Australian Electric Vehicle Association Incorporated

P.O. Box 5285 Clayton VIC 3168
Tel (BH) 03 9701 6076
Tel (AH) 03 9546 9130
info@aeva.asn.au
www.aeva.asn.au

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Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Submission to the AEMC Issues Paper EMO0022: Energy Market Arrangements for Electric and Natural Gas Vehicles

The Australian Electric Vehicle Association (AEVA) welcomes this opportunity to respond to the Issues Paper "Energy Market Arrangements for Electric and Natural Gas Vehicles" released by the Australian Energy Market Commission.

The AEVA is the national peak body representing individuals and organisations involved in the design, development, manufacture, conversion, sale and use of electric vehicles and their components. The association was founded in 1973 and operates as a non-profit organisation.

We believe that through this submission, the AEVA can contribute a great deal to the development of the AEMC's final report by sharing our collective first-hand experience and up-to-date knowledge of the electric vehicle industry and technology.

Summary of position:

The AEVA believes that the Australian energy market arrangements are sufficiently strong and flexible to allow the efficient integration of electric vehicles (EVs) at the expected rates of uptake. Several market initiatives will assist this transition, but these fit within the existing market framework. These initiatives should build on the emerging capabilities of smart grid infrastructure and include:

- *Distributors and retailers free to offer voluntary time-of-use tariffs*
- *Retailers free to offer to the market voluntary direct load control or smart charging services*

It should be noted that these market initiatives would assist in promoting efficient operation of the electric supply system for all types of loads, not just EV charging. In this respect it is important that EVs are not treated differently to other loads or subject to additional barriers to entry or barriers to the realisation of opportunities that they offer.
The AEVA believes that with the right incentives and price signals offered, EVs can reduce electricity supply costs to all users through improving the utilisation of electricity supply infrastructure.

The following detailed responses to specific questions were developed jointly between the AEVA and the Alternative Technology Association's Electric Vehicle Branch. As our area of interest and expertise is electric vehicles, we have not addressed the issues around natural gas vehicles.

Question 1: Assessing the take up of EVs

We consider that the uptake rate scenarios presented in the Issues Paper are somewhat high. Our expectation for uptake in Australia would be between the Low and Central uptake scenarios as presented in the Issues Paper. This view is based on current Australian policy settings for financial support of electric vehicle uptake (very low support), relative cost of vehicles in Australia (high by international comparisons) and the forecast differential between electricity and oil prices. Increasing oil prices, particularly shocks caused by supply disruptions, would drive a proportionate increase in the uptake of EVs.

The Issues Paper notes that the AECOM estimates are comparable to targets set by international governments, but it is important to realise that these countries that have set targets have generally also put in place subsidy mechanisms and other supporting policies to encourage uptake and would therefore be expected to have higher uptake rates than in Australia where there are negligible subsidies for electric vehicles.

Question 2: Cost of additional system peak demand

The estimates of cost provided in the Issues Paper, particularly for the unmanaged charging option which represents a worst case and extremely unlikely scenario, are at the upper bounds of possibility for the following reasons:

- The analysis assumes like-for-like replacement of vehicles and trips from internal combustion to electric. Barring a major breakthrough in battery technology and price, the fundamentals of EV design indicate use of small to medium size vehicles used mainly for typical daily commuting rather than long-distance applications. Therefore the electricity consumption and charging demands are likely to be lower than forecast in the Issues Paper.
- From our experience, early EV adopters are likely to be attuned to environmental and electricity supply issues and will actively seek time-of-use (TOU) tariffs or schedule charging outside of daytime PV feed-in-tariffs such that there will never be a truly "unmanaged" scenario.
- The rapid uptake of distributed PV solar and the offset that this will provide against daytime recharging is not factored in to the analysis in the Issues Paper.
- The analysis presented in the Issues Paper looks at system demand at the transmission level which is a poor model for the costs imposed by peak demand. The majority of peak network costs are at the distribution level, not the transmission level, and the effect on distribution network peaks needs to be fully assessed in order to calculate the cost of increasing peak demands. For example, evening charging at a commercial precinct may have little impact of local distribution network peak demand.

