

27 February 2012

Project Leader – EMO0022
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235



positive energy

Project Reference Code – EMO0022

Dear Sir/Madam,

ENERGEX welcomes the opportunity to provide comments on the Australian Energy Market Commission's (AEMC) Issues Paper on Energy Market Arrangements for Electric and Natural Gas Vehicles.

The electricity market faces the prospect of increasing decentralisation of generation and the potential for growing participation by customers in the provision of market or alternative energy services. The established market and regulatory arrangements were, however, largely developed in an era of centralised generation. While iterative changes have been made to facilitate changing participant and customer behaviour and expectations, it is timely that the AEMC assesses the appropriateness of the current arrangements in the face of increasing innovation through electric vehicles, demand side participation and embedded generation.

To this end, ENERGETEX would encourage the AEMC to consider any changes to market and regulatory arrangements from the point of view of encouraging customers and participants to manage overall energy usage, including peak demand, rather than specific appliance types.

Please find attached ENERGETEX's response to the specific questions raised in the Issues Paper. The submission's focus is on electric vehicles and the relevant issues associated with tariffs, connection services including metering and regulatory arrangements for cost recovery.

Should you have any further questions in relation to this matter, please contact Bevan Kirk, Corporate Analysis Manager on (07) 3664 4092.

Yours sincerely

A handwritten signature in black ink that reads "Kevin Kehl".

Kevin Kehl
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Submission Paper

Energy Market Arrangements for Electric and Natural Gas Vehicles

AEMC Issues Paper

February 2012

Table of Contents

1	INTRODUCTION	1
1.1	Key Points	1
2	RESPONSE TO QUESTIONS	2
2.1	Electric Vehicle Technology and Assessing the Uptake	2
2.2	Impacts on Energy Markets	2
2.3	General issues relating to the appropriate energy market arrangements	3
2.4	Specific issues relating to the appropriate energy market arrangements	10

1 Introduction

ENERGEX welcomes the opportunity provided by the Australian Energy Market Commission (AEMC) to submit comments on the Issues Paper *Energy Market Arrangements for Electric and Natural Gas Vehicles*.

ENERGEX supports the need for an assessment of the market and regulatory arrangements that are required to facilitate the efficient uptake of electric and natural gas vehicles. However, ENERGEX is mindful that electric and natural gas vehicles are but one of a number of technological developments that may create new challenges for energy markets. Many of the implications of these developments will be of a similar nature and it would be beneficial to consider the potential issues from a systems perspective rather than responding to each individual development separately.

1.1 Key Points

ENERGEX is committed to delivering safe, reliable and affordable electricity in a commercial environment that recognises the need to balance customer outcomes with effective risk and price management. As an electricity distribution business operating in the national electricity market, the challenge for ENERGEX is meeting peak demand at a price customers are prepared to pay.

Key points for ENERGEX are as follows:

- ENERGEX supports the establishment of regulatory and market arrangement that will address the potential issues electric vehicles may create, however, specific electric vehicle only arrangements are not considered to be necessary.
- All electrical loads at a site should be subject to the same electricity tariff under a single market NMI. Commercial downstream arrangements, including separate metering, should be facilitated provided they do not affect market settlement and the responsibilities of market participants. Tariffs for specific loads would be expected to increase complexity and cost.
- Customers with an EV should be required to move onto a tariff that provides appropriate price signals and, where possible, combine this with demand management capability.
- Where a customer adds a significant new load (such as EV charging equipment), that requires an upgrade to three phase supply, these customers should be required to pay an appropriate capital contribution toward the cost of

shared distribution asset upgrades, in line with the AER Connection Charging Guidelines.

2 Response to Questions

ENERGEX's response to the questions raised in the Issues Paper are provided below.

2.1 Electric Vehicle Technology and Assessing the Uptake

Question 1 Assessing the take up of EVs

Is the range of estimates provided by AECOM appropriate for assessing the potential impacts of EVs on the electricity market and developing our advice? Does the range of scenario estimates provide a credible view on the potential penetration of EVs?

