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Dear Mr Stewart

Response to the AEMC's Energy Market Arrangements for Electric and Natural Gas Vehicles Approach Paper

Reference: EMO0022

Ergon Energy Corporation Limited welcomes the opportunity to provide a response to the Australian Energy Market Commission's Approach Paper on the *Energy Market Arrangements for Electric and Natural Gas Vehicles*.

Should you require additional information or wish to discuss any aspect of this submission, please do not hesitate to contact me on (07) 4121 9545.

Yours sincerely

A handwritten signature in blue ink that reads 'C. A. Price'.

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Encl: Ergon Energy's submission.

Ergon Energy Corporation Limited

**Response to the Energy Market Arrangements
for Electric and Natural Gas Vehicles**

Approach Paper

Australian Energy Market Commission

27 October 2011

Project Reference Code EMO0022





Response to the Energy Market Arrangements for Electric and Natural Gas Vehicles Approach Paper Australian Energy Market Commission 27 October 2011

This submission, which is available for publication, is made by:

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1. INTRODUCTION

Ergon Energy Corporation Limited (Ergon Energy), in its capacity as a Distribution Network Service Provider (DNSP) in Queensland, welcomes the opportunity to provide comment to the Australian Energy Market Commission (AEMC) on its *Energy Market Arrangements for Electric and Natural Gas Vehicles* Approach Paper.

Ergon Energy agrees with the need for early development of the Regulatory Framework for the Electric Vehicles (EVs) and the approach outlined in the paper.

Ergon Energy recognises the significant benefits that electric vehicles could provide in reducing carbon emissions and the potential to improve electricity network utilisation and place downward pressure on electricity costs, the potential possibilities to improve energy security and the potential for development of local industry.

Ergon Energy's current knowledge and experience with EVs is limited so our ability to provide detailed insight and direction is consequently also limited. We are taking a proactive, supportive position in understanding and facilitating adoption of electric transport (the vehicles and associated charging infrastructure) in order to realise any benefits. We are conducting vehicle and charge infrastructure trials, improving our knowledge through analysis and are active in the development of standards, policy and regulation. We believe shorter-term pragmatic approaches need to be coupled with further research and trials to inform effective longer-term policy, regulation and standards formulation and implementation.

Ergon Energy notes your observation on the estimated recharging capacity of 3-4 kW. We believe that recharging capacities are likely to be greater than this range as battery technologies develop and the market for EVs evolves. In particular, fuel security issues and demand for shorter charging times is likely to drive an increasing size and range of EVs (and consequently battery sizes) in the market, which could be realised on electricity networks as EV affordability improves. A single electric vehicle is likely to roughly double the power (kW) and energy (kWh) load of a 'typical' Queensland home and as such cannot be considered a 'normal' electric appliance. The potential for an adverse community impact from unmanaged charging is significant and could be considered to outweigh individual freedoms to some extent.

While it is not necessarily 'in-scope' for your investigation, we note your comment on the potential need for consumer education. It is essential that community norms be established early such that EVs are not considered "just another appliance". Ergon Energy also believes that industry wide consultation will be critical to identifying the requirements (and impacts) of EVs, and will ensure that the broader EV framework is developed in a manner which duly protects the interests of key stakeholders. (For example, DNSPs, Charging Stations, Government agencies and EV Service Providers etc).

Consideration should be given to charge management and if this aspect should be mandated (ultimately with a range of sophistication and customer functionality). Such considerations are necessary for achieving the community benefit offered by EVs. Without community acceptance of these principles an appropriate balance between vehicle user needs; market based approaches (e.g. EV tariffs); and, charge management, will not be achieved.

Our key points on the emergence of electric transport are:

- Early, proactive action is essential because of:
 - The long lead times to develop learnings and to develop and implement policy, regulation and standards;
 - The need to establish appropriate community norms for electric transport charging to avoid negative community reactions (i.e. acceptance that special loads like electric vehicles should not have unlimited supply), changing norms once electric vehicles are a common feature of the community will be significantly more problematic;





- Uncertainty about electric vehicles adoption rates, it is possible that issues will emerge in the short to medium term due to factors such as clustering.
- Poor management of the introduction of electric transport will almost certainly have dramatic negative consequences for electricity costs and user experiences; creating a barrier to electric transport adoption. Uncontrolled charging will significantly increase electricity network peak demand, leading to increased capital investment in network capacity, leading to increased electricity tariffs.
- Conversely, a well managed introduction of electric transport has the potential to leverage existing electricity network infrastructure to the benefit of vehicle users and the community and will facilitate the adoption of electric transport. Managed vehicle charging will lead to increased network utilisation, leading to downward pressure on electricity prices, as fixed network infrastructure costs are amortised over a greater energy volume and customer base.