We believe that if TOU tariffs are made readily available, the cost of increased system peak demand will be minor and that any increased costs will be more than offset by increased network utilisation, thereby leading to lower network and supply prices for all electricity customers. Even in a worst-case "unmanaged" scenario, the increase in peak demand due to electric vehicles is likely to be far less than the peak demand caused by air conditioning.

Question 3: Costs imposed by EVs on electricity markets

Considerations such as Frequency Control Ancillary Services (FCAS) and clustering of load are not particular to EVs and will be negligible compared to the major drivers of peak load such as air-conditioning. Unlike air-conditioning, EV charging demand is expected to be highly responsive to TOU

tariffs. EV uptake is likely to increase network utilisation leading to lower network and supply prices for non-EV electricity customers.

EV uptake will not drive the need to replace ageing infrastructure. Asset replacement is a lifecycle asset management decision based on the condition of the asset, not demand growth or utilisation.

It is important to distinguish costs to the general electricity market from costs to the consumer. If an EV owner invests in a smart charging system (either individually or through their retailer), this cost is not borne by the market, but will result in a benefit to the electricity market.

Question 4: Benefits of EVs on the electricity market

The benefits of EV uptake have not been quantified in the Issues Paper. We believe that the benefits should be quantified so that it can be assessed against costs. As we have identified above, we believe that the increase in supply system utilisation driven by EV uptake will more than offset any increase in peak demand costs, thereby leading to lower supply prices per kWh for all electricity customers.

Question 5: Nature of service provided when an EV is charged

We do not see the need for changes to electricity market frameworks regarding retailing of electricity for electric vehicle charging. Whether a charging provider considers their product to be electricity or mobility is irrelevant to the electricity market framework. The same applies to existing retailers that may view themselves as energy service providers rather than simply electricity vendors. If an EV charging service provider wishes to follow a business model that avoids them becoming a retailer, there is always the option for the company to contract with an existing retailer and act as an intermediary.

It is also important to realise that charging service providers are not required to charge an EV. Almost all home charging is currently via standard residential electricity retail agreements, and this trend is likely to continue into the future even if specialised plugs or charging points are required to be installed.

Question 6: Should EVs be treated differently as against other loads

From a market framework perspective, there is no need to treat EVs differently to other loads in the electricity supply system. The concept of open access should prevail. Like all load types, EV charging loads will be responsive to market signals. Development of mechanisms to address peak demand and improve the efficiency of the electricity market such as smart grid technologies should take a portfolio view of all loads in the marketplace, rather than attempt to single out specific load types. However, the particular beneficial characteristics of EVs (deferrable, controllable, and potentially reversible load) should be taken into account when considering demand side participation strategies such that these benefits may be realised.

Question 7: EV metering issues

There is no need for EVs to be separately metered. Metering on EVs would be very costly and likely unworkable given the many and varied manufacturers and converters of EVs. Sub-metering & roaming NMIs could provide some market benefits, however it should be up to a charging service provider to determine these benefits and to capture the value of these benefits in their business models. Any metering costs of such business models should be paid for by the charging service provider as part of

their business costs and not recovered through general distribution network tariffs in the way that standard metering charges are recovered.

Question 8: Options for EV charging

There are no changes required to regulatory arrangements to allow different battery charge management scenarios. Electricity retailers face all the price signals to efficiently pass these signals through to EV charging consumers, either via tariff structures or delegated through controlled charging services. To ensure maximum efficiency, distribution and transmission network service providers need to be able to pass time of use price signals through to retailers so that these can be incorporated into the price structures that retailers offer consumers. This is reliant on smart meter technology being rolled out nationally.

Question 9: Retail pricing and EVs

Where electricity prices are still regulated, a regulated off-peak option should be made available. This will ensure that the benefits of load shifting (of all loads including EVs) may be captured and reflected in the lower off-peak price. If EV charging is specifically targeted, there could be a perception of discrimination and we strongly recommend against adoption of this strategy.

Question 10: Structure of retail pricing for EVs

Consumers are extremely price sensitive to perceived transport costs as evidenced by the long queues caused by small reductions in the petrol price. Constant re-charging at peak times with current TOU price levels would be an additional cost most consumers would actively avoid. Innovative tariff structures including dynamic and critical peak tariffs can increase the opportunities for electricity consumers to benefit from emerging technology regarding home energy management to assist demand management and lower costs for all users. Retailers should be encouraged to offer, but not mandate, such tariff structures to all consumers. Any new tariff structures will require regulatory safeguards to ensure that consumers are protected from hardship that could occur from excessively high charges due to unfamiliarity with such tariffs.