- The AECOM forecasts allow for a significant proportion of new vehicle sales by 2020 even in the low (6%) and central uptake forecasts (20%), compared to some other forecasts, including AGL which is quoted in the AECOM paper. In the absence of any methods to encourage off-peak charging, Distribution Network Service Providers (DNSPs) would need to factor the additional peak demand growth into future regulatory proposals for new capital expenditure. There is a risk of over investment during this period if the forecasts are too optimistic. For this reason ENERGEX supports the need for a national forecast that is universally adopted within the NEM (see Question 12 for further information).

2.2 Impacts on Energy Markets

Question 2 Cost of additional system peak demand

Are these estimates on the cost of additional peak demand provide the correct magnitude of the potential impacts of EVs? Are there any categories of costs not included in this discussion?

- The costs outlined in the Issues Paper do not appear unreasonable.

Question 3 Costs imposed by EVs on electricity markets

Does this discussion capture all the potential costs impacts that EVs could impose on the electricity market?

- The discussion focuses on capacity, whereas some of the issues are likely to relate to voltage and power quality. There is also the cost of service upgrades at customer premises. It is possible that many charging installations could require customers to upgrade to three phase supply to the premise.

Question 4 Benefits of EVs on the electricity market

Have we correctly identified the range of benefits of EVs on the electricity market? What are stakeholders view on the materiality of these benefits and the appropriate arrangements of capturing such benefits?

- The ability to recharge EV batteries at times of low utilisation of electricity supply infrastructure (generation, transmission and distribution) creates the potential to accommodate EVs at relatively little cost to the end user. This would require appropriate incentives to be in place to encourage charging at times that maximise the utilisation of existing electricity supply assets. This will minimise the need for new supply infrastructure and can also put downward pressure on wholesale energy prices (where charging utilises spare base load capacity).
- The key issue is scale. Most of the benefits of EVs will only materialise at relatively high penetrations and this would not be expected to occur for many years. The method of incentivising off-peak charging therefore must not incur significant costs early as this will drive up prices in the short term while the benefits will not be realised until much later, if at all.

2.3 **General issues relating to the appropriate energy market arrangements**

Question 5 Nature of service provided when an EV is charged

Does the EV charging service need to be prescribed as a sale of electricity? What are the implications for consumers and EV charging service business models if EV charging was not classified as a sale of electricity?

- The nature of the service being provided when an EV is charged is not an issue for distribution businesses provided that it does not affect the ability of the distribution business to recoup the cost of supply to the primary connection point to the premise. Any arrangements downstream of this should not be the responsibility of DNSPs.

Question 6 Should EVs be treated differently as against other loads

Should the treatment of EVs in the electricity market regulatory arrangements be different in respect of any or all of their potential uses?

- In principle EVs should be treated the same as any other load or distributed energy resource.
- Where the size of any incremental load is sufficient to warrant either two or three phase supply and/or other network supply upgrades then appropriate charging arrangement should be in place to ensure that the costs are not smeared across all domestic customers.
- Similarly, where a customer wishes to connect a distributed energy resource to the network to facilitate participation in market activities, then the associated process, requirements and cost recovery should be the same except where a unique feature of a particular technology can be identified.
- Individual or technology specific tariffs or other incentives are not necessarily required. Rather, there should be appropriate prices and/or other incentives in place that reflect the appropriate cost/value in the market and therefore promote efficient decisions by consumers.
- It would not be appropriate to single out EVs for special treatment as opposed to other large loads such as air-conditioning. However, it is arguable that the absence of appropriate pricing mechanisms and other regulatory arrangements during the period of rapid uptake of air-conditioning and now solar PV has resulted in significant costs in the market and inefficient subsidisation across different customers. It is therefore imperative that any changes to market arrangements are applicable to any technology development that results in similar market costs/benefits.

Question 7 EV metering issues

- Should EVs be treated as a standard appliance load or should they be separately metered from other load at the premises?
- Could sub-metering and roaming NMIs be an effective solution to the costs and time issues associated with a separate metering installation? Are these metering options mutually exclusive or can they coexist thus allowing EV suppliers and customers to choose the solutions that best meet their needs?
- Should metering costs for EVs be recovered any differently than for other existing metering equipment?
- Are the existing metering data confidentiality arrangements appropriate for EVs and, if not, what modifications should be considered?