Continued direct engagement with and the involvement of the electricity industry, including Ergon Energy, is essential for the successful planning and implementation of electric transport, particularly in relation to developing and implementing standards, policy and regulation.

Section 2 below outlines Ergon Energy's response to the consultation questions posed by the AEMC relating to this Approach Paper. Ergon Energy is available to discuss this submission or provide further detail regarding the issues raised, should the AEMC require.

2. EECL Responses

AEMC Consultation Questions	
Question	EECL Response
Electric Vehicles -	
<i>Question 1</i>	
1. What are the key drivers and likely uptake of EVs in the NEM? Are there any differences in these drivers between NEM and WA?	<p>Concur with the drivers noted in the Approach Paper and in addition note the potential long term liquid fuel availability restrictions due to fuel security issues.</p> <p>The uptake of EVs is likely to vary by location reflecting the socio-economic attributes of the customers in geographic areas. Due to the initial costs, early EV owners are more likely to live in more affluent areas. Broader uptake will occur as manufacturing costs / prices reduce and consumers' range anxiety is addressed.</p>
<i>Question 2</i>	
2. What are the costs and benefits that EVs may introduce into Australia's electricity markets? Please provide evidence if available.	<p>Concur with the costs and benefits noted in the Approach Paper noting that early modelling suggests that overload is likely to occur (depending on location specifics) up and down-stream from the distribution transformer, earlier in the LV reticulation and distribution feeders due to clustering effects, and ultimately in zone substations. Additional costs will arise from the implementation of charge management systems. The major avoided cost and potential benefit is the downward pressure on electricity costs created by greater network asset utilisation through effective charge management.</p> <p>DNSPs need to be mainly concerned about the augmentation costs that the charging requirements of EVs are likely to impose. Depending upon the approach adopted in the NEM there may also be significant costs involved in the routine provision of information between the DNSP, the EV owner and other parties involved in the charging regime.</p> <p>Considering only the augmentation costs, the electricity supply industry was generally unprepared for the rapid growth of air-conditioning load and is now encountering problems with the impact of domestic PV systems. The adverse impacts of EVs could be much greater than each of these two technologies if steps are not taken early to manage the charging process and preferably before there is any significant volume of EVs in any particular area.</p>

AEMC Consultation Questions

Question	EECL Response
	<p>The Approach Paper notes the Better Place estimates of average per vehicle consumption values of 3-4 kW and 3.5 MWh per annum. The Approach Paper also notes charging rates of between 1 kW and 19.2 kW. We believe the energy figures are in the ballpark. However, as a DNSP Ergon Energy should be concerned that the range of the charging rates is very broad and the likelihood is that, if it is affordable, EV owners will choose a higher charging rate. Given the earlier comment regarding the affluence of early adopters, charging rates higher than that predicted by Better Place should be expected.</p> <p>A recent survey by Accenture¹ has indicated that internationally 67% of potential EV owners would want to charge their vehicles at home and would want control over when their vehicles are charged. The electricity industry is unlikely to be seen as a roadblock to EV adoption if it tries to impose restrictions on when vehicles can be charged. Thus, early on we may see areas where EV owners want to charge quickly and at times close to the residential peak for their area.</p> <p>The domestic deployment model will have an impact on installation Rules and Standards (specifically AS3000). There have been proposed models where the customer pays for the power at their installation including the EV; where the EV is treated as a separate customer (EV inclusive operating arrangement); or possibly even a child sub-meter (Not permitted in QLD) to the customer's premise meter; or use of prepayment meters to recover usage (in larger complexes).</p> <p>With an increase in load potentially requiring significant switchboard upgrades for customers, the possible issues at the household level would include, and are not limited to –</p> <ul style="list-style-type: none"> • undersized consumers' mains – may be limited by a circuit breaker; • possible requirement for additional phases to lead in – forced upgrade to multi-phase; • possible requirement for additional meter – leads to potential real estate issues on the customer's board; • customer costs to bring meter board up to current Queensland Electricity Connection and Metering Manual (QECMM) standards;

