



Australian Energy Market Commission

ISSUES PAPER

**2020 RETAIL ENERGY COMPETITION
REVIEW: ELECTRIC VEHICLES**

20 FEBRUARY 2020

REVIEW

INQUIRIES

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ABOUT THE AEMC

The AEMC reports to the Council of Australian Governments (COAG) through the COAG Energy Council. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the COAG Energy Council.

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SUMMARY

As part of the AEMC's annual Retail energy competition review, the Commission typically picks a specific technology and explores how it is interacting with retail energy markets. For example, last year's review explored the interaction of behind the meter battery technology with retail markets. The goals from this analysis are twofold:

1. To assess whether energy retailers are innovating in relation to the technology to provide customers with offers they want. Traditionally economists consider that a key benefit of contestable and competitive markets is that they provide incentives for businesses to innovate to provide new or diversified products to meet consumers needs. By picking a prominent new technology and assessing whether this is occurring assists our overarching assessment of the state of competition in the retail energy market.
2. To analyse if there are any retail regulatory barriers to innovation occurring. Assessing the barriers is important because as the policy adviser to governments and rule maker in the sector the Commission can then recommend rule changes to remove any barriers.

In the 2020 Retail energy competition review the Commission will explore electric vehicles (EV) as the technology to research. This is an appropriate time to look at EVs because uptake in Australia and around the world is growing rapidly due to declining costs and the introduction of government policies to encourage uptake. Given the potential considerable impact electrification of vehicles could have on the electricity market it is important to assess how retail energy competition is resulting in innovation related to the efficient use and uptake of electric vehicles.

This issues paper has been published to seek stakeholder views to inform this research. Written submissions are welcome by 19 March 2020 via the AEMC's website, www.aemc.gov.au, using the 'lodge a submission' function and selecting the project reference code RPR0012.

The project team are also open to holding informal discussions with stakeholders instead of, or in addition to written submissions. All enquiries on this project should be addressed to Samuel Martin on (02) 8296 0646 or samuel.martin@aemc.gov.au.

BOX 1: SUMMARY OF QUESTIONS FOR CONSULTATION

Question 1: Context

Are there any other contextual developments the Commission should consider in relation to EV uptake and use in Australia?

Question 2: Role of retailer

What challenges and opportunities, given the current role of retailers in the NEM, are EVs likely to provide retailers?

Question 3: Regulatory environment

- a. Do you consider that regulatory changes, like multiple trading relationships, that improve a consumer's ability to engage with multiple FRMPs at a household would enable innovative services and products to develop for EV consumers?
- b. Do you have any views on an appropriate method (e.g. through a change to the SGA framework or an alternative metering configuration), and relevant costs, to facilitate this?

Question 4: Residential charging

- a. Are there other offers in the retail market, or are you developing any others, aimed at EV consumers?
- b. Are there retail market barriers in developing residential products and services for EV consumers?

Question 5: Non-residential charging

- a. Are you providing or developing any non-residential charging products or services?
- b. Are there retail market barriers in developing non-residential EV charging products and services?

Question 6: EV value streams

- a. Are you currently developing products and services to harness EV value streams?
- b. Are there retail regulatory barriers for retailers or new energy service providers accessing these value streams?

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1 CONTEXT

The prevalence of EV use in Australia and around the world is growing due to declining cost and the introduction of government policies to encourage uptake. A rapid uptake of EVs could have a significant impact on the National Electricity Market (NEM) as residential electricity consumption patterns change. Given this impact it is important to assess how retail energy competition is resulting in innovation related to the efficient use and uptake of electric vehicles.

This section provides an overview of the current uptake, forecast uptake, consumer attitudes, government subsidy schemes, charging infrastructure and behaviour, and other work programs relevant to this research at the AEMC. This gives context to our assessment of the EV segment of the retail market.

1.1 Current uptake of EV's

The uptake of EV's globally has been growing significantly in recent years with over 2 million sold globally in 2018, taking the total to over 5.1 million.¹ For the first half of 2019 sales reached 1.13 million, 46 per cent higher than the same period of 2018.² These increases in EV sales have occurred whilst internal combustion engine (ICE) sales have been declining, leading some analysts to predict that ICE passenger vehicle sales have peaked.³

Sales in Australia have been modest relative to global trends, although the global trend of increasing EV and decreasing ICE sales is also present. Australia sold 6,718 electric vehicles in 2019, a 203 per cent increase compared to 2018.⁴ Sales for all vehicles nationally in Australia over 2019 decreased by 7.8 per cent compared to 2018.⁵

The price and range of EVs have been major concerns for consumers in Australia that have limited uptake.⁶ Australia currently has 22 battery and plug in hybrid electric vehicle models available and in 2020 it is expected that at least nine more models will be introduced.⁷ Increasingly lower priced and higher range models are entering the market (e.g. below \$60,000), as battery technology improves. These factors open EVs up to a wider consumer market. Another factor helping relieve "range anxiety" for consumers is access to public EV charging stations, the number of which in Australia has increased by over 140 per cent in the year to July 2019.⁸

1 IEA, Global EV Outlook 2019, viewed 28 January 2020, <https://www.iea.org/reports/global-ev-outlook-2019>.

2 R. Irlie, EV Volumes, viewed 28 January 2020, <http://www.ev-volumes.com/country/total-world-plug-in-vehicle-volumes/>.