- ENERGEX does not consider that it is essential to have EVs separately metered from other loads in the premise. However, ENERGEX understands that under certain business models and in circumstances where controlled or smart charging is to be pursued that it may be necessary/more efficient to have the EV separately metered.
- To ensure that market metering costs and complexity is kept to a minimum ENERGEX considers that it is necessary to ensure that EV installations in residential premises occur under the existing NMI for that site. Sub-metering at the site should be facilitated but the 'child' meters should not be market metering points. This facility could extend to vehicle roaming where the meter travels with the vehicle but is always linked to a parent NMI at the site where charging occurs. The costs of installing, maintaining and reading sub-meters should therefore lie with the entity requiring this solution and recovered via their contractual arrangement with customers.
- Provided that the above metering recommendations are followed then there would be no requirement to recover metering costs any differently from existing methods. However, it is noted that the metering costs are dependent on the charging options pursued. This is discussed further in Question 8-11.
- Furthermore, ENERGEX believes that under these proposed arrangements there would be no need to change the meter data confidentiality arrangements. Any data collected from non-market child meters would be owned by the party responsible for that meter and governed by their own privacy policies.

Question 8 Options for EV charging

- To what extent are changes required to the regulatory arrangements to allow different battery charge management scenarios to increase efficiency?
- How should the arrangements ensure that the party in control of charging faces the all system costs? Who should be providing the information for decision making for smart meter charging?

- From July 2012 Queensland customers will be able to opt for a time of use tariff thereby facilitating time-of-use charging for customers who see value in this approach.
- ENERGEX would be supportive of arrangements for the cost effective control of electric vehicle charging. In Queensland the technical capability already exists to implement controlled charging to some degree through the use of ENERGEX's and Ergon Energy's existing load control infrastructure. The use of this technology is likely to be at least a good interim solution to create diversity in customer charging behaviour and thereby minimise the impact on peak load and improve the efficient use of electricity supply assets. The application of charging control needs to be considered in combination with appropriate tariff settings.
- Smart charging will require investment in technology that facilitates dynamic load control in response to market signals. This investment could be undertaken by distribution businesses (provided that appropriate regulatory funding was provided for) or other third parties such as retailers or charge service providers. Presently, there may be difficulties in developing the business case for this investment given the separation of benefits and investment costs in the value chain. ENERGEX understands that this issue is being investigated in the DSP III review.
- ENERGEX agrees that there is a need to be mindful of all market costs where customers elect to allow third parties to remotely control EV charging rate (kW) and / or time. In addition to costs, however, it is also necessary that the party responsible for controlling the load does this in a way that does not result in any adverse impact on power quality and voltage.
- Distribution business are sensitive to where and how loads are brought onto and off the network whereas energy Retailers, load aggregators and charge service providers are primarily concerned with how much capacity is available at a given time irrespective of location. It is imperative therefore that if load control is not coordinated by the DNSPs that there are appropriate mechanisms in place to

ensure that quality of supply is not compromised. Currently distribution business are the only party with wide spread load control capability. However, over time it is expected that the deployment of new communications infrastructure and energy management technologies will enable more parties to control customer loads. Associated regulatory arrangements will therefore need to evolve over time to ensure that settings keep pace with technology and market developments.

Question 9 Retail pricing and EVs

In an area where the sale of electricity is subject to retail price regulation and given the appropriate metering capability, should the sale of electricity for recharging be treated any differently to other loads? If so, why?

