Department of Energy and Mining (DEM)

Provided via email to: dem.smartappliances@sa.gov.au

9 April 2021

Dear DEM team

Consultation on proposed demand response capabilities for selected appliances in South Australia – Tesla response

Tesla Motors Australia, Pty Ltd ("**Tesla**") welcomes the opportunity to provide the Department of Energy and Mining (DEM) with a response to the "Proposed Demand Response Capabilities for Selected Appliances in South Australia – Consultation Paper" ("**the Consultation Paper"**). Tesla recognises that South Australia is currently dealing with the impacts of negative load associated with the high penetration of rooftop solar and there is a focus on managing these impacts through the suite of smart inverter requirements through the SA Smart Homes Program.

Tesla does not believe that mandating demand response requirement through compliance through AS4755 series of standards is the best mechanism to address these negative load issues. We also believe that it may work to disincentivise the uptake of electric vehicles in South Australia which will add load and act as a valuable mitigant to the current daytime solar troughs being experienced in South Australia.

Summary of concerns

Tesla has the following concerns with the approach proposed by the SA Government:

- EV charging is typically non coincident with peak network load, particularly when network tariff reform such as SAPN's solar-sponge residential TOU, encourages consumers to charge during off-peak hours. The technology is in place for EVs to charge during off-peak right now (refer Tesla Scheduled Departure).
- AS4755.2 and AS4755.3 are both control based standards designed to provide a third-party agent with the control of electric vehicle supply equipment (EVSE). This approach is incompatible with encouraging the development of EVSE to be responsive to market or tariff signals.
- The approach is also misaligned with the weight of EV and EVSE standard work that is being done internationally. This has a number of flow-on effects:
    - It adds costs specific to South Australian EV customers
    - It adds additional compliance work specific to South Australia that has no use- case in any other global jurisdiction and is unlikely to be taken up in other Australian states.
    - Functionality that this provides is considered outdated and superceded by international developments
    - **As such it reduces the attractiveness of South Australia as a market for both EV OEMs and prospective EV customers.**

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Tesla has provided more detail on these issues and our specific concerns in the body of our submission below.

While we have concerns with the approach that is being proposed by South Australia, we are supportive of smarter market integration and command requirements being considered for EVs across Australia. EVs have an important role to play in managing both peak demand and supporting with the impacts of negative load in South Australia. However, EVs are an emerging market, and consideration needs to be given to the full scope of market services that EVSE can provide both in South Australia and in the national electricity market (NEM), as well as the full suite of international work that is being done in respect of "smart EV control", interoperability, and EV charging protocols that are being adopted around the globe.

The treatment of EVSE and appropriate integration of EVs in the existing network infrastructure and energy markets requires a far more nuanced approach than the considerations applied to air conditioners, pool pumps and hot water heaters. There is a wealth of international knowledge on EVSE standard development that should be applied in South Australia. Tesla does not support South Australia going it alone and creating jurisdiction-specific requirements that are misaligned with the years of "smart charging" work that has been done in Europe and North America.

Recommended alternative approach:

We note the consultation paper considers the option of using an international standard as an alternative to AS4755. As such Tesla recommends that further work is done on the adoption of the Open Charge Point Protocol (OCPP) protocols that are currently being used or considered across North America and Europe. Specifically, we recommend:

- **An industry-led process building on the international experience related to OCPP and particularly OCPP1.6. This would develop local implementation pathways for "smart charging" and would ensure that EVSE are capable of this smart charging response. This would require EVSE to be network connected (which is increasingly common in the industry), and have the added benefit of being backwards-compatible with EVSE that already support this protocol, rather than only to new EVSE on the market after adaptation of the standard.**
- **This would be considered as an absolute industry-led alternative to the adoption of AS4755, and as such EVSE installed will have greater flexibility in the receipt and response to market signals – and will not have to comply with the prescriptive DRM response modes.**
- **An industry led approach to EVSE standards development can either be led directly through the SA Government, or be included as a Distributed Energy Resource (DER) Maturity Plan topic and included in the broader DER reform agenda.**
- **The industry-led approach would define the communications protocol between the EVSE and the Aggregator to allow OEMs to provide the EVSE product. Aggregators would then be able to offer consumers a compelling and competitive offer for use of their EVSE in the market (similar to current VPP arrangements for batteries and solar). Customers would be able to opt-in to different programs and enrol their device to receive market signals. This communications protocol can also be used to create emergency backstops if needed.**

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To further discuss any of the content included in this response – including to better understand the OCPP protocols, please contact Emma Fagan (efagan@tesla.com) or Josef Tadich (jtadich@tesla.com).