¹ "Plug-in electric vehicles - Changing perceptions, hedging bets. Accenture end-consumer survey on the electrification of private transport" – 2011



AEMC Consultation Questions	
Question	EECL Response
	<ul style="list-style-type: none"> • compounding of issues due to impact of multiple car households; • load and regeneration patterns will have to be actively managed; • reading options – this will be inline with current market requirements based on site type; • potential requirement for interval data and impacts for remote read requests; • resourcing – unknown impacts but will be a burden on BAU requirements similar to PV etc <p>Presently, very few issues have been identified from a physical metering solution for stand-alone charge stations.</p> <p>The Approach Paper also raises the issues of V2G facilities. The technical capability needed to provide V2G services has been demonstrated in trials in the USA involving a small number of vehicles. However, the regulatory requirements associated with doing this on a large scale and in a competitive market are likely to be very complex. In fact more complex than determining a robust and equitable regime for charging of EVs only. It is recommended that this issue (V2G) should be postponed until a charging only regime has been developed.</p>
<i>Question 3</i>	
3. What are the appropriate electricity market regulatory arrangements necessary to facilitate the efficient uptake of EVs?	<p>Suitable tariffs will need to be developed to facilitate appropriate price signals for the customers to enable network load control.</p> <p>There should be a review of the National Electricity Rules to consider whether a new service provider role is required in the electricity market and how these roles will interact with the existing Network Service Providers, Retailers, Generators and Customers.</p> <p>As noted above, an appropriate balance between vehicle user needs, market based approaches (e.g. EV tariffs) and mandated charge management, needs to be struck to ensure efficient and effective outcomes.</p> <p>The effectiveness of market approaches such as optional specialty tariffs, including controlled and / or time of use tariffs is not well understood but is probably not likely to be effective without relatively large price differentials.</p> <p>Cost reflective capacity (kW) charges are likely to be significantly more efficient price signals than energy (kWh) charges but may not provide sufficient incentive to shift charging times out of</p>

AEMC Consultation Questions

Question	EECL Response
	<p>peak periods. Though in principle, further network investment may be required but would it be substantially funded by the user given that charge providers are not allowed to cost shift between other tariffs i.e. spreading the cost to the broader community; or will the NEM provide a range of charging options for the EV customer.</p> <p>Use of controlled tariffs is considered highly desirable in the short to medium term as an interim step to cost effectively leverage existing load management infrastructure. Changes in access to controlled tariffs will be required, albeit with attendant issues including miss-use (e.g. ‘gaming’ between controlled and un-controlled tariffs).</p> <p>A range of approaches are possible with varying degrees of sophistication generally trading simplicity and lower initial implementation costs for greater levels of certainty, security and customer acceptance. A suite of alternatives with progressively more flexibility, at the user’s cost, is required. For example:</p> <ul style="list-style-type: none"> • Circuit level control mandated as a minimum (e.g. controlled tariffs) • Appliance (i.e. vehicle) level control mandated is preferred (to avoid miss-use) • Limited, managed opt-out control as an available alternative/option • Interactive, dynamic control for higher user choice and acceptance is desirable <p>As a minimum, circuit level switching for electric vehicle charging should be mandated. This would be similar to off-peak water heating where a wiring circuit in an installation is switched. Regulations would require that vehicle charging systems are wired to off-peak supply and that electric vehicles be fitted with Special Purpose Outlet (SPO) plugs (e.g. J1772) to prevent them being installed into uncontrolled General Purpose Outlets (GPOs). While the installation of an SPO would be at relatively low cost to customers, this approach poses a number of issues including the likely proliferation of simplistically easy methods to circumvent the SPO (e.g. a ‘conversion lead’ between an SPO plug and a GPO socket, indeed some EVs are supplied with such a lead); and objections from electric vehicle users and interest groups citing the inability of users to recharge a vehicle for ‘emergency purposes’ during off-peak times. Some limited in-peak time boost charging may be possible through circuit level control.</p> <p>Development and availability of further customer options with greater sophistication to facilitate</p>



