



John Pierce
Chairman
Australian Energy Market Commission
www.aemc.gov.au

23 February 2012

Dear Mr Pierce,

Submission Response - EMO0022 AEMC Energy Market Arrangements for Electric and Natural Gas Vehicles Approach Paper

Origin Energy Ltd (Origin) welcomes the opportunity to comment on the AEMC Energy Market Arrangements for Electric and Natural Gas Vehicles Issues Paper (the 'Issues Paper'), released in January 2012.

Origin is a major Australasian integrated energy company focused on gas exploration, production and export, power generation and energy retailing. Listed in the ASX top 20, Origin is Australia's largest energy retailer servicing 4.5 million customer accounts. Origin has been at the forefront of delivering sustainable energy solutions to consumers for many years and has created by far the greatest green energy community with approximately 500,000 customer accounts on products such as GreenPower. As part of our commitment to innovation and tomorrow's energy solutions, Origin is supporting the development of the emerging electric vehicle market in Australia by working with industry stakeholders to develop charging solutions and customer education programs. We recognise the significant opportunities that this more sustainable transport solution represents to customers, energy markets and the community as a whole.

This submission focuses on electric vehicles in the National Electricity Market (NEM). Origin will not be providing comment on issues specific to Western Australia or natural gas vehicles.

Summary of Origin's position

Origin supports the AEMC's view that while the penetration of EVs will be gradual over the next decade, EVs could account for a significant share of the Australian new car market in the long term. In our view current energy market arrangements are likely to be compatible with business models that develop to market EVs and associated infrastructure. To the extent that changes are contemplated, we believe it is premature to make significant changes to energy market arrangements at this time because the technology of the vehicles, batteries and related charging systems are expected to develop significantly in the coming years - rendering changes that seek to solve today's challenges potentially inappropriate in the future. Furthermore, there are a number of initiatives related to electricity market arrangements that are already underway that will sufficiently support the efficient uptake of electric vehicles, such as the AEMC's DSP Stage 3 review. In this context, Origin makes the following comments on the Issues Paper.

1. It is crucial that energy market arrangements for EVs focus on the best long term outcome for the market and consumers - this is achieved through well thought out arrangements focus on the cost/benefit outcome and treat all electricity loads, market participants and consumers consistently.
 - Origin believes the best outcome for the market and consumers is an EV solution that is part of a fully integrated smart home or business solution which optimises all available demand side activity with the support of appropriate price signals such as time of use (TOU) pricing. To enable this, market arrangements must be consistent across all forms of demand side participation.
 - Origin therefore does not support market arrangements that encourage an exclusive electric vehicle solution which Origin believes is only likely to increase system complexity and costs and lead to market inconsistencies. Any additional costs brought about by an exclusive EV market arrangement would ultimately be borne by the consumer.
2. Origin supports the AEMC's preliminary view that EV charging should be classified as a sale of electricity and that all EV charging agencies should be subject to the National Energy Customer Framework (NECF).
 - Inclusion of EV charging agencies under the NECF is crucial to ensure a standardised level of consumer protection and avoid confusion in the market.
 - The proposed distinction between non-energy EV tariffs (such as per kilometre tariffs) and kilowatt hour EV tariffs is artificial, likely to lead to market inconsistencies and not defensible as a reason to avoid licensing/authorisation under the NECF or a retail exemption.
3. As the AEMC has noted, if EV charging is seen to be the sale of electricity, the issue should instead be whether the EV charging service provider would either need to acquire a retail licence (authorisation) or obtain an exemption. Origin strongly believes that retailer authorisations are required for EV charging agencies and that exemptions are undesirable.
 - While the parent/child NMI approach suggested by some proponents may lead to a view that providing retail exemptions within embedded networks is a viable approach, we do not agree that this is appropriate, even if conditions are attached to the exemption.
 - Exemptions have developed for historical reasons that date back prior to market creation and contestability. They have always been less than ideal because affected consumers are essentially invisible to regulatory oversight and their rights to an essential service on equal terms to all other consumers cannot be guaranteed.
4. Origin strongly supports pricing arrangements that ensure EV users face representative cost signals and that minimise costs to all users in the electricity market - in particular TOU pricing and ultimately retail price deregulation.