3 Bloomberg NEF, Electric Vehicle Outlook 2019, viewed 23 January 2020, <https://about.bnef.com/electric-vehicle-outlook/#toc-viewreport>.

4 Electric Vehicle Council, 'Huge jump in Aussie EV sales underscores massive untapped potential', viewed 7 February 2020, <https://electricvehiclecouncil.com.au/huge-jump-in-aussie-ev-sales-underscores-massive-untapped-potential/>.

5 Federal Chamber of Automotive Industries, viewed 28 January 2020, <https://www.fc.ai.com.au/news/index/view/news/600>

6 Queensland Home Energy Survey 2018, Insights Report, Colmar Brunton, p. 61.

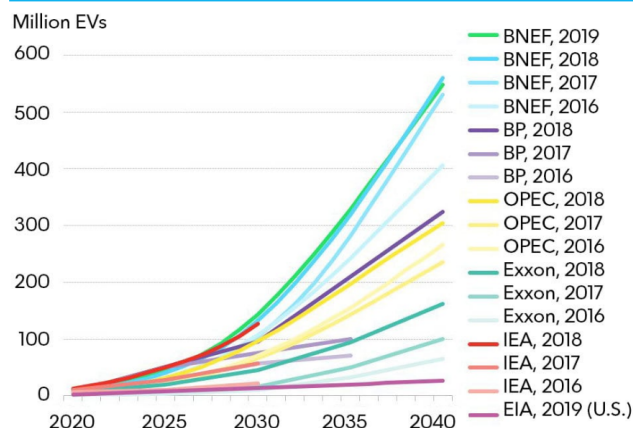
7 State of Electric Vehicles, Electric Vehicle Council, August 2019, p. 11.

8 State of Electric Vehicles, Electric Vehicle Council, August 2019, p. 19.

1.2 Forecasts

While the uptake of EVs globally is expected to continue to increase substantially over the coming decades, the rate at which this occurs is uncertain. Figure 1.1 shows that industry forecasts have generally been increasing over time with the most optimistic of them from BloombergNEF predicting that there will be 550 million EVs on the road globally by 2040.

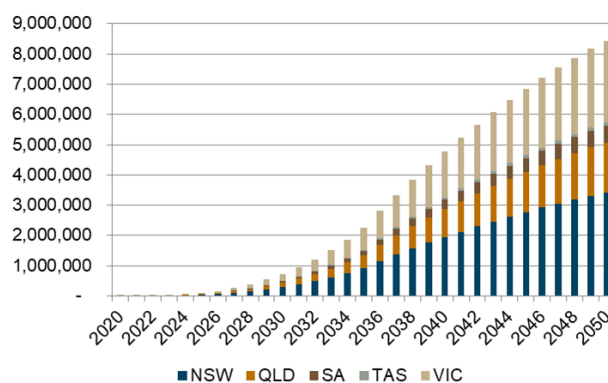
Figure 1.1: EV Outlooks then and now



Source: BloombergNEF, Electric Vehicle Outlook 2019.

Figure 1.2 below presents the Australian Energy Market Operator's (AEMO) forecast for uptake by state in the NEM as part of the 2019 NEM Electricity Statement of Opportunities's (ESOO) central scenario. AEMO highlight that this central scenario forecast is influenced by a lack of supportive policy and EV infrastructure that leads to a slow reduction in vehicle prices and lower vehicle model availability.⁹

Figure 1.2: NEM EV forecast



Source: AEMO, ES00 2019, Central scenario.

⁹ AEMO, ES00 2019, p. 40.

