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**Joel Aulbury**

Project Leader

Australian Energy Market Commission

**Submitted online via: [www.aemc.gov.au](http://www.aemc.gov.au)**

**27 March 2020**

Dear Joel

**2020 Retail Competition Review: Electric Vehicles, Issues Paper**

AGL Energy (**AGL**) welcomes the opportunity to respond to the Australian Energy Market Commission's (**AEMC**) 2020 Retail Competition Review: Electric Vehicles, Issues Paper, February 2020 (**Issues Paper**).

Confidential information has been omitted for the purposes of section 24 of the Australian Energy Market Commission Establishment Act 2004 (SA) and sections 223 and 268 of the National Energy Retail Law. Where the information has been omitted, it has been blackened.

AGL has delivered multiple Electric Vehicle (**EV**) projects and trials and has a market-leading understanding of the implications of EV uptake on the energy system. Relevant projects and expertise include:

- \$1/day electric car energy plan (**ECP**). Launched in 2016 and concluded in 2018, the plan provided consumers unlimited EV charging for \$1/day with complimentary carbon offset for the EV load.
- AGL's current offer for electric vehicle owners<sup>1</sup> includes bonus credits and complimentary carbon offset for the whole of house energy load.
- As part of the Australian Renewable Energy Agency (**ARENA**) funded Demand Response trial in New South Wales,<sup>2</sup> AGL tested deferment of EV charging for 14 consumers to reflect a demand response event.

These products and trials have enabled AGL to develop a better understanding and dataset on EV charging behaviours and the implications of this type of charging. We therefore provide our feedback based on insights from our EV products and trials in the **Attachment**.

AGL believes that Australia's energy and transport policy and regulatory framework will play a crucial role in facilitating the uptake and grid-integration of EVs in Australia. We continue to engage with state and federal governments and regulators to support the development of a policy and regulatory framework that:

- Increases the range and affordability of new and used EVs in the Australian market;

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<sup>1</sup> See further, AGL EV Plan, available at <https://www.agl.com.au/electric-vehicles>.

<sup>2</sup> See further ARENA Advancing Renewables AGL Demand Response Project, available at <https://arena.gov.au/projects/agl-demand-response/>.

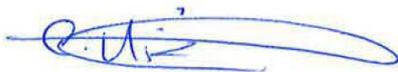
- Reduces consumers' "range anxiety";
- Enables EV grid integration so that EV can interact with Australia's energy markets for the benefit of all energy users; and
- Improves consumer confidence in the emerging market for EV products, systems and services.

In addition to the contextual developments identified, we recommend the AEMC consider the following matters:

- International and Australian technical standards. Promoting interoperability through technical standards will be a key enabler for the use and optimisation of EVs across Australia's energy markets.
- Alternatives to multiple trading relationships (**MTR**). Before making a final decision on MTR, the AEMC should consider and evaluate all possible alternative solutions, such as separate connection points and sub-metering, that may prove more cost effective and less complex.
- Tariff design to address EV charging. While convenience-based charging has the potential to increase peak demand substantially, retailers and other market participants have the potential to develop incentives for customers to shift their EV load thereby reducing peak demand and providing benefits to the consumer and broader energy market.
- Market design of distributed energy resources. Market participants' ability to harness and share with consumers EV value streams will also depend, in part, on the policy and regulatory framework governing distribution market design and network planning and operations and the reforms that are currently on the horizon.

Should you have any questions in relation to this submission, please contact Kurt Winter, Regulatory Strategy Manager, on 03 8633 7204 or [KWinter@agl.com.au](mailto:KWinter@agl.com.au).

Yours sincerely

A handwritten signature in blue ink, appearing to read 'C. Hristodoulidis', with a long horizontal flourish extending to the right.

Con Hristodoulidis

**Senior Manager, Energy Market Regulation**

## ATTACHMENT

### Question 1: Context

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

AGL is generally supportive of the contextual analysis elaborated in the Issues Paper on EV uptake and use in Australia, including with respect to current uptake, forecast uptake, consumer attitudes, government subsidy schemes and charging infrastructure and behaviour.