- Time of use (TOU) tariffs are important to influence the charging of EVs to occur at off-peak times of the day. However, while Origin supports TOU pricing, we do not believe it is necessary or desirable to mandate TOU tariffs (or other tariff variations) - charging at night is likely to be convenient to most EV owners and a TOU tariffs should be sufficient to further encourage this behaviour.
 - In the longer term, Origin believes that facilitation of the most efficient use of EVs will require retail price deregulation. So long as retail prices remain regulated, the pricing structures that can be offered to customers may be limited and the introduction of network time of use pricing poses significant risk to retailers and the energy market. Origin therefore supports the AEMC in its review of electricity market competition by jurisdiction through the Australian Energy Market Agreement.
5. **Further regulatory support for the parent-child NEMs is inappropriate; if this metering application were to become mainstream it would increase system costs and complexity with little benefit to the consumer.**
- Origin believes concerns that current market metering arrangements represent a barrier to the uptake of EVs and that parent-child NEMs for EV charging agencies are required are unfounded.
 - The creation of additional NEMs at a supply point will not enhance the customer's supply experience, are not necessary for significant EV take up, rather they will add complexities and costs to the market and residential supply.
6. **Origin strongly believes there is a need to develop a policy framework that includes third parties more generally and that this should be approached through the National Electricity Customer Framework (NECF).**
- We observe that many of the matters described in this Issues Paper will apply for every third party service provider that seeks to net off appliances in the way suggested by some EV charging agencies to date. This is, by definition, not an EV issue but an issue of new technologies opening up perceived opportunities to businesses seeking to enter the household energy market. Whether it is an EV charging agency seeking child NEMs to separately sell kilowatt-hours, or a white goods retailer seeking child NEMs to offer an air-conditioning service that markets units of cold air, the issues remain the same.
 - Rather than viewing energy market issues through the lens of different business models, Origin would prefer to see policy debates address how we can conceptualise third parties' involvement in a regulated market for an essential service. This is vital if we are to be able to manage the complexity in this area going forward, and to provide certainty to all stakeholders, including consumers. The current approach of recalibrating third parties as agents of the retailer or customer (or customers themselves) is not appropriate, as the definitions are fluid and jeopardise equitable coverage of consumer protections and clarity about market relationships.



- In Origin's view, the issue has not been framed correctly in policy debates to date: the paradigm shift should not be to provide unauthorised (under the NECF) third parties access to competition at every level, but for authorised entities in the market to commercialise the new opportunities that emerge, such as vehicle charging. The issue is then how to authorise third parties; certainly the existing licence arrangements are not appropriate if they are seen to exempt third parties selling energy to small consumers.
- Origin therefore believes that the NECF authorisation regime warrants a reassessment in light of likely third party and consumer requirements. The AER's work to date has been reasonable and comprehensive, but naturally limited by the NECF itself, which does not contemplate the presence of third party service providers in the sense that we now need to.

Please find below detailed responses to the Issues Paper questions.

I would be happy to discuss any aspect of this submission further with the AEMC at your convenience. Alternatively, if you have any queries you can contact Madeleine Lyons (02 8345 5207) or Fiona Simon (03 8665 7865).

Yours sincerely,

A handwritten signature in black ink, appearing to read "Tim O'Grady".

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1. Introduction

Origin agrees with the AEMC's view that while the penetration of EVs will be gradual over the next decade, EVs could account for a significant share of the Australian new car market in the long term.