Question 11: Network pricing and EVs

EVs should not be treated any differently to other loads from a network pricing perspective. Network service providers should be allowed to offer innovative tariff structures to retailers, including dynamic and critical peak tariffs in order to increase the opportunity of electricity consumers to better manage their demand and lower their cost of power for all end uses, including EVs

Question 12: Forecasting the take up of EVs for the network operator and NSP

Network service providers and operators are already tracking the likely uptake of EVs in the same way that they track the uptake (and growth) of air-conditioning demand and solar PV systems. There are no regulatory measures required to ensure the forecasting of EV uptake by NSPs and network operators as this forms part of their standard business processes. There is likely to be detailed information about the location of electric vehicle registrations from vehicle registration agencies which will lead to well calibrated forecasts of continuing EV uptake. By contrast this level of information is not available for other major loads such as air-conditioning.

Question 13: Network Issues: Connection services

Safety is a key issue regarding connections and all electrical work should be undertaken by licensed electricians. If households connect their EV charging via a third party provider then the responsibility for electrical safety falls on charging service providers which should be regulated. The standard connection capacity of new dwellings should take into account the likely installation of EV charging.

Question 14: Network Issues: Network reinforcement and augmentation

The best way to apportion costs of network reinforcement and augmentation is not based on connection capacity but via dynamic pricing. Offering TOU tariffs to all consumers (including EV owners) will provide an incentive for off-peak charging and ensure that increases to peak demand are minimised and that network utilisation will actually increase. In this respect, EV owners will be lowering network costs to all users. Network augmentation will continue to be driven by air-conditioning demand and increasing housing density. A causer-pays approach would be more suited to appliances such as air-conditioners that tend to naturally increase demand at peak times, are not a deferrable load and for which there is likely to be relatively low price elasticity due to the high value placed on short periods of cooling.

Question 15: Retail Issues: Retailer and NSP exemptions and embedded networks

It would be preferable for EV charging in an embedded network to be classified as on-selling with an automatic exemption. However, there would likely need to be a limit on connection point capacity for each embedded network and consideration of whether EV charging constitutes the major use of the embedded network or an ancillary use.

Question 16: Retail Issues: Settlement

We do not consider that EVs will create wholesale settlement issues that require changes to the electricity market. Settlement between different retailers or between a retailer and a third party charging provider can be made under current arrangements.

Question 17: Retail Issues: Licensing arrangements

Automatic exemptions should apply for low capacity or ad-hoc charging arrangements, particularly for provision of low level 10 or 15amp charging. This would cover, charging away from home at locations such as motels, hotels, public car parks places of employment. In these cases, there would still be a primary retailer for the supply to the location.

Question 18: Vehicle to Grid/Home issues

Electricity market arrangements should encourage all types of demand side participation, including EVs acting in a vehicle to home (V2H) or vehicle to grid (V2G) capacity. V2H in particular offers significant opportunities for consumers to manage their energy costs without the need for feed-in-tariff arrangements. Used EV batteries can also be given a second life as demand-side storage to manage consumption profiles. In V2G or V2H applications, consumers should be free to either set their own EV charge/discharge schedules in response to tariffs offered by retailers or to delegate control to third party aggregators or retailers as part of a commercial arrangement from which they would receive compensation. It should be noted that battery life is linked to the number of discharge cycles, the rate of charge/discharge and the depth of discharge. Therefore there is a cost to the EV owner for the provision of V2G or V2H services that must be weighed up against the benefits.

Question 19: Issues specific to Western Australia

As the Western Australian electricity market operates a capacity market as well as an energy market, the benefit of EVs offering capacity in a V2G capacity should be made available. This may be realised through third-party aggregation of EV V2G capacity.

General comments regarding charging infrastructure:

Any public charging points must be open access and not restricted to a particular charging service provider. It is also recommended that all public charging points provide a standard 15 amp general power outlet as well as any proprietary outlet such that all EVs, including converted and older EVs, are able to use the charging point.

We look forward to continued involvement in helping guide the efficient integration of EVs into Australia's electricity markets.

Daryl Budgeon (Secretary)