#### Policy and regulatory framework

AGL agrees with the AEMC that government policies have the potential to facilitate the uptake of EVs in Australia. The key attributes to support the development of a policy and regulatory framework include:

- *Increase the range and affordability of new and used electric vehicles in the Australian market* - through a combination of financial incentives such as stamp duty and registration concessions, and non-financial incentives such as emissions targets, vehicle fuel efficiency standards, quantitative EV targets and government fleet targets;
- *Reduce consumers' "range anxiety"* - through concerted state policies on EV charging infrastructure planning and deployment including planning schemes to improve information asymmetry and early market competitive grant funding to stimulate efficient industry investment in fast charging infrastructure;
- *Enable EV grid integration so that EV can interact with Australia's energy markets for the benefit of all energy users* - including through innovation trials such as demand response and orchestration as well as market design reform, network planning and operations, and technical standards; and
- *Improve consumer confidence in the emerging market for EV products, systems and services* - by ensuring the customer protections framework is fit-for-purpose and customers receive the same rights and protections irrespective of how they choose to receive their energy supply and services.

#### Technical standards

We recommend the AEMC consider further the implications of technical standards for EV uptake and use in Australia. Promoting interoperability through technical standards will be a key enabler for the use and optimisation of distributed energy resources (**DER**), including EVs, across Australia's energy markets. technical standards should adhere to the following guiding principles:

- Align with internationally accepted standards to ensure access to an open and competitive market for DER;
- Be technology agnostic and remain future-proofed for future technological developments; and
- Empower consumers with choice to utilise DER assets for their own comfort and to participate in competitive market services which address broader energy system needs through innovative aggregator models such as virtual power plants.

Below we outline some risks and opportunities with the development of specific technical standards as they impact EV uptake.

### *Mandating demand response capability for EV chargers*

EV chargers could play an important role in DR alongside other DER in optimising Australia's energy markets to the benefit of consumers. We therefore support a coordinated industry approach to developing technical standards for smart EV charging to facilitate interoperability for consumers between physical and commercial systems.

In November 2019, the COAG Energy Council agreed to:

- Mandate that all electric vehicle chargers that are supplied or offered for supply would have to comply with the full range of demand response modes in either the relevant part of AS/NZS 4755 Part 3 or AS 4755.2; and
- Establish an E3 Technical Working Group, with membership to be determined by the Senior Committee of Officials (SCO), to consider the matter of an equivalent international standard for EV charge/discharge controllers.

AS/NZS 4755 remains the only DR framework for electrical products in Australia and it currently includes the requirement to provide a physical interface on AS/NZS 4755.3-compliant electrical products, so that products can receive operational instructions from an external 4755.1-compliant Demand Response Enabling Device (**DRED**). In 2017, the AEC brought forward the proposal to create AS4755.2 with the intent to create an enhanced DR standards framework that would increase flexibility, reduce cost and improve customers' experience in the delivery of demand response services (which is currently before the Standards Australia Committee for review). In our view, substantial work remains to develop Australia's technical standards framework to align with international standards that are considered best practice.

The EV charging sector is in the early stages of development both in Australia and internationally, therefore developing an appropriate standard will require careful consideration of a range complex matters, including but not limited to:

- Ascertaining the minimum 'smart' technical requirements for EV charge points necessary to facilitate the management of electricity network capacity and energy availability;
- Aligning data communications arrangements with international standards and protocols, including the Open Charge Point Protocol;
- Developing appropriate cyber security controls to ensure that communications are exchanged in a secure manner with an appropriate level of encryption to protect against cyber-attack; and
- Facilitating transactional traceability for consumers to enable them to see their transactions with EV chargers (including time of charge, duration and cost).

The COAG EC's decision to slow the standard development timeframe for EV charging and permit an alternative compliance option for EVs via an International Standard provides an opportunity for industry to carefully consider the above matters and make sensible decisions to support EV charging.



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More generally, we have also experienced many practical issues with the use of the DRED control methodology specified in AS4755 in our trialling of DR for air conditioners in the context of our Demand Response project that is funded by ARENA and NSW Government<sup>3</sup>. These included:

- Bespoke, complex and high cost installations;
- Inconsistent response of different makes and models of air conditioners to the control commands;
- No local override capability if the customer wants to opt out of an event after it has started (AGL provided this functionality remotely if a customer called to opt out); and
- The lack of a feedback mechanism from the air conditioner to confirm that it has successfully executed the command.

