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Australia

Kris Funston
Australian Energy Regulator
GPO Box 3131
Canberra ACT 2601

17 May 2024

RE: SA Power Networks - Determination 2025–30

Dear Kris,

Tesla Motors Australia, Pty Ltd (Tesla) welcomes the opportunity to provide the Australian Energy Regulator (AER) with a response to the AER's Issue Paper for SA Power Networks (SAPN) Regulatory Proposal for the 2025 – 2030 period. We appreciate the work being done by the AER and distribution network service providers (DNSPs) to adapt to a shifting energy landscape with significant uptake in consumer energy resources (CER).

Tesla's global mission is to accelerate the world's transition to sustainable energy. In Australia, we cannot achieve that full transformation without CER. Most importantly, Tesla is focused on deploying smart, orchestrated CER, where customers are compensated for the market benefits their systems provide. From Tesla's perspective, we believe the following:

1. CER – particularly distributed behind-the-meter batteries – are one of the most cost-effective technologies that should be considered within the broader renewable energy technology stack; and
2. CER provides greater market benefits when they are orchestrated and actively responding to market signals, rather than just providing self-consumption benefits to an individual customer.

These statements and world views are not unique to Tesla. A large proportion of homes across Australia have already invested in rooftop solar, and AEMO views behind-the-meter battery storage, and particularly orchestrated CER as the key storage technology in the broader storage mix. AEMO is predicting a four-fold increase in rooftop solar capacity reaching 72 GW by 2050 and facilitating the use of consumer-owned batteries and VPPs to deliver 27 GW of flexible demand response for the NEM.

In Tesla's view we see energy generated from rooftop solar PV being used at the point at which it is generated – used to charge an electric vehicle (EV) or to power an air conditioner, hot water heater or another home or commercial appliance; or alternatively that energy is stored for future use – either for customer home consumption or for export to the grid where the market value and customer incentives dictate. The worst future outcome would see solar PV switched off during the day – due to excess generation, and EV charging switched off in the evening – due to excess load.

We note AEMO's 2023 South Australian Electricity Report outline that maximum operational demand is forecast to continue to occur in summer around sunset where distributed PV contributes little. It is projected to grow approximately 70 MW per year due to expansion of large industrial loads, and growth in EV uptake and number of electricity connections in general. This forecast growth in peak demand is driving a corresponding increase in forecast network capacity augmentation expenditure in the 2025-30 regulatory control period (RCP) when compared to the 2020-25 RCP, as detailed in the capacity augmentation business case. At the same time as peak demand is forecast to grow, state-wide minimum demand is forecast to continue to decline rapidly, due primarily to the continued uptake of small-scale rooftop solar. Tesla's continued preferred use-case is to store energy for later use, and time-shift loads to charge during period of high solar penetration rather than curtailing.

We note that the transition creates emerging considerations for DNSPs to adapt to a shifting landscape, including the establishment of dynamic operating envelopes (DOEs) and two-way export pricing to manage the increasing supply from rooftop solar, coupled with falling minimum demand. Tesla is supportive of SAPN continuing to utilise innovation to manage the risk of excess variable renewable energy and supports their approach that aims to manage the network through an efficient combination of price signals and pursuing network as well as non-network and market-based solutions.

We welcome working further with the AER throughout the determination process. Please contact Emily Gadaleta ([redacted]) with any questions or follow-up.

Sincerely,

Tesla Energy Policy Team

[redacted]

Transition from flat tariffs to solar sponge TOU tariffs

Tesla is supportive of the design of two-way pricing that ensures simplicity and transparency for customers with clearly communicable benefits that reward time-shifting behaviors change. We are happy to support continued design of these tariffs to demonstrate the value that residential storage systems can provide to the networks – particularly during evening peaks.

For the most part, the proposed approach from SAPN in allocating capacity to customers appears reasonable – whereby customers are given a fixed service level threshold. This model gives most customers a guaranteed service level of 95% which equals max. (10kW) export 95% of the sunshine hours. It would be helpful for the AER in their interim guidance note for flexible exports to specifically call this approach out as being customer focused and simple to understand and implement. Tesla sees the interim guidance note, as well as the following rule change to be fundamental to the successful integration of CER.

