

23 March 2020

Mr John Pierce
Chairman
Australian Energy Market Commission
Sydney South NSW 1235

10 Eagle Street
Brisbane QLD 4122
T 07 3347 3100

By online submission

AEMC code: RPR0012

Dear Mr Pierce

2020 Retail Energy Competition Review: Electric Vehicles – AEMO Submission

AEMO welcomes the opportunity to comment on the Australian Energy Market Commission's (AEMC) Issues Paper on Electric Vehicles (EVs) as part of its 2020 Retail Energy Competition Review.

AEMO's forecasts are predicting the number of EVs in Australia to increase dramatically over coming years and decades. As the electrification of vehicular transport occurs as part of the broader energy system transformation, it is vital that the challenges that are presented are appropriately managed and the opportunities harnessed. AEMO is already working with key partners and stakeholders on many of these issues, through the Distributed Energy Integration Program.

The appropriate regulatory environment is also key to the successful integration of EVs. This includes providing effective signals and incentives, and allowing consumers to enter into service contracts with more than one supplier. Facilitating multiple trading relationships (MTRs) has previously been considered by the AEMC. AEMO notes that these issues and concepts are also being examined as part of the Energy Security Board's (ESB's) work on the development of a two-sided market. Accordingly, it will be important for the AEMC's considerations of these matters to be aligned with the ESB's activities.

We welcome the opportunity to provide further input as this review progresses. Should you wish to discuss any of the matters raised in this submission, please contact Kevin Ly, Group Manager Regulation on kevin.ly@aemo.com.au.

Yours sincerely



Peter Geers
Chief Strategy and Markets Officer

Attachment 1: AEMO submission

ATTACHMENT 1:

2020 RETAIL ENERGY COMPETITION REVIEW: ELECTRIC VEHICLES (RPR0012) – AEMO SUBMISSION

AEMO welcomes the AEMC's focus on electric vehicles as part of its 2020 Retail Energy Competition Review and the opportunity to comment on the Issues Paper. AEMO's submission addresses two areas of focus in the Issues Paper.

Firstly, the context of this review (Question 1 in the Issues Paper). This section provides details of AEMO's areas of focus and current work with respect to electric vehicles (EVs), which is primarily focused on grid integration.

Secondly, the regulatory environment (Question 3), particularly with respect to options for enabling multiple trading relationships (MTRs) through the existing National Electricity Rules (NER) framework. This section also notes the importance of tariff reform to enable EV users to provide services that support system reliability and security, while receiving clear signals about the costs to the power system of different charging behaviours.

1. Context

The progressive uptake of EVs presents both opportunities and challenges for the electricity system. As the electricity system transformation converges with adjacent sectors, in this case transport, the need for complex elements to work together becomes even more important. A chaotic adoption of EVs would pose significant challenges (and costs) to the energy system; while a rollout that is supported by appropriate market frameworks and regulation can both meet consumer demand (for simple and efficient powering of their vehicles) and support the power system of the future. Preparing now for the wide-spread adoption of electrified transportation will assist with efficient integration of EVs into existing and future markets and networks.

AEMO's long-term electricity demand forecasts predict rapid growth in EV energy consumption from the mid-2020s¹, as uptake in Australia becomes consistent with comparable countries. From the mid-2030s, the electrification of vehicle transport is forecast to be the primary driver for overall demand increases in the National Electricity Market (NEM).² The fact that Australia has so far lagged behind the rest of the world in EV uptake provides an opportunity to leverage experience from international jurisdictions further along the adoption curve.

¹ AEMO, August 2019, *2019 Electricity Statement of Opportunities: a report for the National Electricity market (NEM)*, 39, available at: <https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/nem-electricity-statement-of-opportunities-esoo>

² Operational Consumption under the ESOO Central Scenario.

Distinguishing EVs and EV chargers

When considering the potential electricity grid and system impacts of integrating dramatically increasing numbers of EVs, it is useful to consider the difference between vehicles and associated charging infrastructure. As highlighted in the Issues Paper,³ different types of charging infrastructure place dramatically different demands on the grid. In particular, devoted EV chargers in homes and carparks (at shopping centres, hotels or workplaces) and fast-charge installations (equivalent to petrol stations, the first of which are being built by State Governments, including Queensland) have the potential to place significant demands on the grid. Stationery EV chargers will soon be subject to demand response standards (discussed below), presenting clear opportunities for optimised integration that supports the efficient functioning of the grid (over both the operational and investment timeframe).