1.3 Consumer attitudes

The main concerns of consumers that inhibit the purchasing of EVs as observed across multiple studies in Australia are "range anxiety" and purchase price. With more affordable models becoming available and as the average range of EVs increases alongside the increased deployment of charging infrastructure these concerns should reduce and purchasing increase. Surveying of motorists from New South Wales, Victoria and Queensland, on behalf of the Electric Vehicle Council in 2019, indicated that 45 per cent would consider purchasing an EV. This increases to 69 per cent in a situation where EVs are at the same price point, as an equivalent ICE vehicle.¹⁰

The 2018 Queensland Household Energy Survey (QHEs) highlighted that there is an increasing willingness to consider EVs at lower price points, though the lower price models currently available on the market do not have sufficient range. QHEs pinpointed a tipping point of range and price that would facilitate widespread adoption as an EV model with a range of 500 km at a cost of \$50,000.¹¹

1.4 Government strategies

There are a number of current state EV policies and as they evolve over time they have the potential to accelerate the uptake of EVs in Australia. State government policies vary across jurisdictions and have so far included:

- reduced vehicle registration fees for EVs
- investment and support for public and private EV charging infrastructure development
- fleet targets for EV or zero emissions vehicles
- information programs to help spread awareness of the benefits of EVs and educate the public about model availability or charging infrastructure development
- preferential lane access for EVs into bus and transit lanes as well as dedicated EV parking and free or discounted parking.¹²

1.5 Charging infrastructure

The number of public charging stations in Australia has increased by 143 per cent between June 2018 and July 2019, with a total of 1,930 stations as of July 2019.¹³ The roll out of public charging infrastructure is significant as in other markets it has had a positive correlation with increased uptake of EVs.¹⁴

The different types of charging infrastructure are listed in Table 1.1 below. It is expected that as battery prices reduce EVs will continue to have larger battery capacity and therefore faster charging infrastructure will be preferred by consumers, level 2 at the home and progressively more level 3 chargers in public, as explained in Table 1.1 below.

10 State of Electric Vehicles, Electric Vehicle Council, August 2019, p. 23

11 Queensland Home Energy Survey 2018, Insights Report, Colmar Brunton, p. 61.

12 State of Electric Vehicles, Electric Vehicle Council, August 2019, p. 44

13 State of Electric Vehicles, Electric Vehicle Council, August 2019, p. 19

14 Ibid.

Table 1.1: EV charging infrastructure

	LEVEL ONE	LEVEL TWO	LEVEL THREE
Equipment and location	Charging through a standard existing power point. Requires a specialised vehicle cable but no specialised installation equipment.	Charging that requires installation of a dedicated EV charger, typically found in homes, shopping centres, hotels, workplaces and apartment complexes.	Fast charging units that are typically found in commercial premises or en-route highway locations similar to fuel stations.
Rate of charge	Operates at 120V AC up to 10A or 2.4kW. Roughly 10km/hr of charging provided to a standard EV. Can be used to top up daily use, will not recharge an EV fully overnight.	Operate at 240V AC up to 22kW (32A three-phase). Providing 15-100km/hr of charging. Capable of providing a full recharge overnight.	Currently available rapid AC chargers can charge at 43kW while rapid DC chargers are typically 50kW though can reach up to 350kW (40-500A, three-phase). Providing up to 150km/hr on the lower end and at higher rates could fully charge an EV in 10 minutes.

Source: Electric Vehicle Council, viewed on 30 January 2020, <https://electricvehiclecouncil.com.au/about-ev/charger-map/>.

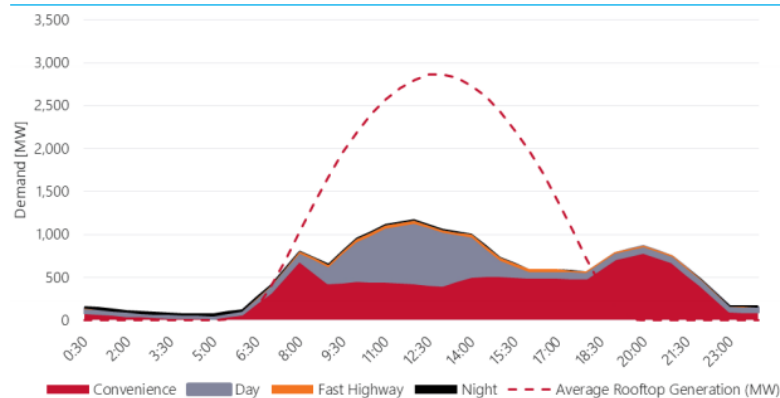
1.6 Charging behaviour

A recent review of charging behaviour by Energeia segmented the Australian market between drivers with and without access to dedicated charging infrastructure. Drivers with access to dedicated charging at the home or workplace, representing around 70 per cent of the market, were estimated to only require public charging for one per cent of kilometres travelled. Drivers without access to dedicated charging facilities, representing the other 30 per cent of the market, would require public charging facilities for 100 per cent of charging requirements.¹⁵

Similar analysis by AEMO modelled the charging behaviour of EV consumers, as part of the 2019 ES00, as influenced by the availability of public infrastructure, tariff structures, energy management systems, and the driver's routine. Figure 1.3 below shows an example of the charge profile used in the 2019 ES00's Central Scenario on an average weekday for NSW in January 2039.

¹⁵ Energeia, Electric Vehicle Market Study, May 2019, p. 4.

