stations as they see fit. Tesla superchargers, for example, are only usable in Australia today for Tesla cars. There is no expectation that these assets are available for all, or that they constitute an essential service. Where government co-funding is used to support EV charging station deployment, the typical expectation is that the equipment is available for use by drivers of all types of EV.

In terms of adequate protections:

- Consumers should have visibility of pricing and accessibility requirements prior to arriving at the public charging locations. Per the notes in response to question 21, this is already in place.
- Consumers should receive a clear receipt for payment associated with the transaction. This may be via email, rather than in physical printed form. This is also already in place.
- The ability to pay by credit card at DC fast charging locations is desirable, from the point of view of enhancing universality of access, for chargers that are intended to be accessible to all. This does not necessarily need to mean a physical credit card reader, however – the capability can be achieved via scannable QR codes or a phone service, for example. It does require that the charger be connected to and managed by a CPO, which will not always be the case for 7-22kW AC chargers.

The commentary in the issues paper around charge data records, and reference to the "Eichrecht", is worth further exploration. The capabilities of some proposed solutions go far beyond the existing status quo with respect to data records associated with petrol and diesel supply. Many of these solutions are very new, and as yet un-tested in the real world.

The cost and effort involved in developing and maintaining these solutions will likely be non-trivial, and the costs will ultimately be borne by consumers. Depending on what is implemented, it may also reduce competition in the marketplace. Prudence would dictate that we install hardware that is capable of participation in structures of this type (meaning, all DC chargers installed with government support should have OCPP 1.6J), then wait and see which structures deliver the best consumer outcomes overseas before determining what to adopt.

Response to Question 23

23. The ESB welcomes stakeholder views on when they consider the issues associated with roaming might become a policy issue to address in Australia?

The service provided by Hubject in Europe has struck challenges recently. Our understanding is that Charin went out to tender for a service provider to deliver an ISO15118 plug-and-charge Certificate Authority, and that while Hubject initially took it on (being the incumbent delivering the service already), they reneged on certain key requirements, resulting in Charin withdrawing the tender and awarding the scope to Irdeto instead. The Irdeto delivery of this capability is underway, with expected delivery later this year. This certificate authority element is a key piece of the puzzle for enabling ISO15118 plug and charge, which is in turn, an element of roaming implementations. While at this point it seems unlikely that Hubject will remain a significant player at the Certificate Authority level (given Charin are backing Irdeto), they are certainly making a play to be a central clearing house between CPOs in a future involving roaming in Europe. A key concern held in some quarters is the perception of a lack of impartiality of Hubject as a participant, given their ties to the German auto industry. Multiple press releases have come out in the last couple of months around these issues.

The synopsis above should serve to show that the European situation with respect to roaming is very much in flux. Roaming by way of bi-lateral agreements could be executed without a central clearing house, but as the number of CPOs rises, the number of bilateral agreements needed will scale geometrically. For the first 6 CPOs, only 15 agreements would be needed in total. For the 20th CPO, 19 new agreements would be required, bringing the total number of agreements to 190. For this reason, a central clearing house model may be better at encouraging new CPOs to enter the market – each new CPO entrant needs to only make a single agreement with the central clearing house.

The challenge is that the central clearing house needs to be absolutely trusted by all participants, and once emplaced is in a position of significant market power with respect to the CPOs. To succeed, a new CPO would almost certainly need to engage with the central clearing house, which would put the central clearing house in a position to dictate terms to new entrants. This would need suitable governance.

One of the short term measures that it would be prudent to execute in the near term is the setting up of a Certificate Authority, which is a necessary element to enable the plug-and-charge element of the ISO15118 standard. We'd note that this is not really a consumer protection matter – it's a method to deliver a better consumer experience for drivers, so that they don't need to use an app, or a credit card at the time of using the fast charger. It's also one of the building blocks that can support roaming in the future.

We'd also observe that the successful roaming implementation in Portugal starts with hardware with OCPP1.5 or 1.6J communications capability, which connects to the CPOs, who then use OCPI at the next layer up in the architecture. Fast chargers being deployed with government support today in Australia typically includes OCPP 1.6J – so the equipment being installed today is 'roaming ready', for a future when a certificate authority is stood up, and a decision is made with respect to bi-lateral agreements vs the central clearing house model.

Conclusion

The EVC has worked with the ESB in the lead up to this issues paper, and is keen to continue engaging with all stakeholders to support the smooth integration of EVs into the energy system over the coming decades.

Correspondence to the EVC can be directed to:

office@evc.org.au