EV chargers cannot, however, automatically perform all potential grid support functions in the absence of an EV. In particular, the potential for EVs to 'soak up' excess solar generation at times of daytime minimum demand, or inject power back into the system for network support, requires the charger to be connected to the vehicle. It is also important to note that EV chargers are subject to demand response standards, unlike EVs themselves. This issue is discussed further below.

DEIP EV Grid Integration Working Group

Established in 2019, the Distributed Energy Integration Program (DEIP) EV Grid Integration Working Group provides a central forum for key industry and government stakeholders to collaborate and coordinate EV activities. The group approaches EVs from an energy sector perspective but with transport and infrastructure partners, promoting policy and regulatory alignment and development before wide-scale EV adoption begins.

During 2020, AEMO will primarily contribute to DEIP Working Group through leading, or co-leading, two taskforces. These are:

- Data Availability – investigating ways to improve access to EV data within the energy sector, including potential pathways to collect information on the location and characteristics of EV chargers, which are not within the scope of the recently established DER register.⁴ The data capture needs and structures required to support effective grid integration of EVs and EV charging is an issue for the taskforce's potential future consideration.
- Standards – assessing gaps in existing Australian Standards frameworks relating to EV grid integration, including standards which may impact on the security and reliability of the electricity system or that could influence the efficient integration of EVs into retail and wholesale energy markets.

³ AEMC, 20 February 2020, *2020 Retail Energy Competition Review: Electric vehicles – Issues Paper*, 4.

⁴ Available at: <https://aemo.com.au/en/energy-systems/electricity/der-register>

Forecasting and Planning

AEMO incorporates EV projections in long-term electricity demand modelling. Independent consultants are engaged annually to provide EV uptake and usage forecasts across future scenarios for input into the Electricity Statement of Opportunities (ESOO) and Integrated System Plan (ISP)⁵ publications.

During 2019, AEMO developed an EV Modelling Roadmap to support the further development and refinement of EV adoption and charging forecasting, including broad engagement across the energy and transport industries at two industry workshops. This roadmap identified several focus areas, including:

- Forming partnerships with relevant road and transport authorities, including EV charging infrastructure installers
- Development of an EV modelling specification, identifying data requirements for EV modelling
- Development of lead and lag indicators, regarding adoption and charging behaviours
- Securing data sources for operational and economic influences.

Demand Response Standards

In September 2019, AEMO provided a written submission to a review of the application of Australian/New Zealand standards for 'smart' demand response (DR) capabilities of selected appliances. The review was conducted for the Council of Australian Governments (COAG) Energy Council. In that submission, AEMO supported the mandating of certain DR capabilities in some types of appliances, including air-conditioners, electric water heaters, pool pumps and EV chargers.⁶

The mandating of different DR modes within the Standard (AS/NZS 4755) will provide the power system with greater functionality and responsiveness, especially as the build-up of compliant appliances gains momentum. For example, such appliances could support and enable the participation of more consumers in wholesale demand response (WDR) markets, as these continue to develop in the future. AEMO also understands that the AS/NZS 4755 Standard includes a five-minute capability, in alignment with the future settlement structure of the NEM.

Dynamic connections and signalling for EV charging

Over and above the need for smart DR capability, AEMO expects that EVs, along with other distributed energy resources (DER) such as home battery storage will respond best to more

⁵ Available at: <https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp>

⁶ AEMO, 13 February 2019, *Submission to Consultation paper: 'Smart' Demand Response Capabilities of Selected Appliances*, 2. Available at: <https://www.energyrating.gov.au/document/submission-aemo-smart-demand-response-capabilities-selected-appliances>

dynamic signals from distribution network service providers (DNSPs), Aggregators or Retailers. DNSPs such as SAPN are already proposing dynamic connection arrangements whereby DER will be given a wider operating envelope in exchange for the need to respond to signals when network congestion causes voltage increases or decreases. This will increasingly be required when vehicle-to-grid (V2G) capability is commonplace for electric vehicles. The key economic driver for this dynamic capability is the need to minimise network augmentation for EV charging – especially for EV superchargers where network augmentation costs to support the installation of superchargers under current network connection arrangements can be prohibitive.

The joint AEMO and Energy Networks Australia Open Energy Networks (OpEN) project investigates the need for distributed optimisation and a Distributed Market Framework to support its operation. EVs are envisaged to be an important part of the DER capability set, but what will be required will be Aggregators to operate portfolios of EV chargers/V2G on behalf of customers to respond to market signals. If managed optimally these Aggregators will be able to minimise the connection (and network augmentation) costs for EV owners and EV charger owners and provide services to Distribution networks or to the bulk system including FCAS, Demand Response or bid into the wholesale energy market.