- ENERGEX considers that, ideally, customers who have an EV should not be permitted to remain on a tariff structure that provides no incentive with respect to when charging occurs or at what charge rate (kW), e.g. any flat rate or inclining block tariff. Customers should be required to shift to time of use and ideally a capacity based time of use tariff or an appropriate controlled load tariff. These tariffs would not apply specifically to the EV but to the entire premise load. This will provide appropriate incentives for customers to manage their total premise load and its impact on the network.
- In the absence of this requirement and where regulated retail tariffs remain in place, there is a significant risk that customers will opt for the 'safety net' tariff which maximises their convenience by charging the same price irrespective of when the vehicle is charged or at what rate (kW).
- It is also important to consider how the market and regulatory arrangement will affect the investment decisions of electricity infrastructure suppliers. For a given forecast uptake of electric vehicles, infrastructure suppliers will need to make assumptions about charging behaviour. If consumers are incentivised to adopt tariffs that do not provide appropriate price signals then the expected impact on peak demand will be higher and this will feed through to forecasts of future investment requirements.

Question 10 Structure of retail pricing for EVs

How are rules regarding the availability of TOU pricing likely to affect efficient uptake of EVs? Should there be a requirement to offer TOU tariffs for EVs? Should other forms of pricing apply to EVs to discourage charging at peak times, such as critical peak tariffs or other dynamic tariff structures? Should EVs be treated any differently from any other load in this regard?

- As stated in Question 9, ENERGEX believes that EV owners should be on a tariff that incentivises appropriate consumption at the premise. This should not be an EV specific tariff but rather, the addition of an EV should be a trigger point whereby it is considered inappropriate to supply load to that premise that levies the same charge irrespective of time of day or maximum demand (kW) imposed on the system..
- In Queensland customers have the option to change, at minimal cost, from market contracts to regulated tariffs, and between alternative regulated tariffs. While regulated tariffs that provide no effective signal regarding the time of consumption or electrical demand, such as inclining block, remain available to any customer, there is a strong likelihood that a high proportion of customers will favour these tariffs as they provide the greatest flexibility and convenience as well as providing a higher degree of certainty around their electricity bills. ENERGEX expects that many EV owners will therefore opt for this option rather than take up a voluntary time of use tariff. To ensure that the uptake of EVs does not lead to a repeat of the air-conditioning experience, it is imperative that where a customer has an EVs that there is a requirement to take up a more appropriate tariff that ensures they pay a fair and efficient price for their impact on network infrastructure.
- This proposal may require an upgrade in metering infrastructure at the premise. Under a time of use tariff, electronic metering will be required if the premise does not already have one installed.
- If customers remain free to access regulated tariffs such as flat rate or inclining block, then ENERGEX would support a requirement for EV charging to be controlled.

Question 11 Network pricing and EVs

Are new or bespoke network tariffs warranted for EV charging? If so, what form should these network tariffs take? How can these network tariffs be better integrated with overall retail tariffs?

If there are to be separate tariffs for EV tariffs, should there be regulations for identifying the EV household and for monitoring consumption? If so, how?

- ENERGEX does not consider that new or bespoke network tariffs are required for EVs. ENERGEX's primary objective is to ensure that customer experience appropriate price signals for their consumption choices. This objective would be compromised when network price signals are not reflected in the retail tariff applied to customers. There is a need for capacity based time of use network tariffs that apply to whole of premise load and that these capacity charges are explicit in the retail tariffs that appear on customer bills. Further there may be some value in considering a discounted time of use network tariff where the premise has loads that can be controlled at the request of the DNSP.
- If EV customers are to be required to relinquish access to particular tariff options then there will be a need for regulations requiring customers to notify their retailer that they intend to charge an EV at their premise. ENERGEX notes that in the USA, it is a requirement for customers to obtain a permit prior to the installation of EV charging infrastructure. While this process provides robust information on which properties have charging infrastructure installed it does not provide any detail on whether the current occupant is charging an EV at that premise. Enforcement is further complicated when EVs are able to be charged from existing 10 amp outlets. Even if a 15 amp solution is required, there are currently no requirements for a customer to disclose their reason for installation of a 15amp outlet. It may therefore be necessary to have arrangements in place at the point of sale, both at dealerships and for private sales, or through registration statistics, whereby the retailer is notified of the customer's purchase of the EV.

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

Are measures required to facilitate more effective forecasting of EV take up for network operator and NSPs?