Compliance is critical to effective CER integration and social licence

Conformance of CER with technical standards and requirements plays a critical role in ensuring that the distribution network and the broader electricity system can be operated safely and reliably, as well as deliver a satisfactory customer experience. While these CER technical standards, requirements and regulatory obligations play a critical role in ensuring the safe, efficient and reliable operation of the electricity system, recent studies by AEMO have revealed very significant levels of non-compliance to these standards across the population of installed equipment in South Australia[1]. These issues have technical and financial implications for customers with CER and the broader community. At best, poor levels of compliance to CER technical standards by industry have a negative impact on network hosting capacity, quality of supply and lead to a poor customer outcome when their asset does not operate as intended.

We appreciate that the introduction of multiple tools across DNSPs in Australia are working to be able to help manage CER in emergency situations. However, these types of controls and a lack of a national governance framework should not come at the expense of the customer. Industry and government need to continue to collaborate to ensure that when tests are conducted of these new controls, communications are sent to affected customers with clear pathways identified for customers who may experience adverse effects, such as their CER assets not reconnecting to the network. In the absence of this, the energy transitions' social licence will deteriorate and the incentive for customers to participate in aggregation or orchestration services that benefit themselves, as well as the grid, will be diminished. Tesla recommends that the AER consider in their flexible exports interim guidance note, as well as the following rule change that requirements be introduced for DNSPs to communicate directly to customers when undertaking tests of new tools, such as emergency backstop mechanisms.

[1] https://aemo.com.au/-/media/files/initiatives/der/2023/oem_compliance_report_2023.pdf?la=en

The current work underway by industry through the AEMC review and subsequent CER Roadmap being developed by Energy Ministers reinforces the critical importance of compliance with CER technical standards. Tesla supports SAPN's phase 2 proposal to continue to build out their suite of CER compliance systems, including detecting and requiring the correction of potential noncompliance with already-installed CER, making use of the increasing availability of smart meter data to detect potential compliance issues.

Innovation Fund business case

Tesla supports SAPN view that in the rapidly changing energy landscape, innovation and use of new solutions is essential. SAPN outlines that pursuing innovation programs via regulatory proposals is currently challenging. To address this issue, the Demand Management Innovation Allowance Mechanism (DMIAM) is often used to fund innovation initiatives within the regulatory framework. However, its focus is restricted to managing network demand which limits the range of initiatives and programs that can be funded. Further, given the range of evolving challenges SAPN notes that they face arising from the rapid pace of the energy transition, funding under DMIAM is insufficient to cover the level of innovation required in the 2025-30 period.

We recommend that the AER review uptake of DMIAM since it was introduced and consider whether it remains appropriate given the level of uptake to date and its current scope, noting that SAPN has raised its limited the range of initiatives and programs that can be funded.

CER integration to increase hosting capacity

South Australia continues to lead the nation in the uptake of small-scale batteries connected at the distribution network, with growth driven by the SA Government's successful Home Battery Scheme which provided subsidies for home batteries from 2019 to 2022. There are now more than 48,000 small-scale batteries in homes and businesses in South Australia, more than any other state, with an aggregate capacity of more than 240 MW. Around a third of these are enrolled in Virtual Power Plant (VPP) schemes which allow them to be centrally controlled and operated, enabling customers to earn money by using their batteries to trade in the NEM wholesale energy market and to help stabilise the power system.

SAPN's CER Integration Attachment outlines that based on forecast rates of uptake of rooftop solar and behind-the-meter batteries, their primary operational tool to maintain reliability and quality of supply in the 2025-30 RCP will be to use flexible exports to dynamically reduce customer export limits in locations and at times when the network is constrained, to maintain net reverse power flows at local LV transformers within limits. From July 2023, SA Government regulations came into effect requiring all new solar systems installed in South Australia to be compatible with flexible exports. By the commencement of our next RCP in July 2025, we expect the majority of customers connecting new solar and batteries to do so under a flexible connection arrangement.

Tesla emphasises that while increasing residential solar may pose some operational challenges with minimum demand, residential batteries provide an opportunity for customers to increase their solar self-consumption and help to reduce overall power price volatility. Residential batteries are expected to be a major contributor to the storage capacity needed to shift electricity demand to timeslots of high renewable electricity generation. At the household level, the battery charges in the daytime when solar power is generated in excess, and discharges later when there is typically higher demand. These charge and discharge patterns benefit customers that want to increase their solar self-consumption. They can also lower consumer bills who are on time-of-use tariffs. The benefits of these charge and discharge patterns translate to power markets by flattening out the overall load or the 'duck curve' which emerges at high solar penetrations.