Any standards addressing EV chargers should seek to mitigate these kinds of challenges that would otherwise lead to poor customer outcomes.

#### *Inverter power quality response modes*

Standards Australia's deliberations on amending AS4777 (the inverter grid connections standard) has recently extended to the treatment of EV technologies. In our view, the incorporation of EV technologies into the inverter grid connection standard could present substantial complexity and may impact the value of EVs where they are required to provide grid support services (especially if the network operator obtains direct control of the inverter through connection agreements without consumer consent) without fair compensation. This could in turn negatively impact the retail market for EVs including product and service offerings that contemplate grid services.

Among other things, the AS4777 amendment seeks to address overvoltage issues on the distribution network through regulating power quality response modes. AGL recognises that sustained overvoltage issues present a challenge for distribution network businesses to manage with the increased penetration of DER. However, from our South Australian Virtual Power Plant (**SA VPP**) Program,<sup>4</sup> that commenced in 2016, we have observed that DER is typically not the sole cause of the problem and regulating power quality response modes through technical DER devices standards is not the only available solution.

While power quality response modes may be effective in some circumstances (for example niche parts of the network that have the appropriate high reactance conductor type), regulating power quality response modes uniformly across distribution networks risks negatively impacting upon customer value.

In order to enable the integration of DER more generally and EVs specifically into Australia's energy markets, we would encourage the continued exploration and costing of alternative voltage management solutions, that may be more comprehensive in addressing the underlying high voltage issue.

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<sup>3</sup> See further ARENA Advancing Renewables AGL Demand Response Project, available at <https://arena.gov.au/projects/agl-demand-response/>.

<sup>4</sup> For further information regarding AGL's ARENA SA VPP program, including the two milestone reports published to date, please refer to <https://arena.gov.au/projects/agl-virtual-power-plant/>.



## **Question 2: Role of retailer**

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

AGL considers that EVs present substantial opportunities for retailers operating in the NEM to deliver greater value to EV owners while also offering significant benefits to the broader energy system and consumers, both through traditional energy contracts and innovative product and service offerings such as managed charging and orchestration.

#### **Retailer opportunities associated with EVs**

The AEMC forecast increase in electricity consumption and change to the underlying residential demand profile associated with the uptake of EVs presents a significant opportunity for retailers to innovate their services offerings to attract EV consumers.

AGL has delivered multiple EV projects and trials and has a market leading understanding of the implications of EV uptake on the energy system. Through managed charging and orchestration, AGL envisages substantial opportunity for retailers to deliver greater value to EV owners while also offering significant benefits to the broader energy system and consumers.

In AGL's ARENA and NSW Government funded Demand Response project<sup>5</sup>, AGL conducted a small smart-charging proof-of-concept trial for 14 EV owners in 2018-19. In this trial, consumer charging was interrupted for two hours for a series of demand response events. In exchange, consumers received an event-based incentive payment. The trial provided a demonstration of the technical feasibility of EV charging orchestration. The trial also showed that new demand peaks could be created at the local network or system level on the conclusion of each event, and that these new load peaks could be greater than the convenience-based charging peaks. To improve outcomes at the system level, the conclusion was that more comprehensive management strategy would need to be considered to co-optimize the benefits to consumers, energy retailers and networks.

#### **Retailer challenges associated with EVs**

In developing our ECP, we observed challenges in developing options to incentivise customers to shift their EV load that would otherwise provide benefits to the broader energy market by reducing peak demand associated with the increased uptake of EVs. These challenges include:

- The complications of tariff design to address EV charging; and
- The ability to separate out EV load through separate connection points or sub-metering. We elaborate our views on connections and sub-metering in the context of MTR considerations in response to question 3 below.

From November 2016 to November 2018, AGL's ECP offered a \$1/day unlimited EV home charging energy plan. Customers on this plan had no incentive to modify when or how much they were charging their EV. The charging profile obtained from the 100,000+ days of data obtained by AGL through this pilot project reflects a convenience profile, with no trade-off against impacts on the broader electricity system.

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<sup>5</sup> See further ARENA Advancing Renewables AGL Demand Response Project, available at <https://arena.gov.au/projects/agl-demand-response/>.