- ENERGEX supports the development of a national forecasting methodology for EV uptake. Distribution and transmission business will need to justify any investments associated with accommodating electric vehicle charging whether these are investments to augment supply capacity or to fund new connection, metering and/or load control assets. A nationally developed forecast of EV uptake on which to base business case assessments would avoid the costs of separate forecasting by each NSP, the AER and the system operator. The cost of developing a national forecast methodology and preparing forecasts at defined regular intervals should be jointly funded by all relevant parties.

2.4 Specific issues relating to the appropriate energy market arrangements

Question 13 Network Issues: Connection services

What issues arise in regard to connection services for EVs? Are there further connection issues if additional capabilities such as Vehicle to Grid arise? How should these issues be addressed?

- ENERGEX agrees that there are a number of issues associated with connection of EV charging and vehicle to premise / grid capability that will need to be addressed.
- Issues associated with cost recovery of connection assets and deep system network augmentation are addressed in question 14 while vehicle to premise / grid issues are discussed in our response to question 18.
- ENERGEX does not see a requirement for a customer to change its connection agreement with a DNSP unless they intend to utilise vehicle to premise / grid functionality.
- In line with ENERGEX's earlier comments regarding appropriate metering arrangements for EVs, there should be a clear distinction with regard to responsibilities between distribution businesses and commercial third parties. Distribution business assets and responsibilities should only extend to the primary point of supply to the premise. Any downstream arrangements should be the responsibility of the relevant commercial entity.

- Existing processes should be retained for extending the distribution network to establish a point of supply for EV charging where the proximity of the charging equipment is remote to existing customer switchboards.

Question 14 Network Issues: Network reinforcement and augmentation

What new issues arise regarding requirements for network reinforcement and augmentation to support EV charging and recovery of the costs incurred, and how should they be addressed?

How should the connection services for EV households be classified? It is necessary to differentiate between EV and non-EV households?

Does the take up of EVs require a departure from the current method of recovering the costs of grid augmentation from small customers, with the costs spread across all customers, towards a “causer pays” approach?

- ENERGEX supports the principle of a ‘causer pays’ charging arrangement for network upgrades, where this does not result in undue administrative cost. The AER’s proposed Connection Charge Guidelines will in general provide an adequate mechanism for DNSPs to determine whether the addition of an EV at a premise triggers a capital contribution assessment. ENERGEX would argue that in determining the capital contribution required, the methodology for calculating incremental revenue will need to take into account the mobile nature of the load.
- ENERGEX notes that the legislative intent under the NER is for retail customers to be excluded from deep system network augmentation charges. It is possible therefore that many electric vehicle charging installations will not result in exceedance of the threshold developed under the connection charge guidelines. If this is the case, and given the predicted slow uptake rate of the EVs, the AEMC should consider whether it is appropriate for network upgrades associated with the consumption decisions of a small percentage of consumers to affect the network charges of all consumers. For this reason, ENERGEX believes that it is imperative that EV customers are on appropriate tariffs, for example time of use demand/energy.
- ENERGEX is of the view that to ensure that the connection charging guidelines work effectively for EV charging installations, it will be necessary for DNSPs to determine under what circumstances EV charging will require three phase supply and to update their connection rules and processes accordingly. This will ensure that the focus for charging small retail customers for connection services

is based on the electrical requirements of the entire premise and does not specifically single out EVs. It does however send a strong price signal to prospective EV buyers to carefully consider the electrical needs for their preferred charging arrangement.

- The key difficulty with this approach will be the mobile nature of the load and the potential implications for a customer who has paid a capital contribution at one location and then moves premise. This would equally apply in situations where a customer installs air-conditioning at one premise that requires an upgrade to three phase supply and then relocates to a new premise.
- While ENERGEX's position with regard to appropriate tariffs for EV households does require differentiation between EV and non-EV households, the same is not necessarily required from a connection services perspective. Rather all that would be required is a standing process for licensed electrical contractors, requiring EV charging installations that result in the premise exceeding the connection conditions for single phase supply to upgrade to three phase supply. In Queensland this would be outlined in the Queensland Electricity Connections and Metering Manual.