Tesla is very happy to support with the adoption of smart charging in South Australia and the NEM more broadly, and can offer support through the development process to ensure this does not disincentivise the adoption of EVs in Australia. We look forward to working further with DEM on this topic.

Kind Regards

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Summary response:

Concerns with proposed AS4755 based approach

Concerns with the Standard

Tesla has a number of technical concerns with both the AS4755.2 standard itself, and the approach that the SA Government is taking to implement it. As a starting point, there are significant risks associated with mandating a standard ahead of the final version being released.

The primary purpose of the AS4755 series of standards appears to be to mandate responses to operational commands from a remote agent (presumably SA Power Networks) either through a DRED device (AS4755.3) or through an alternative approach, such as an API (AS4755.2). As opposed to a pure communications protocol (explored in "Tesla preferred solution" below), the AS4755 standards also set very narrow and specific performance parameters on how the device should be controlled. Mandating a DRED device adds redundant cost to all EVSE (and thus all EVs purchased in South Australia), as it requires a local ethernet connection (RJ45) and connection to a third-party DRED-control unit which in-turn requires secondary communication to an agent. Mandating compliance with AS4755.2 through a relevant agent issuing web-based TCP/IP commands will also add integration costs to a specific protocol, that still needs to be developed, and lacks the functionality of existing protocols used internationally such as OCPP. This should not be introduced without the SA Government giving due consideration to how it will work in practise and how existing legacy EVSE can be integrated.

The DRM response modes would see an EVSE charge restricted to zero load (DRM0 or DRM1), to below 50% (DRM 2) or to below 75% (DRM 3). None of these operating parameters allow for flexible, responsive behaviour to support market needs. These strict operating parameters will also prevent EVSE OEMs and aggregators from being able to participate in system security markets. Any EVSE that is restricted to DRM 0 – 3 would not be able to provide raise FCAS services for instance, as this would violate the grid draw requirements.

Conversely, an EVSE responding to market needs and market signals can quickly ramp charge up and down. Figure 1 below provides a proof-of-concept example of a Melbourne-based Tesla Model 3 SR+ demonstrating the ability to respond to external signals and quickly reduce charging in less than a second in response to market signals for energy and ancillary service. Noting that the market needs are established on a five-minute basis and published by the Australian Energy Market Operator (AEMO), a third-party relevant agent pushing DRM signals out over the top of the AEMO market signals will suppress an Aggregators ability to properly respond to market needs.

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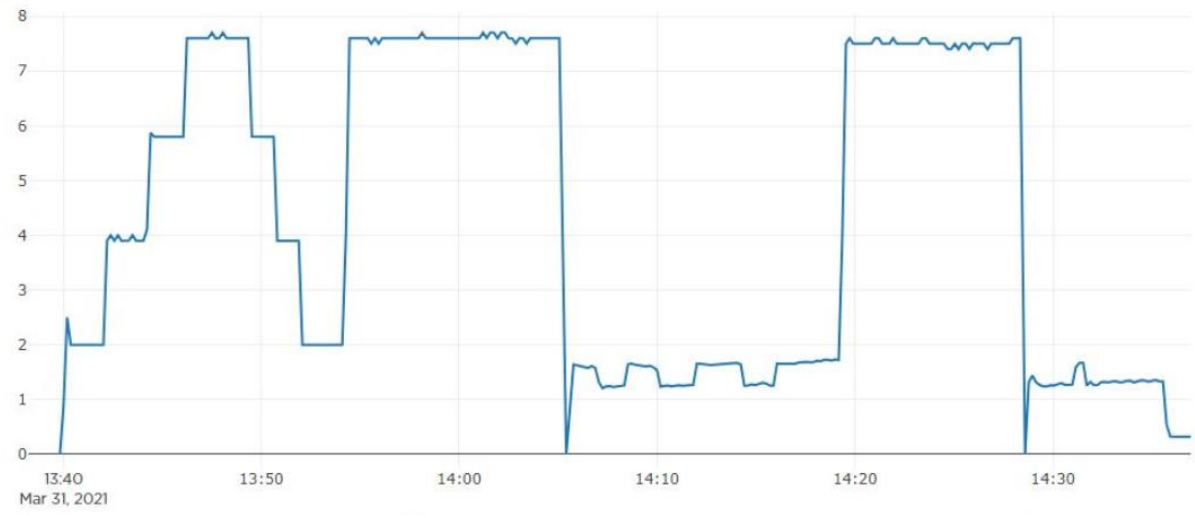

Figure 1: Example shifting charge patterns of a Melbourne Model 3 SR+ on a single-phase 32A Tesla EVSE (units in kW)

In addition, the static nature of the DRM signals will only enable EVSE to solve for one problem – reduction of peak demand. This approach ignores the bigger issue in South Australia, as identified in the Consultation Paper – managing the impacts of negative load.