AEMC Consultation Questions

Question	EECL Response
	<p>more user choice, while still maintaining the integrity of reducing or eliminating peak demand impacts, will be essential in gaining customer acceptance of the above minimum mandated controls. Possibilities range from providing a limited number of opt out instances per period; graduated charge control (e.g. Demand Reduction Enablement Device (DRED)); through to fully interactive, dynamic control between the user and network using Home Area Network-like capabilities – so called ‘smart grid’ solutions. These solutions will necessitate more sophisticated systems at a higher cost which should be borne by the users.</p> <p>The regulatory framework needs flexibility to cater for new market opportunities and arrangements created by the emergence of new mobile loads and new participants including energy intermediaries that are not traditional network or retail providers. Pre-determined positions and arrangements should not hinder the possibility of greater competition and service to EV users and benefits for the broader community.</p> <p>Other market regulatory arrangements that need to be considered, and are not limited to –</p> <ul style="list-style-type: none"> • Recovery mechanism for costs to implement a charge/regeneration control and management system • Develop a set of common National Electricity Connection and Metering Guidelines • Import/Export metering capability – how will it fit with current and proposed tariff models e.g. IES solar bonus versus alternate generation sources (wind) as there is a potential for different rates to be paid for different generation sources which will have an effect on billing and settlement systems <p>At this point in time there is a vast range of possibilities raised by the introduction of EVs (including V2G services) and the list of arrangements to be considered as indicated in section 2.4 is fairly inclusive. However a short description of each of the dot points would have been useful to ensure that submitters had the same interpretation of the issue. Given this list, we are concerned that the scope of this review may be too broad to achieve reasonable progress in a timeframe in advance of EVs being purchased by early adopters of this technology. As recommended above with respect to V2G services, it is desirable to limit the scope of what is initially being considered.</p>



AEMC Consultation Questions	
Question	EECL Response
<i>Question 4</i>	
<p>4. What are the required changes to the current electricity market regulatory arrangements and suggestions for reform to facilitate the efficient uptake of EVs?</p>	<p>Changes that should be contemplated to the current regulatory frameworks include, and are not limited to –</p> <ul style="list-style-type: none"> • Clarification of the networks ability to control loads such as EV charging including broadening concept from specific loads impacting on other specific customers; • Allow plug in to controlled tariffs following due consideration to the potential for gaming and measures to prevent it; • Mandate controlled charging by distribution network service providers; • Clarify/simplify requirement for EV charge service providers in relation to requirement to have transmission or distribution authorities; • Simplify requirements for EV charge service providers to supply energy to EV users as non-retailers (essential to facilitate innovation in EV charging arrangements); • Establish simpler, facilitative arrangements for EV charging systems as embedded networks; • Clarify the roles and responsibilities of the RP / MPB at the customer's installation where multiple NMs exist; • Clarify/simplify status of EVs with vehicle to grid capability as not being generators; and • Clarify purchase arrangements for energy exported to the network where it is required for network support (i.e. service purchased by the distributor) and when it is not required for network support (e.g. market load curtailment purchased by other market participants). <p>Managing the load and interaction between the Retailers / LNSP and Energy Service Providers</p>



AEMC Consultation Questions	
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	<p>may lead to a metering solution requirement where impact is unknown.</p> <p>At this stage of the investigation it is necessary to more accurately define the concept of what should be achieved, at least, initially. It would be beneficial for the AEMC in conjunction with relevant parties to develop a fairly detailed strawman. Once the concept has been defined the impacts on current regulatory requirements can be determined. If necessary iteration can occur between concept and the needed regulatory changes.</p>
<i>Question 5</i>	
5. Are there any electricity market regulatory arrangements that affect EVs which may also apply to NGVs?	Nil comment.
Natural Gas Vehicles -	
<i>Question 6</i>	
6. What are your views as to the projected uptake of NGVs? Please provide views and evidence if available.	Nil comment.
7. What are the costs and benefits that NGVs would introduce into Australia's natural gas markets? What are the impacts that NGVs may have on Australia's electricity markets? Please provide evidence if available.	Nil comment.
8. What are the appropriate natural gas market regulatory arrangements that would facilitate the economically efficient uptake of NGVs? Please specify for CNG vehicles and LNG vehicles, respectively.	Nil comment.
9. What are the required changes to the current natural gas market regulatory arrangements and suggestions for reform to facilitate the efficient uptake of NGVs? Please specify for CNG vehicles and LNG vehicles separately.	Nil comment.
10. Are there any natural gas market regulatory arrangements that may also apply to EVs?	Nil comment.