The chart below shows the charging profile of consumers on the \$1/day ECP on the maximum demand day in 2018 in the NSW region, 14 February 2018. Demand in NSW on that day reached 12,846 MW for the trading interval ending 17:00pm (EST) while the charging profile of consumers on the \$1/day plan started to increase markedly at about the same time.

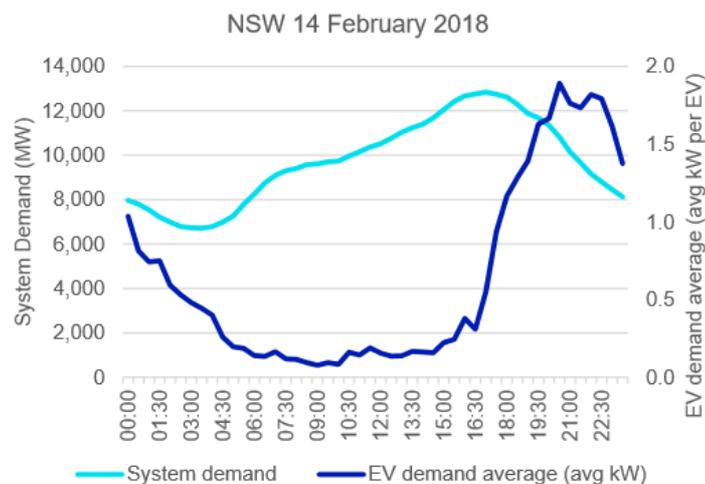


Figure 1: Unmanaged charging profiles on the day of NSW regional peak demand (2018)

From the chart above it is apparent that convenience-based charging has the potential to increase peak demand substantially. With increasing penetration of solar PV, peak demand in the NEM is expected to move later into the day which will increase the overlap between the regional peak demand and the peak of convenience-based charging. Increasing peak demand would likely result in higher wholesale and network costs.

Time-of-use tariffs and critical peak demand tariffs are designed to provide consumers with prices that reflect the cost their energy consumption has on the broader network. In theory such cost reflective network prices ensure allocative efficiency is met, and consumers choose to consume electricity where the cost is at or below the marginal benefit they get from each unit of consumption. In practice, this could lead to consumers potentially delaying charging or scheduling charging to be just outside the most highly priced periods under their tariff. Such a re-scheduling of charging could result in the creation of secondary peaks, i.e. spikes in consumption at the time when a customer's tariff transitions to a lower priced period. A study for the Colorado Public Utilities Commission by the U.S. National Renewable Energy Laboratory (NREL) found that time-of-use tariffs can create new system-wide peaks, steep demand ramp rates and localised network peaks as electric vehicle penetration increases.<sup>6</sup>

Through broad industry engagement, AGL understands that distribution network businesses are currently grappling with challenges associated with higher than ideal voltages on low-voltage networks. Additional

<sup>6</sup> "Electric Vehicle Charging Implications for Utility Ratemaking in Colorado", National Renewable Energy Laboratory (NREL), Jan 2018, <https://www.nrel.gov/docs/fy19osti/73303.pdf>.



distributed energy storage resources, such as EVs, may provide an opportunity to support the resolution of these challenges.

The complications of tariff design to address EV charging are also evident at the consumer level:

- Flat rate residential tariffs which customers can opt into voluntarily (if they are not already on one) provide no incentive to charge outside of traditional peak times.
- Time varying tariff structures provide an opportunity for owners to charge their EV during periods of lowest cost, however low consumer awareness and understanding of electricity tariffs may limit their effectiveness as a means of managing EV charging loads; for example, consumers must weigh the potential benefits from shifting EV charging into off-peak periods against the impact of a peak tariff on the rest of their household load.
- Traditional 'off peak' times occur overnight, however with the high penetration of rooftop solar there is an increasing need in certain network zones to shift load to the middle of the day in order to soak up excess solar generation.
- Demand-based tariff structures are unfamiliar to most Australian consumers and may result in significant bill impacts on the introduction of EV home charging that were not foreseen prior to the EV purchase decision.