Figure 1.3: Average weekday EV demand by charge profile type assumed for the ESOO Central scenario in January 2039 in New South Wales



Source: AEMO, Electricity Statement of Opportunities 2019, August 2019, p. 41.

QUESTION 1: CONTEXT

Are there any other contextual developments the Commission should consider in relation to EV uptake and use in Australia?

1.7 AEMC work programs

Relevant AEMC work programs that are addressing barriers related to the efficient integration of EVs into the wider electricity market are detailed below to help provide context on the scope of this paper.

Outside of these programs the Commission is also working closely with the EV Grid Integration Working Group which provides a central forum for key industry and government stakeholders to collaborate and coordinate activities, and promote policy and regulatory development before wide scale EV adoption begins.

1.7.1 Electricity network economic regulatory framework

In the 2019 Electricity network economic regulatory framework review final report, the Commission recommended regulatory reforms to integrate distributed energy resources (DER), including EVs, into the electricity market and optimise benefits for all electricity system users. The Commission identified a number of 'tools' to integrate DER and optimise benefits for all customers.¹⁶ The report makes particular recommendations to reform regulations around the way electricity 'exports' and 'imports' are priced, and to allow for

¹⁶ For more information see <https://www.aemc.gov.au/market-reviews-advice/electricity-network-economic-regulatory-framework-review-2019>.

different access and connection services to be provided by network distribution businesses that are relevant for EV consumers.

1.7.2 Two-sided markets

On 14 November 2019, the Commission released an information paper to open discussions on how digitalisation is changing the NEM and the potential to move towards a two-sided market. Technological advances in digitalisation mean that consumers, instead of having to actively monitor the electricity market and decide how or when to participate, can now 'set and forget'. Consumers, or someone acting on their behalf, can set EV chargers, batteries, pool pumps, smart air conditioners and any other number of devices to consume electricity at the cheapest times and export at the most expensive times. COAG Energy Council has tasked the ESB with creating a fit for purpose market design for 2025, which includes a two-sided market.¹⁷

1.7.3 Wholesale demand response mechanism

The AEMC has received three rule change requests seeking to facilitate wholesale demand response in the national electricity market. The three rule change requests followed a recommendation in the AEMC's Reliability Frameworks Review to integrate more demand response in the wholesale market by enabling demand response aggregators and providers to be recognised on equal footing with generators in the wholesale market and so offer wholesale demand response transparently into the market. In July 2019, the Commission made a draft determination to introduce a wholesale demand response mechanism which would allow a new category of market participant, a demand response service provider, to sell wholesale demand response directly in the wholesale market. The Commission expects to publish a second draft determination on the Wholesale demand response mechanism rule change request in March 2020.¹⁸ This rule change process may be relevant to EV charging load operators who seek to utilise EV chargers as a demand response resource.

1.7.4 NECF Review

In the AEMC's 2019 Retail energy competition review final report the Commission mapped the consumer protections that energy consumers in the national electricity market currently receive under the National Energy Customer Framework (NECF) and the Australian Consumer Law (ACL). The Commission concluded that the NECF generally complemented the ACL in protecting energy consumers from harm.

The Commission is continuing two further areas of analysis as part of the 2020 Retail energy competition review: consumer protections related to new energy products and services, and the impact of digitalisation on regulatory provisions under the NECF for the traditional sale of energy.¹⁹ This work will be relevant for any new energy service providers that are seeking to provide energy services for EV consumers.

¹⁷ For more information see <https://www.aemc.gov.au/news-centre/media-releases/ebay-ing-australias-energy-market>.

¹⁸ For more information see <https://www.aemc.gov.au/rule-changes/wholesale-demand-response-mechanism>.

¹⁹ For more information see <https://www.aemc.gov.au/market-reviews-advice/consumer-protections-evolving-market>

2 RETAIL MARKET

This section provides an overview of the current market design for EV consumers in Australia by mapping out the interactions an average EV consumer will have with the retail market and raises questions associated with these interactions that this review would welcome stakeholder feedback on.

For the purposes of the mapping exercise that follows, consumer EV charging habits will be assumed to be primarily shaped by convenience, as highlighted in section 1.5, and will be differentiated between charging that occurs at a retail customer's home and in the public. This leads to a limited set of customer interactions with the electricity market through charging at the home and a set of non-residential charging circumstances either on the street, at a destination or en-route to a destination. This chapter lays out the regulatory environment present for EVs and then uses that lens to view the separate interaction points between EV consumers and the retail electricity market.

2.1 Role of retailer

For most small consumers, the primary interaction they have with the electricity market is through their electricity retailer. The retailer is the final segment of the traditional electricity supply chain, and facilitates the supply of electricity to customers. Some of these consumers may perceive electricity retailers as sellers of electricity, through a network of electricity wires. In fact, the retailer is not involved in the physical supply of energy to the consumer. Instead, the retailer provides the consumer with a financial product, which is the retail contract, that packages wholesale, network, metering, customer service and other costs. The range of retail offers available in the market are essentially a range of financial products related to facilitating the supply of energy.