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

Should the provision of commercial charging (both in public spaces and in dedicated charging stations) be classified as on-selling? Do retailer and NSP exemptions and embedded networks provide an appropriate framework to apply to EV charging? What would be the preferable arrangements?

- ENERGEX does not support the use of embedded networks for EV charging where child NMIs are established as market NMIs. As outlined earlier, ENERGEX considers that the most cost effective method for the introduction of EVs in the NEM is to minimise metering costs and complexity by treating EVs in the same way as any other load. As outlined in ENERGEX's response to the AEMC Approach Paper in October 2011, there is not sufficient clarity concerning the roles and responsibilities of various parties under the existing embedded network framework.

Question 16 Retail issues: Settlement

What new issues for wholesale settlement arise with EVs, and to what extent do they depend on the metrology arrangements in place? How can these issues be addressed?

- The use of embedded networks and sub-metering potentially creates difficulties for market settlement arrangements. These difficulties and costs can be overcome by ensuring that there is only one market NMI at the site and any sub-metering arrangements are for the purpose of settling commercial arrangements between customers and third party service providers.

Question 17 Retail issues: Licensing arrangements

What licensing issues arise with EVs, if licences are required? Do new issues arise because of the nature of EV loads or from new business models for EV charging? Are the existing licensing arrangements still appropriate?

- No comment

Question 18 Vehicle to Grid/Home issues

What additional issues arise from EV discharging and to what extent are those issues different from those that arise from any other on-site small scale generation? Are there any unique issues or requirements if the electricity is only provided to the home and not exported to the grid? Who should control discharging schedules? How can the right incentives be provided to facilitate the use of EV discharging to support DSP?

- ENERGETX's understanding of the potential options to discharge an electric vehicle battery for purpose other than providing electricity to the electric motor on board the vehicle are as follows:
 - Vehicle to premise (emergency supply) – only available when there is no grid supply to the premise.

- Vehicle to grid (constant discharge rate) – discharge from the battery is set at a constant rate, e.g. 2kW. Electricity discharged from the battery in excess of the site load would be exported into the LV network.
- Vehicle to grid (load following) – discharge to the premise can occur even with a live grid connection to the site. However, battery discharge rates vary in accordance with household demand up to a specified maximum. Under this option, no electricity is exported from the premise into the LV network.
- Vehicle to premise (emergency supply)
 - This is no different to the current use of uninterruptible power supplies and should not result in any network issues.
- Vehicle to grid (constant discharge rate)
 - This will result in network issues similar to those currently being experienced with solar PV. This option will therefore require electronic metering and a suitable network connection agreement to be in place between the customer and the DNSP.
 - This option is likely to appeal to a wider range of market participants but it has the largest potential impact on distribution network infrastructure requirements and costs. Where discharge is desired by market participants rather than the consumer, then enabling this capability would require appropriate communication and control infrastructure to be in place. As was the case with control of charging, any party in control of battery discharging schedules would need to take account of the impact on quality of supply and ensure that statutory requirements are met.
- Vehicle to grid (load following)
 - This could have implications for system stability if there is significant coincidence in the commencement of battery discharge timing. This situation could occur under time of use pricing scenarios where customers are seeking to use stored energy during peak tariff times. This is more likely to impact on localised LV feeders rather than system wide due to the large penetration of EVs that would be required to affect upstream system stability.
 - This could be a highly beneficial outcome from a demand management perspective subject to timing of customer utilisation. This option would, however, require more sophisticated metering arrangements with communication capability between the meter and the vehicles battery management system to dynamically vary the battery discharge rate. The demand management benefits may however justify the additional cost of this option.
 - In the event of a loss of supply, it is unlikely that this arrangement could be sustained due to the loss of power to the meter and the communications to the vehicle battery management system. It would be necessary for the system to switch to vehicle to premise as discussed above.

- It is expected that a similar connection agreement as described for vehicle to grid (constant discharge) would be required to protect against the potential for a communications failure/error between the smart meter and the vehicle battery management system that resulted in excess energy being discharged from the vehicle battery.