A first step in this process will likely require DNSPs to take an enhanced Distribution System Operator (DSO) role to monitor their networks and create constraint calculations that can be communicated to Aggregators (and AEMO) as operating envelopes to enable the previously mentioned dynamic signalling. As DER uptake increases the OpEN project has identified the need for a Distribution Market Operator (DMO) to then ensure the optimal operation of DER and the Distribution Network for the wholesale and any network services markets.

In the medium term, Wholesale Demand Response may provide an ability for EV fleet managers to supply demand response services and the Market Ancillary Services Specification already allows for aggregated loads to provide FCAS. In addition, Retailers can already aggregate portfolios of distribution connected assets to meet their energy portfolio needs. However, as the AEMC have suggested in its Issues Paper, a review of regulatory arrangements to support a future of large-scale EV adoption prior to this uptake is prudent.

2. Regulatory environment

Multiple trading relationships

As highlighted by the AEMC in the Issues Paper, a design to establish a form of multiple trading relationships (MTR) was considered by AEMO and the AEMC in 2015. The model considered at the time was primarily to support the concept of enabling a second Market Customer to utilise a common connection point to provide energy services for provision of EV charging in addition to the customer's household electrical installation.

The design considered at that time was problematic for a range of reasons, which included:

- For the design to be accommodated, competitive structures and consumer protections needed to be compromised (e.g. appointment of financial responsibility for metering services, and rights and responsibilities for de-energisation and life support at connection points); and
- The design was based on one specific service provider's business model and preferred way of engaging customers.

The costs of implementation of the 2015 MTR model were not explored in detail, however AEMO considers that due to the likely changes required to market and participant systems and processes, they would have been material. The 2015 MTR model would as a minimum have required:

- New Market Settlements and Transfer Solutions (MSATS) functionality to link multiple NMIs at a single connection point;
- Distributor system changes to recognise multiple National Metering Identifiers (NMIs) at a single site and a redesign of customer connection processes / systems used for operations such as rectifying faults and outages; and
- Metering Coordinator/Metering Provider/Metering Data Provider system changes to track and maintain the part of a single metering installation for which they are responsible and to which they have access.

AEMO considers that the issues highlighted in the AEMC's determination in 2015 remain relevant today, and that no developments or changes have become manifest in the energy market that might reasonably give cause to reconsider the veracity of the determination. To the contrary, AEMO considers that market development since 2015 supports the AEMC's determination. In particular, the cost of providing remotely-read interval metering equipment has dropped to be no more expensive than 'behind-the-meter' devices, and there are current examples of service providers utilising second connection points in the form of Small Generator Aggregator (SGA) connections for services at small customer connection points. Customers that have an SGA connection are already 'MTR' connected customers.

The SGA model was originally designed to incentivise small generating systems (such as stand-by generating systems in offices, hospitals and shopping centres) to engage directly in the market, increasing generation capacity. The SGA model provides a framework that can be adapted to facilitate more general arrangements, not just limited to generation. This provides an established model for allowing two connection points at a site, and for the switching of connected plant (e.g. solar generation, battery systems, EV charging and discharging) between them.

AEMO notes that these concepts and related design considerations are matters that are likely to be considered in the work currently being pursued by the ESB in their post-2025 market design workstream on two-sided markets. The ESB is considering how consumers can obtain the full value of investments in technology such as pool pumps, EVs, household batteries and appliances within a two-sided market design.

The Issues Paper references Elexon’s work regarding MTRs in the United Kingdom (UK) electricity market. AEMO notes that although the UK market is often a good reference point for NEM market development, the operating model and regulatory framework for metering provision and metering data management in the UK is very different to the NEM. As a result of the different directions taken in these areas, options made available for MTRs to support in-home charging in the UK are unlikely to suit the NEM. However, due to recent changes in UK legislation in support of EV uptake, in the future that market might provide some useful data regarding the demand for multiple trading arrangements to support EV charging in preference to EV charging through packaged products at the standard customer connection point.

The need for effective retail tariffs

As previously stated, it is important that EV users are given appropriate signals about the costs of their charging behaviour on the grid, and opportunities and incentives to provide value to the grid in the form of DR or other network support services. Such signals could be sent via the use of well-designed retail electricity tariffs and supply contracts.

These issues are currently under consideration by other DEIP EV taskforces. In particular, the EV Council (which represents the Australian EV industry) and the Australian Energy Council (which represents participants in contestable energy markets) are leading an examination of residential EV tariff design and incentives. The EV Council is also leading a taskforce specifically examining issues related to high-capacity connections for EV charging, including options for tariffs.

AEMO welcomes the opportunity to work with the AEMC and provide further input as the Review, and any subsequent rule changes and implementation activity, progresses.