The main risk that these financial products serve to protect consumers against is price volatility in the wholesale market. Electricity retailers must source supply from the wholesale spot market, to satisfy their customers' demand. Due to the need to balance electricity supply and demand in real time the spot market price can fluctuate greatly depending on the conditions in the market in a given trading interval. Energy retailers manage the risks associated with wholesale market volatility through the purchase of hedging products on the contract market and through vertical integration with generators. Small customers are then generally charged a fixed rate for their energy consumption and billed at regular intervals.

The electrification of Australia's passenger vehicle fleet is expected to materially increase electricity consumption in Australia and will change the underlying residential demand profile, as shown in Figure 1.3. This poses a significant opportunity for retailers to innovate their service offerings to attract EV consumers who are likely to have a higher electricity consumption rate than non EV consumers. It is important that retail market regulation enables retailers, or new energy service providers, to efficiently realise and deliver value streams from the charging (or discharging) of EV batteries, as discussed later in section 2.5, to the asset owner.

QUESTION 2: ROLE OF RETAILER

What challenges and opportunities, given the current role of retailers in the NEM, are EVs likely to provide retailers?

2.2 Regulatory environment

2.2.1 Consumer protections

In Australia, in relation to the energy sector, there are two consumer regulatory frameworks that complement each other, the ACL, the general consumer framework and the NECF, the energy-specific framework. Due to the essential nature of the supply of electricity as a service, the NECF provides a framework for consumer protections in addition to those general protections provided under the ACL. Central to the NECF is the principle that consumers have a right to access energy (as an essential service) on fair and reasonable terms.²⁰ The NECF includes specific provisions to provide consumers with effective access to energy supply and network services (guaranteed connection obligations, limitations on disconnections and energy interruption, etc.).²¹

Currently, the NECF and ACL apply in different ways depending on the way in which an energy related product or service is provided for an EV consumer. Regardless of where, when or by whom the sale of electricity occurs the ACL applies. In addition to the ACL, where electricity is supplied by an:

- authorised retailer at a home or small business, the NECF applies
- exempt seller, any conditions placed on the exempt seller under the NECF through the exempt seller authorisation applies
- entity that requires no authorisation or exemption, only the ACL applies.

2.2.2 Sale of energy

Any person who sells energy "to a person for premises" in the NEM is required to have a retailer authorisation or hold an exemption.²² The NERL sets out the types of exemptions that are available and the types of entities that could be exempted from holding a retailer authorisation.²³

The Australian Energy Regulator (AER) considers that "to a person for premises" captures EV chargers at a home or small business but does not apply to EV chargers at commercial EV charging stations.²⁴ Based on this view, commercial EV charging station operators do not need to hold either a retailer authorisation or an exemption to sell electricity to consumers.

20 NERL (Adoption) Bill 2012, Second Reading Speech (NSW)

21 AEMC, Consumer protections in an evolving market: New energy products and services - 2020 Retail Energy Competition Review, 12 December 2019.

22 Section 88 of the National Energy Retail Law, *Schedule to the National Energy Retail Law (South Australia) Act 2011*

23 Division 6 of Part 5 of the NERL, for more information see <https://www.aer.gov.au/retail-markets/authorisations>.

24 Australian Energy Regulator, Response to AEMC Issues Paper - Energy market arrangements for electric and natural gas vehicles, submission to the AEMC, 28 February 2012, p. 2.

The home will be the most convenient charging location for the majority of EV owners. The sale of energy in a residential environment would require a retailer authorisation or exemption, bringing consumers under the protection of the NECF or exempt selling guideline. The AER has noted that for an entity selling to a residential premise it is likely that any exemption agreement would place conditions similar to the NECF obligations on the exempt sellers.²⁵

2.2.3 Multiple trading relationships

Under current arrangements, a consumer is only able to have a single financially responsible market participant (FRMP) at each network connection point, i.e a retailer from which they buy electricity. There are a number of situations in which a consumer may wish to engage with separate service providers. This could include separating the responsibility of controlled loads (such as air conditioning, hot water, pool pumps or EV charging) or DER between multiple retailers. Consumers are able to achieve this by establishing a separate connection point or through the existing embedded networks framework. However, these options contain either considerable complexity, connection costs or multiple network tariffs. Consequently, the current regulatory framework does not facilitate consumers easily engaging with multiple FRMPs.