While a relevant agent operating under an AS4755 standard would be able to reduce grid-draw during periods of peak demand, there are no incentive mechanisms available in the standard to time-shift EV charging to the middle of the day to soak up the excess solar generation.

Further, the approach proposed in the Consultation Paper will disincentivise aggregators and OEMs from investing in the infrastructure and skills development for EVSE to be market responsive to both peak demand and negative load since it appears most likely that a relevant agent will be able to suppress market integration by overlaying specific DRM parameters. Tesla's preference is to support increased smart charging, and smarter market integration of EVSE and use the market responsive capabilities to ramp charge up or down. As such we support the development of open charging protocols that will set the appropriate communications framework for EVs or EVSE to receive these command signals. Our preferred approach, which will achieve the same outcomes as AS4755, is explored below.

Concerns with South Australia going it alone

Tesla also has concerns with South Australia introducing requirements for DER that are not adopted anywhere else in the country or in any other international jurisdiction. The Smarter Homes requirements introduced last year required all inverter based DER to be compliant with the AEMO low-voltage disturbance ride-through test procedure; as well as requiring that all solar inverters have a relevant agent established to remotely connect and disconnect systems. These requirements were deployed at cost to industry, and do not appear likely to be adopted by any other Australian jurisdiction.

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While the Smarter Homes requirements were driven by immediate concerns for energy system security, the same cannot be said for the demand response requirements for EVSE given the proposed 2026 start point. There is no reason for the SA Government to introduce demand response requirements for EVSE without first giving industry the chance to look to international best practice, and propose an Australian based approach that is fully consistent with the command/ control and interoperability functionality that is being deployed in Europe and North America. Aligning with international best practice will also enable standards to be introduced ahead of 2026, and potentially ahead of the 2024 preferred timeline put forward in the Consultation Paper.

Market integration concerns

As noted above, one of the primary concerns that we have with the adoption of AS4755.2 and/or AS4755.3 is that it is a control-based standard, and as such incompatible with market integration of EVSE. Tesla supports market-based alternatives, and continued work done on supporting EV or EVSE responsiveness to energy and system security market signals.

Tesla is supportive of the integration of smarter EV charging equipment into existing and emerging energy markets. We were supportive of the work that the South Australian Government has led on establishing the Smart Charging Trials fund, as well as the demand response rule change that was put forward by the South Australian Government which has resulted in the establishment of the Wholesale Demand Response Mechanism (WDRM). The approach proposed in the Consultation Paper is not compatible with a market-based solution. And it will result in a reduced investment from aggregators and industry in establishing demand response capabilities in South Australia.

The approach proposed in the Consultation Paper also appears to be incompatible with the work being undertaken by the Energy Security Board (ESB) in the Demand Side Participation workstream. We are supportive of the work being undertaken by the ESB in considering opportunities for potentially looking at an expanded WDRM that can include households. We are also supportive of all market-based solutions to address negative demand – including removing barriers for aggregated DER (including EVSE) to more easily access existing and emerging markets.

It does not appear as though the solution proposed in this Consultation Paper sits within the DER work-program that is being proposed under the ESB P2025 work. Tesla would prefer that any work on EVSE providing demand response is considered within the broader framework of Demand Side Participation market reform. Given the emerging nature of standards development and interoperability of DER (including EVSE) in Australia, this could be a topic of the proposed Maturity Plan. This would ensure that these reforms are considered within the broader market development context and not in isolation. It would also ensure that EVSE becomes market responsive in a way that adds value – rather than cost – to EV customers.

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Tesla preferred solution:

As noted in our cover letter, Tesla supports far more nuanced treatment of EVSE than that currently being recommended through the Consultation Paper. Tesla recommends that South Australia consider an industry-led "open standard" standard development process.

Specifically, Tesla recommends that industry leads the development of a local introduction of OCPP standards – particularly OCPP 1.6.