More broadly, as AGL recently observed in our response to the AEMC's review of consumer protection in an evolving market for both new energy and traditional retailers<sup>7</sup>, the National Energy Customer Framework (**NECF**) should be designed in light of the evolving energy market to move away from prescription and towards an outcomes-based model. This would help remove constricting or outdated requirements that constrain traditional retailers in offering new and innovative developments for customers, while ensuring a level of consistency for the customer experience. In the EV context, redesigning the NECF could:

- Improve retailers' ability to develop innovative products to deliver greater value to EV owners (reflecting customers' changing behaviours and opportunities to support the broader energy system through smart charging and orchestration); and
- Ensure that EV owners receive a consistent customer experience from new entrants in the energy market.

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<sup>7</sup> See further, 'AGL encourages outcomes focused regulation for consumer protections' (13 February 2020), AGL Submission in response to AEMC Review of Consumer Protections in an Evolving Market for both New Energy and Traditional Retailers, Available at <https://thehub.agl.com.au/articles/2020/02/agl-encourage-outcomes-focused-regulation-for-consumer-protections>.



### 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?**

In light of the accelerating rate-of-change in technological advances and forecasted growth in battery and EV penetration, AGL supports further consideration of the regulatory framework governing customers' ability to connect and trade with Australia's energy markets.

To establish a fit-for-purpose regulatory framework that best serves EV consumers and the broader energy market, we consider that the regulatory framework governing customers' ability to connect and trade should adhere to the following guiding principles:

- Empower consumers with choice to utilise their DER assets for their own comfort and to participate in a range of competitive market services which address broader energy system needs;
- Enable economically efficient access arrangements that appropriately balance the anticipated consumer and market benefits with the cost and complexity of implementation; and
- Ensure a consistent customer experience by affording the same rights and protections to consumers regardless of how they choose to receive their energy supply and services.

Based on these principles, AGL recommends this review consider alternatives to MTR, such as separate connection points or sub-metering within EVs (and other DER assets). In our view, alternatives to MTR may prove more cost effective and less complex while also ensuring a consistent consumer experience through equivalent consumer protections. Separate connection points or sub-metering could enable customers to benefit from bespoke EV product and service offerings whilst avoiding the complexity associated with MTR in terms of customer and market settlements and system changes and associated costs.

Innovation in EV product and service offerings could also be supported by improvements to the legislative framework governing measurement to enable new sub-metering technologies to support customers' trading relationships. As we stated in our response to the 2019 Measurement Law Review<sup>8</sup>, while AGL supports electricity meters being subject to regulation to ensure accuracy and permissible limits of error, a degree of flexibility could be introduced into the regulatory approval processes for pattern approval and verification to enable new sub-metering technologies to enter the market.

In developing our ECP, we observed challenges in delivering cost effective metering arrangements to deal with EV load separately to household load, due in part to the fragmented market for metering services, as well as the pattern approval and verification requirements under the *National Measurement Act 1960* that have limited new technologies from participating in market (such as metrology devices contained in DER and/or charging stations).

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<sup>8</sup> See further, AGL submission in response to the Measurement Law Review (21 July 2019), Available at <https://thehub.agl.com.au/articles/2019/06/submission-to-the-commonwealth-measurement-law-review>.



**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?**

Through managed charging and orchestration, AGL envisages substantial opportunity for retailers and other new market participants/aggregators to develop innovative products and services for EV owners that also deliver significant benefits to the broader energy system and consumers.

As this is a new and emerging market, AGL believes it is important to make fact-based and ‘no regret’ regulatory and market changes to the energy markets framework to support the smooth integration of EVs. AGL supports the industry and market participants trialing and piloting innovative technologies and business models in Australia’s energy markets to deliver greater benefits to customers. We believe the regulatory framework should better enable such innovation and we welcome the AEMC’s proposed regulatory sandbox arrangements as an important opportunity to accelerate progress<sup>9</sup>.

AGL foresees substantial potential for managed EV charging, with the forecasted increase in peak demand potentially resulting in higher wholesale and network costs that would be borne by all energy consumers. Nevertheless, customers’ increased engagement and expectation to exert more control over their energy supply arrangements necessitate the development of customer centric solutions to managed charging. A customer centric approach would enable customers to benefit economically from their charging behaviour decisions. While EV flexibility can provide grid services, the current market structure does not enable the full potential value of these services to flow back to the customer. Accordingly, we see value in testing whether an intelligent systems approach could more efficiently support EV growth and deliver benefits to the consumers who can supply grid services.