The Commission's 2012 final advice on the energy market arrangements for electric and natural gas vehicles (2012 EV review) considered how metering arrangements could enhance choice and facilitate efficient use of electricity services for customers with electric vehicles. A key recommendation was that a customer should be able to engage with a different FRMP at its premises for different portions of load without having to establish a second connection point, an arrangement referred to as multiple trading relationships (MTR).²⁶

Following this, in 2015, the Commission received a rule change request from AEMO aiming to better enable MTR by implementing a new framework that removed the need for a customer to establish a second connection point and therefore reduce the cost of engaging another retailer. The Commission decided not to make a rule at the time as consumers could already engage multiple retailers at a premises under the current rules by establishing a second connection point.²⁷

Expert advice provided to the Commission through the rule change process identified that it was far more economical for customers to engage multiple retailers through a second connection point than initially thought in the original 2012 EV review. Therefore, the cost of implementing the proposed changes across IT systems and operational process of retailers and distributors would have outweighed the benefit provided to a small subset of consumers.²⁸ The majority of stakeholder submissions to the rule change considered that the benefits were not significant, or were not sufficient to warrant the costs of implementation.

25 AER, AER Final Retail Exempt Selling Guideline, March 2016, p. 19.

26 AEMC 2012, Energy market arrangements for electric and natural gas vehicles, Final Advice, 11 December 2012, Sydney

27 If a customer requests the establishment of a second connection point, this must be provided by the customer's DNSP.

28 AEMC 2016, Multiple Trading Relationships, Final Rule Determination, 25 February 2016, Sydney

Subsequently, through the 2018 Reliability Frameworks Review the Commission highlighted a number of aspects of the energy market that are continuing to evolve, that may warrant further consideration of MTR. These include:

- The increasing uptake of DER, including solar PV, batteries, EVs and dynamic controllable loads. A formerly passive demand side is becoming increasingly engaged through the uptake of DER which is greatly expanding the choices that consumers have to manage their energy needs at the household or business level.
- The growing number of virtual power plants where DER are being orchestrated to provide services on a wholesale level. This may lead to higher rates of uptake of multiple trading relationships than was considered previously.
- Renewed stakeholder support from across industry for consumers to have more options for participating in the wholesale market. Further information is detailed in section 1.7.3.
- New metering configurations that would reduce the cost and complexity of accessing multiple FRMPs at a connection point. Differing metering arrangements than were considered in the MTR rule change request may enable MTR at a lower cost.²⁹

A potential option to enable MTR or innovative products and services for EV consumers in general, amongst others, may be to amend the small generation aggregator (SGA) registration category. An SGA is a registered participant who may supply electricity aggregated from one or more small generating units (under 30MW) to a transmission or distribution system and purchase all electricity supplied to that point.³⁰

The UK Balancing and Settlement Code (BSC) administrative body Elexon is currently considering a modification to the BSC to enable individual consumers in the UK to be supplied by multiple retailers through one meter (i.e. MTR). It envisions this change will support the development of non-traditional business models and innovation.³¹ Further consideration of MTR in the NEM would likely encounter similar issues to this policy development.

QUESTION 3: REGULATORY BARRIERS

- a. Do you consider that regulatory changes, like multiple trading relationships, that improve a consumer's ability to engage with multiple FRMPs at a household would enable innovative services and products to develop for EV consumers?
- b. Do you have any views on an appropriate method (e.g. through a change to the SGA framework or an alternative metering configuration), and relevant costs, to facilitate this?

²⁹ AEMC, Reliability Frameworks Review, Final Report, 26 July 2018

³⁰ For more information on the SGA registration category see https://www.aemo.com.au/-/media/Files/Electricity/NEM/Participant_Information/Application-forms-and-supporting-documentation/SGA-Registration-Guide.pdf.

³¹ Further information is available at <https://www.elexon.co.uk/mod-proposal/p379/>

2.3 Residential charging

The home will be the most convenient charging location for the majority of EV owners who have off-street parking. EVs are capable of charging off standard residential electrical infrastructure (level one charging) or owners can install a dedicated electric vehicle charger to achieve faster charging times (level two charging). For EV owners in apartment buildings with off-street parking the ability to install charging infrastructure will depend on the specifics of each circumstance.

The sale of energy in a residential environment, as noted in section 2.2.2, would require a retailer authorisation or exemption, bringing consumers under the protection of the NECF or exempt selling guideline. For apartment owners, this would be more case specific and depend on the charging and metering infrastructure.