Importantly the OCPP (and related) protocols create communication protocols that are also aligned with IEEE2030.5, so it becomes a simpler process for aggregators to incorporate EVSE or EVs into existing VPPs to better incentivise response to market signals.

Benefits of an industry-led approach

Industry led standard development processes have proven to be extremely successful with new DER hardware and software. As some specific examples of how industry led standards development can be successful:

- The Battery Safety Guide which has subsequently been adopted for use by both the Clean Energy Council as the methodology for listing safe home battery systems, as well as by the SA Home Battery Subsidy Scheme as a subsidy eligibility requirement;
- The ANU led Evolve project is leading the local work on DER interoperability through the development of a local implementation guide for IEEE2030.5.

Given that the management of EVSE or EVs in response to charging signals is a new area, Tesla recommends a similar approach be undertaken for EVSE standards. There is no urgency on finding an immediate solution, and with a 2026 or 2024 start date, the SA Government can afford to do this the right way. An industry led approach to EVSE standards development can either be led directly through the SA Government, or be included as a Maturity Plan topic and included in the broader DER reform agenda.

There are several major benefits to an industry led approach:

1. By having skin in the game, the SA Government will see far greater buy-in from industry in the best methods and standards supporting better integration of EVSE into the market.
2. International OEMs, aggregators and retailers can bring their international standards development experience, and make best practice recommendations for the development of EVSE demand response.
3. Better industry engagement – the current make-up of EL-054 (more than 50 representatives) only has one - EV charging representative. An EVSE industry focused approach to establishing standards would ensure that the local and international experts are at the table designing the solution.

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4. Solutions deployed will not require jurisdiction specific compliance work to be undertaken, and as such will be lowest cost for consumers.

Importantly for the purposes of this Consultation Paper, the introduction of OCPP standards can achieve the same outcomes as AS4755 adoption, in a way that adds customer value, and incentivizes aggregators and OEMs to build out market responsive capabilities, rather than adding costs and disincentivizing market growth.

Rather than prescribing specific DRM parameters, the OCPP standards provide a communications protocol for enabling commands to be sent either directly to the EV, or to the EVSE. This is both consistent with the work being done internationally (OCPP standards are currently going through consultation on methods for adoption across the US and Europe), and it enables EVSE to respond to a range of different market signals and commands – in addition to providing peak demand reduction. By incentivising the development of communication protocols for EVSE in Australia, the SA Government will better enable market integration of these systems. This will drive smarter charging capability and better incentivise time-shifting of charging behaviour to manage negative load periods, since aggregators will receive negative pricing for charging during this period. Given the ability to participate in system security markets won't be suppressed (as they would under an AS4755 approach) aggregators will also be able to "stack services", include EVSE in portfolios of aggregated DER and VPPs, and pass value back to customers to further incentivise smarter charging behaviour.

By building out a standard communications framework, the SA Government can still develop back-stop functionality for a relevant agent (such as SA Power Networks) to reduce charging in emergency situations, however by removing the DRM parameters, this control can be restricted to emergencies – rather than being the basis of the approach undertaken.

This approach is also similar to the approach taken in the UK, where OZEV determined that "smart functionality" requires the EV or EVSE to have the ability to send and receive messages and impact the rate of charge available. The decision taken by OZEV was to explicitly avoid requiring on how exactly the rate of charge should be impacted – which is what AS4755 seeks to do.

By building out the appropriate communications frameworks, and mandating the ability to receive signals, the SA Government can ensure compliance at lowest cost and with smarter charging capabilities deployed at scale.

How this would work

Open Charge Point Protocol (OCPP), Open Charge Point Interface (OCPI) are open communications protocols that allow management between the Aggregator/Agent and the EVSE. Figure 2 below provides an overview of how the communication pathways apply to EVs and EVSE and how this links more broadly to aggregators and to the energy

market. Importantly, OCPP is agnostic to the communications protocol between the Aggregator/Agent and the DNSP or AEMO market signal, allowing: IEEE2030.5, open ADR 2.0, or any local market API.

The OCPP 1.6 protocol, following a certification onboarding of the EVSE to the Aggregator, allows the Aggregator/Agent to read (GET) information from the EVSE (current charging load and number of active EVs charging for example), as well as send (POST) smart-charging commands (modifying charge rates for example) over a highly-flexible .JSON format that allows advanced time-based scheduling for current and future events and fall-back limits if communication is lost, providing greater confidence in the aggregated demand response. This protocol is also flexible enough to cover single Connector EVSE (such as home charging), and more complex multiple Connector EVSE (such as community charging, and/or high-powered level 3 DC charging).