We support SAPN's proposal that if they maximise reliance on solar curtailment and minimise investment in additional export capacity, they may meet regulatory obligations and requirements and otherwise maintain quality and security of supply but fail to meet or effectively manage customer demand for the export service. If SAPN are to maintain export service levels in the 2025-30 period in line with customer demand, we support their proposal for targeted investments to increase export capacity in congested areas of the network where service levels are forecast to decline.

However, Tesla does not support any introduction of import limits by any DNSP as part of their program to shape daytime load and reduce export peaks. A large, ongoing concern that Tesla has within the broader dynamic operating envelope space (distinct from flexible exports), is the use and introduction of flexible import limits. We are also concerned about when and how generation limits are used. Both of these mechanisms stand in stark contrast to flexible export limits as they are not about controlling site exports that may have a direct impact on the grid, and instead result in DNSPs reaching behind the meter to control when and how customers are using energy – either from their own generation or from the grid.

We understand that the AER sees flexible exports as the more pressing priority, however it is important to recognise that just because there is less talk about flexible imports (and generation) does not mean that it is not happening. Further import and generation controls are already explicitly enabled through both the existing CSIP-Aus, and further fleshed out within the scope of the CSIP-Aus Handbook. This effectively gives licence to DNSPs to introduce import controls, but in a way that is totally unregulated or ungoverned while it sits outside of the AER remit.

This concern is based on the current market reality. Energy Queensland has recently released their final Queensland Energy Connection Manual (QECM)[2] which includes dynamic import controls for electric vehicle supply equipment (EVSE), and the current "Dynamic Standard for Small IES connections"[3] .

[2] https://www.ergon.com.au/__data/assets/pdf_file/0008/1170953/Queensland-Electricity-Connection-Manual-Version-4-2912908.pdf
[3] https://www.energex.com.au/__data/assets/pdf_file/0008/1072592/STNW3510-Dynamic-Standard-for-Small-IES-Connections.pdf

8.10.4 *Dynamic*

(a) Technical requirements, maximum and minimum *dynamic* capacities and fixed limits for *dynamic EG* systems are specified in *EG* standards as per clause 8.15.1.

(b) *Dynamic EVSE* shall:

(i) have *dynamic import* limits supplied by the *DNSP* to *dynamic EVSE* at the *premises*. The *dynamic import* limit supplied will be no more or less than the minimum and no more than the maximum shown in Table 46.

(ii) be capable of dynamic operation within the limits as specified in Table 46. The *import* limits are based on the aggregated *import* of all *dynamic EVSE* at the *connection point*.

Table 46 *Dynamic EVSE* limits

	Fixed *import* limit / minimum *dynamic import* limit	**Maximum *dynamic import* limit**
single-phase	≤ 1.5 kW	≤ 15 kW
two-phase	≤ 1.5 kW	≤ 10 kW/phase
three-phase	≤ 1.5 kW	≤ 15 kW/phase

Figure 1: Dynamic EVSE imports included in the QECM

4.3.3 Import limits at Connection Point

Dynamic Small IES capable of importing electricity from the Distribution Network, such as an ESS, shall be subject to Import limits. The Import limits for a Dynamic Small IES shall meet the following requirements:

a. The dynamic Import limits are supplied by the DNSP to the Dynamic Small IES. The dynamic Import limit supplied will be no less than the minimum and no more than the maximum shown in Table 5 **Table 7**.

b. For Premises with multiple Connection Points the aggregate of the Import limits are applied to the Premises, and all across the multiple Connection Points must collectively will not exceed the limits in Table 5.

c. The Import limits shall meet the measurement and control requirements in Section 4.3.4.

Table 5 Dynamic Import limits

Subcategory		**Minimum dynamic Import limit**	**Maxiumum dynamic Import limit**	**Techical study required**
Single-phase		1.5 kW	18 kW	No
Two-phase		1.5 kW	10 kW per phase[1,2,3]	No
Three-phase		1.5 kW	10 kW per phase[1,2,3]	No
SWER	Single-phase	1.5 kW	10 kW	Yes
	Split-phase	1.5 kW	10 kW per phase[1,2,3]	Yes

Note 1: Multiphase EG Systems shall meet phase balance requirements from Section 4.3.5 of this Standard.