2.3.1 Current residential offers

With only limited uptake of electric vehicles in Australia so far, there are few retail offerings targeting this market. Currently EV specific retail offerings either provide standard flat rate or time of use tariffs with attached products or services value added. The current market offers based off a desktop study include:

- AGL's Electric Vehicle Plan is a flat rate tariff of 25 per cent less than the reference price with an incentive of \$480 in bonus credits over two years and free household carbon emissions offsetting household consumption.³²
- Origin are offering an EV plan in partnership with Hyundai that provides Hyundai electric car owners with up to \$750 off a solar or battery system.³³
- Powershop is offering a 'super off-peak tariff' for those who own an electric vehicle in Victoria, NSW and Queensland. With the 'super off peak' tariff, customers will pay a considerably reduced usage rate between 12am and 4am on weekdays. Powershop also has a partnership with Chargefox, Australia's largest EV Charging network, that provides Chargefox customers \$100 off their bill when they join Powershop.³⁴

Sonnen, a battery service provider that currently offers the sonnenFlat package in partnership with the authorised retailer Energy Locals has expanded its service offerings into electric mobility in Germany with sonnenDrive. The current sonnenFlat package includes the installation, maintenance and operation of a battery and solar PV system in return for a flat monthly rental fee. The expanded offer currently available in Germany, sonnenDrive, offers customers the addition of an EV to this package for an additional monthly subscription fee.³⁵

32 For more information see <https://www.agl.com.au/get-connected/electric-vehicles/electric-vehicle-plan>.

33 For more information see <https://www.originenergy.com.au/blog/hyundai-ev-partnership/>.

34 For more information on see <https://www.powershop.com.au/electric-vehicle-tariff/>.

35 PV Magazine, 'Sonnen adds electric cars and rooftop PV to its monthly payment plan', viewed 31 January 2020, <https://www.pv-magazine.com/2019/11/13/sonnen-adds-electric-cars-and-rooftop-pv-to-its-monthly-payment-plan/>. Also available on SonnenGroup website at <https://sonnen.de/sonnen-drive/>.

QUESTION 4: RESIDENTIAL CHARGING

- a. Are there other offers in the retail market, or are you developing any others, aimed at EV consumers?
- b. Are there retail market barriers in developing residential products and services for EV consumers?

2.4 Non-residential charging

The number of public charging stations in Australia, as stated in section 1.5, has increased by 143 per cent between June 2018 and July 2019, with a total of 1,930 stations as of July 2019.³⁶ It will be important as public charging station deployment continues to increase that they are operated with exposure to the right market signals to ensure efficient operation and utilisation of the grid. Public charging stations can have a large impact on the grid, for example a charging station built in 2017 in Adelaide with eight chargers was equivalent to the connection of 100 new homes.³⁷

There are a number of different charging station network operators across Australia which have so far been predominantly either automotive associations, EV manufacturers, government owned network corporations or private developers. There is a growing prevalence of Australian public charging operators moving towards user-pays centric business models with free charging gradually being phased out.³⁸ Free charging has been offered in Australia so far as either a community service by government or to attract customers to either the EV brand or to a business. Commercial charging stations typically either price based on volumetric or time based charges or under a subscription service model.

Shared mobility services, ride-hailing and car-sharing, currently account for around five per cent of global passenger vehicle distance travelled. This is predicted to rise to 19 per cent by 2040. The shared mobility services fleet is predicted to transition to EVs much faster than the public passenger vehicles and may heavily utilise public charging facilities.³⁹

2.4.1 En-route

The en-route location will be the most familiar to current ICE drivers as they will likely be mostly co-located with current service stations and follow a similar business model. Though there has only been limited deployment of EV charging infrastructure by service station operators in Australia they have been shifting into this space faster in other markets and are well placed to develop and manage Australia's future en-route public charging network.⁴⁰ This

³⁶ State of Electric Vehicles, Electric Vehicle Council, August 2019, p. 19

³⁷ Everergi, Managing the impacts of renewably powered electric vehicles on electricity distribution networks, 2019. These chargers included two 22kW AC chargers, two 50kW DC fast chargers and four 125kW Tesla Superchargers.

³⁸ Energeia, Electric Vehicle Market Study, May 2019, p. 9.

³⁹ Bloomberg NEF, Electric Vehicle Outlook 2019, viewed 23 January 2020, <https://about.bnef.com/electric-vehicle-outlook/#toc-viewreport>.

⁴⁰ Energeia, Electric Vehicle Market Study, May 2019, p. 9.

will become more apparent with an increase in uptake and further development of level three fast charging infrastructure which will reduce charge times and make en-route charging more convenient for consumers and attractive for developers.

Payment for charging at an en-route facility will likely be more expensive than either a street or destination charging situation as there would be a premium on charging spots and speeds.

2.4.2 Destination

Destination charging locations are where an EV will likely be left for a longer period while another task is carried out, such as shopping, dining or working. It is currently common for retail business locations to attract customers with EV charging facilities that are either free or pay for use. A pay for use model would commonly rent the parking spot out to a third party who carries out installation and charges for its use. This could also be the case for apartment complexes and workplace employee car parks.