*Confidential information has been omitted for the purposes of section 24 of the Australian Energy Market Commission Establishment Act 2004 (SA) and sections 31 and 48 of the National Electricity Law.*

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<sup>9</sup> See further, AGL submission in response to Regulatory Sandbox Draft Rules (21 February 2020), Available at <https://thehub.agl.com.au/articles/2020/02/submission-in-response-to-regulatory-sandbox-draft-rules>.

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In terms of retail market barriers, as we have elaborated above, we have experienced some challenges in terms of:

- The complications of tariff design to address EV charging; and
- The ability to separate out EV load through separate connection points or sub-metering.

**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?**

AGL continues to consider opportunities for non-residential charging, including in the context of private fleets and public transport fleets. By way of example, AGL recently responded to the NSW Parliamentary Inquiry into electric buses in regional and metropolitan public transport networks in New South Wales.<sup>10</sup>

In our view, governments can play an integral role in supporting charging options outside of the home through the planning and deployment of charging infrastructure, including by:

- Ensuring transparency of networks constraints information to support efficient industry investment in charging infrastructure. We believe the Federal and State governments can take a leading and coordinating role by requesting distribution networks provide public information about the strength and quality of their networks to allow charging infrastructure proponents to properly plan and work with distribution networks on the efficient roll out of infrastructure.
- Developing competitive grant programs for fast charging infrastructure. At the early stages of the EV market in Australia, fast charging infrastructure addresses only an occasional need for EV owners, without necessarily capturing the indirect value of EV charging services. Early market competitive grant programs could entail specific investment criteria to ensure that stations be installed in the right locations that appropriately service the market, including in lower socio-economic areas.<sup>11</sup>

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<sup>10</sup> See further, AGL Submission in response to (20 December 2019), Inquiry into electric buses in regional and metropolitan public transport networks in New South Wales, Available at <https://thehub.agl.com.au/-/media/thehub/documents-and-submissions/2019/agl-submission---nsw-parliamentary-inquiry-into-electrified-buses.pdf?la=en&hash=8CD64A0E5FD4EEAD99F935F7C49058A0>.

<sup>11</sup> We note in the context of the Norwegian market, which is the global leader in terms of market share of EVs, the Norwegian Government launched a program in 2017 to finance the establishment of at least two multi-standard fast charging stations every 50km on all main roads in Norway (<https://elbil.no/english/norwegian-ev-policy/>)

- Reforming the network connections framework to streamline and expedite the process and ensure consistency between jurisdictions.

**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?**

AGL considers that retailers' ability to harness EV value streams associated with managed charging and orchestration will depend, in part, on the policy and regulatory framework governing distribution market design, and network planning and operations as well as technical standards development. In our view, key enabling reforms include:

- The establishment of a distribution market operator and supporting communications infrastructure to enable co-optimisation of bidding from DER to support both network and wholesale markets;
- Connection, access and pricing arrangements to better incentivise networks to support DER services and enable greater certainty for DER market participation;
- The network expenditure assessment framework to ensure that networks effectively facilitate the interaction of DER with the broader energy market system; and
- Establishment of technical standards that promote safety but offer open access and interoperability.

AGL supports the work being undertaken in recent industry consultations to advance these key reforms, including through the Energy Security Board's (**ESB**) DER Integration Workplan, the Distributed Energy Integration Program (**DEIP**) Access and Pricing Working Group and the Open Energy Networks (**OpEn**) consultations.

While we welcome the ESB's coordinated approach to these important reforms, we would encourage the ESB to undertake more transparent and robust consultation with industry and market participants. We would recommend that the ESB's consultation processes better reflect the AEMC's approach to consultations, including by:

- Establishing appropriate timeframes for industry to engage with ESB reviews, fairly balancing the desire for timely advice with the need to ensure that advice accurately reflects industry expertise;
- Providing formal opportunities for industry to provide written submissions; and
- Communicating the ESB's analysis and development of proposals across key milestones as the ESB's work progresses (as the AEMC would do with issues papers and draft decisions) to provide industry with a clearer sense of the direction of travel and key issues for consideration.

In our view, this would ensure that the ESB's advice and any policy and regulatory decisions that follow are informed by relevant industry expertise, thereby guarding against any unintended consequences or poor customer outcomes.