Note 2: Availability of Import limits above the minimum dynamic Import limit in Table 5 are subject to availability of Distribution Network capacity.

Note 3: Aggregate Import limits will not be permitted to exceed Distribution Network capacity limits.

Figure 2: Dynamic IES import controls included in the Dynamic Connection Agreement

In general, we believe that the market rationale for flexible or dynamic exports has been well established. Tesla understands the principles that networks have excess capacity to enable higher levels of export for the majority of the year but need to constrain exports during those high solar yield/ low load periods. The customer benefits of moving to flexible exports are also clear (based on the current SA Power Networks approach, and others that are under design). The status quo for standard static connections is 5kW, and customers have the potential to double that where they move to dynamic connections.

We do not believe that the equivalent rationale for import controls has been considered. For instance, explaining to customers that they can install a 32A induction cooktop with no restriction, but cannot do the same for EV charging infrastructure, does not appear to have been justified.

Import controls also have a significant impact on customers. Considering residential battery energy storage systems first. For the most part, these will charge from on-site solar. Grid charge is usually associated with storms and other extreme situations where batteries are looking to maximise charge for customers ahead of potential risk of blackouts. For example, during the application of Tesla "Storm Watch", Tesla Powerwall's will make sure that they are charged to a certain level, so customers have sufficient back-up power in case of blackout during a storm. Curtailing battery import during this period creates an outsized negative impact for customers, as it means in the event of a black out, they will not have sufficient back-up capacity to maintain loads – which effectively negates the value proposition of a lot of home batteries, and the fact that many customers buy systems specifically for the purposes of home resilience and reliability of supply during grid outages. This is also problematic in that the restriction of grid charge is applied to a storage asset, which would otherwise be able to provide support during a black-out, rather than to a "dumb" load.

Similar for EVSE, there is no value proposition for customers associated with "dynamic imports". As noted above, the customer benefits associated with flexible exports are clear and relatively simple to understand and convey by OEMs, installers, aggregators and retailers. On the other hand, from a customer perspective the status quo regarding grid imports for EVSE is that there is no limit beyond the kW rating of a device. Customers are therefore being asked to trade off installing an asset with no import limits, against installing the same asset with import limits – and no associated incentive for having those systems controlled by a network. Alternatively, they are being told that they cannot install a class of assets (i.e. EV chargers) unless there are import controls applied. The broad rationale being put forward is that this is necessary for "network protection" however there has been no detailed analysis of this, and this rationale does not benefit individual customers.

In addition to the above, the following provides an overview of Tesla's list of concerns regarding the practical implementation of import limits:

- The calculation of capacity limits for import is unclear, and it is not clear how they interact with standard 60A household load ratings.
- Which loads are considered to be controllable and why? Applying specific requirements or grid connection processes to some loads but not others creates an asymmetry, and specifically disincentivises smart loads over dumber loads. This is also the case for batteries which will have their ability to import from the grid curtailed.
- How will import limits be effectively implemented? For the most part networks will only have visibility of the total load of a site. A distribution network will not see whether a customer is installing an induction cooktop, electric hot water heater, or multiple reverse-cycle air conditioners. However,

there is an increasing push for specific requirements regarding the installation of EVSE which may result in import requirements being only applied to smarter loads – see point above.

- Whether import controls will be applied at the site or device level. Networks are generally pushing for both import and export controls to be applied at a site level. The QECM extract above refers to limits being applied to the premises. The IES Connection standard extract above refers to limits being applied at both the premises and the device. This creates significant confusion for customers and opens risk of further customer loads being curtailed – potentially down to 1.5kW for the entire site.

Recommendation: Noting the risks of DNSPs operating in an absence of regulation in this space, we would recommend that the AER issues an additional note to say that flexible imports should not be considered, or implemented, by DNSPs until more work has been done on the cost-benefit application and there has been additional consideration given to regulatory framework for how they are implemented. We are at a critical time in our clean energy transition, industry is already in a position where the regulations and regulatory framework is playing catch-up to the work that the NSPs have been doing for the last two years. We cannot afford to have a prolonged period of flexible imports, or import controls being introduced through opaque, back-door mechanisms in an entirely unregulated environment.