Workplace charging may also be an integral part of many consumers charging habits, especially those without access to charging infrastructure at home. A study of EV charging behaviour in the US involving 17,000 charging locations and 8200 EVs found that over 40 per cent of charging on weekdays was carried out at the workplace.⁴¹

2.4.3 Street

Street charging of an EV at public charge points may become common in densely populated areas with a higher proportion of residents without access to dedicated charging infrastructure in off-street parking. This is also likely to be required wherever shared mobility services are utilised (e.g. GoGet). To date, street charging facilities have been provided by local councils installing level one or two chargers in dedicated EV parking spots.

With a greater uptake of EVs, street chargers may become more ubiquitous. For example Ubitricity in partnership with British retailer OVO Energy, a new entrant to the Australian retail scene, is running a trial in London installing charging points in 50 street lamp posts.⁴²

Residential chargers which are offered up for public use through peer-to-peer (P2P) platforms could also improve the availability of chargers for owners without off-street parking or for shared mobility services. An example of this is Evertly which currently operates a P2P charging network utilising existing residential and commercial charging infrastructure in Australia.⁴³

QUESTION 5: NON-RESIDENTIAL CHARGING

- a. Are you providing or developing any non-residential charging products or services?
- b. Are there retail market barriers in developing non-residential EV charging products and

41 Idaho National Laboratory, Plug-in Electric Vehicle and Infrastructure Analysis. September 2015.

42 For more information see <https://www.ubitricity.co.uk/>.

43 For more information see <https://evertly.com.au/>.

services?

2.5 EV value streams

The primary value of any vehicle to consumers is as a method of travel. Secondary to this there are a number of value streams available to EV consumers that if utilised could provide substantial benefits to consumers and the whole electricity system. This is through the charging of EVs at times which lead to a greater utilisation of the grid without increasing peak demand and the potential use of EVs as a battery system leading to bidirectional flows providing a wider range of system benefits.

2.5.1 EV charging

Smart and flexible EV charging, charging which responds to controls or market signals, may provide benefits to the wider grid by promoting more efficient use of current infrastructure. If provided the right signals, EV charging load could provide a significant aggregated demand response resource for the system. At a household level the EV charging load may also be optimised to charge off excess rooftop solar generation. It is expected that the system benefits of flexible charging may be achievable automatically in the future, without requiring conscious consumer action, due to digitalisation.

Enel X, an example of a business that is actively aggregating EV charging loads, in California currently deploys a 30MW/70MWh aggregated charging capacity which is active in wholesale day-ahead and real-time markets through dynamic management of charging loads. This 'virtual battery' of over 6000 chargers is able to ramp up and down to meet grid needs with customers involved receiving reward incentives.⁴⁴

2.5.2 EV as a battery

Vehicle-to-Grid (V2G) and Vehicle-to-Home (V2H) refers to the capability of utilising the EV batteries as behind the meter batteries to discharge electricity to the grid or the home. Vehicle to grid and home technologies may significantly increase the abilities of consumers to interact with the electricity market and this capability is being included in some new EV models (e.g. Nissan Leaf).

For the 2019 Retail competition review the Commission identified potential value streams batteries could provide. Batteries storage devices have a range of technical capabilities, including the provision of energy, voltage control, frequency regulation and reactive power. Utilising these technical capabilities batteries could provide services to customers, network service providers and to the wholesale or frequency control markets.⁴⁵

A new retailer to Australia, OVO Energy, UK's second largest electricity retailer, is currently trialling vehicle to grid technology in the UK on a two year V2G project involving over 1000

⁴⁴ For more information see <https://evcharging.enelx.com/news/blog/606-why-electric-vehicle-grid-integration-matters-today>

⁴⁵ AEMC, 2019 Retail Energy Competition Review, Final report; Chapter 8, 28 June 2019

households with a Nissan Leaf. This trial will provide OVO Energy with an understanding of the technical and social feasibility of V2G services.⁴⁶

QUESTION 6: EV VALUE STREAMS

- a. Are you currently developing products and services to harness EV value streams?
- b. Are there retail regulatory barriers for retailers or new energy service providers accessing these value streams?

⁴⁶ For more information see <https://www.ovoenergy.com/electric-cars/vehicle-to-grid-charger>.

ABBREVIATIONS

ACL	Australian Consumer Law
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
BSC	Balancing and Settlement Code
Commission	See AEMC
DER	Distributed Energy Resource
ESOO	Electricity statement of opportunities
EV	Electric vehicle
FRMP	Financial Responsible Market Participant
ICE	Internal combustion engine
MCE	Ministerial Council on Energy
MTR	Multiple Trading Relationships
NEL	National Electricity Law
NEO	National electricity objective
NECF	National Energy Customer Framework
NERL	National Energy Retail Law
NERO	National energy retail objective
NGL	National Gas Law
NGO	National gas objective
QHES	Queensland Home Energy Survey
SGA	Small Generation Aggregator