By utilising a more widely-accepted industry-led protocol, the development and integration work that EVSE OEMs require is minimised, and just as importantly allows the use of off-the-shelf software packages for Aggregators that integrate with multiple EVSE and facilitate the provision of these services to the market.

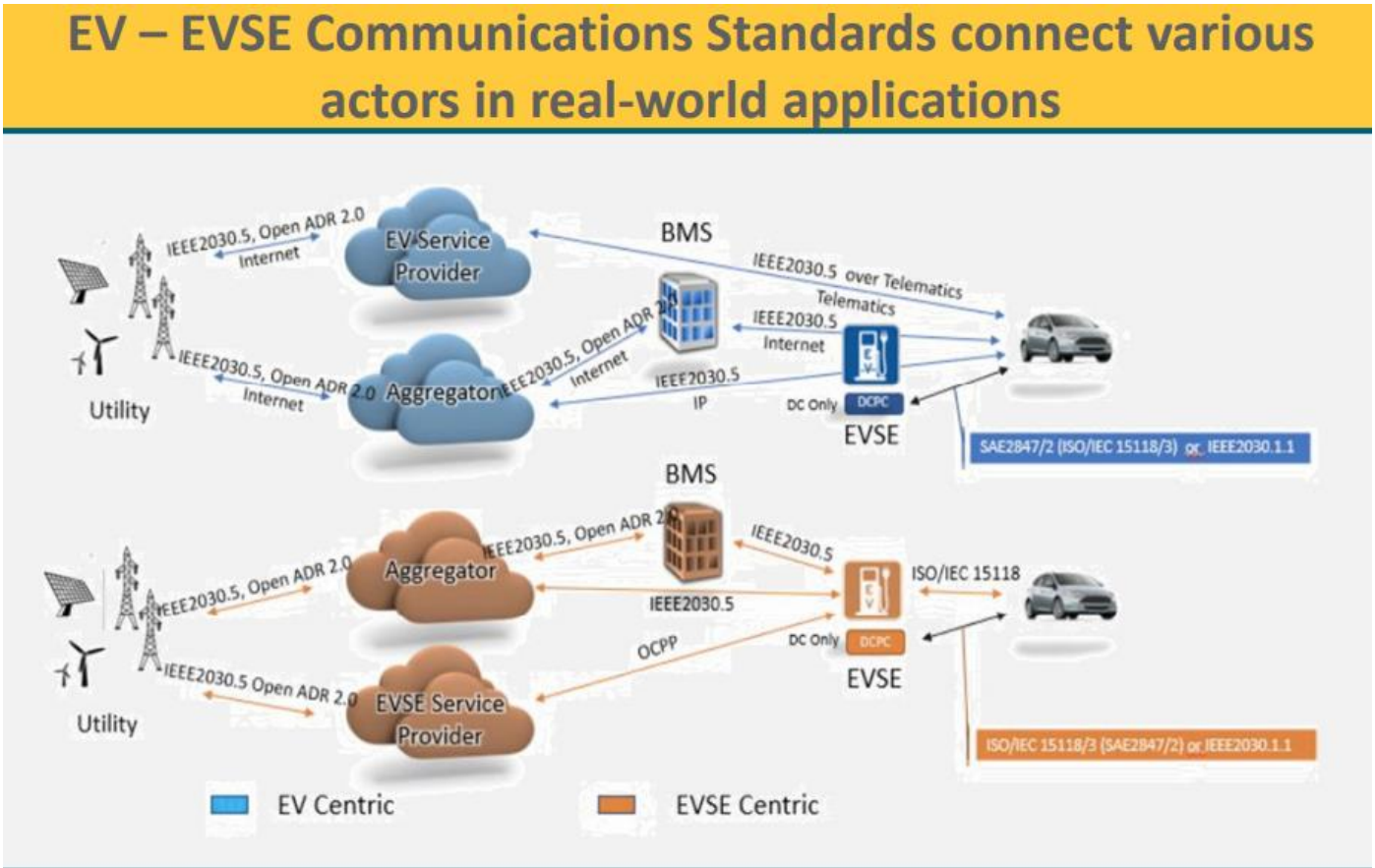

Figure 2: EV and EVSE communication pathways (reference PG&E 2018)