We also support the intention of the AEMC in its review of Energy Market Arrangements for Electric and Natural Gas Vehicles (the 'Issues Paper') to ensure arrangements cater for innovation and competition in the market and:

1. facilitate consumer choice in the way they use Electric Vehicles (EVs),
2. appropriately allocate costs to the party that causes these costs, as much as is feasible;
3. ensure security, safety and reliability of the electricity system; and,
4. minimise the costs and risks of regulation to service providers and energy users.

We believe that these signals are consistent with those that are required across the wider electricity consumer market to encourage the more efficient utilisation of existing infrastructure.

2. Assessing the take up of EVs

Question 1: 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?

Estimated Percentage of Annual Vehicle Sales

Whilst there are many views on what the uptake of EVs might look like, Origin believes that the estimates provided by AECOM are appropriate for assessing the potential impact of EV's on the electricity market.

Whilst AECOM suggest a significant bias towards PHEVs, we believe that the actual PHEV and BEV split could be significantly different depending upon a number of factors including technology advances, battery cost, relative fuel costs and consumer perceptions.

In the shorter term, the take up rate of EVs, their likely concentration in commercial applications and generally relatively slower rates of charging may mean that the issues identified in the Issues Paper may be less of an immediate concern.

2.1 Estimated impact of EVs on system peak demand in the NEM

Question 2: Do 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?

General comments

While EV penetration is expected to take many years to be material and while it will remain small relative to total increases in peak demand, it remains important to manage it efficiently.

There are many benefits for EV users and non-EV users from charging in off-peak periods and Origin supports energy market arrangements that facilitate this, in particular smart meter charging and TOU pricing.

Wholesale market peak vs network peak

Origin notes that modelling focuses on 'system peak', which in the Issues Paper seems to implicitly refer to wholesale market peaks.

Origin recommends that when modelling EV impacts on peak demand, it is useful to understand and distinguish the impacts of EVs on the two different types of peak in the electricity market - wholesale market peaks and network peaks:

- Wholesale market peaks arise during periods of high demand across the system, relative to available electricity generation capacity.
- Network peaks arise when demand within a *local section* of an electricity network is high relative to local network capacity, different sections of network may peak at different times of day.

Load factor improvements

The Issues Paper notes that greater utilisation of the existing infrastructure may create additional operational maintenance costs and also could lead to such infrastructure being needed to be replaced sooner. However, Origin notes that the benefit of greater utilisation could also be positive due to improved load factors, provided it takes place in off-peak times. AECOM sought to quantify this benefit and suggested that retail tariffs could be reduced significantly provided that mechanisms are implemented to improve utilisation of network assets¹.

Static vs dynamic analysis

AECOM notes that the modelling is a static analysis. Origin recommends that dynamic analysis that examines how increases in energy consumption and peak demand impact the wholesale market would be valuable in time, and should be conducted in the context of a holistic view of demand side participation changes.

¹ Draft Initial Advice, Impact of Electric Vehicles and Natural Gas Vehicles on the Energy Markets, 6 December 2011, p. 66



The assumptions behind the modelling, may have a significant influence on the results. For example, AECOM modelling in high take up scenario and under a 'peaky' daily load profile, found that networks should be able to accommodate EV charging during off-peak periods without increasing the peak load.

Comments on specific scenarios

Origin notes that the two extremes scenarios - un-managed charging and controlled charging are intended to be used to book-end AECOM's analysis - it is important to recognise that they are extremes and as such may not be entirely feasible. AECOM makes this point on page 39 of their modelling report, however it is not reflected in the AEMC's Issues Paper.

Origin also supports AECOM's suggestion that off peak charging should not be mandated and existing market arrangements relating to issues such as FCAS are sufficient.

Un-managed charging

Origin considers the current un-managed charging scenario to be overstated as it assumes that 80% of all vehicles are charged every day during a narrow evening window. It is more likely that vehicle charging under this scenario would be more staggered, although likely to be focussed to the early and late evening. Therefore it is inappropriate to consider the current Un-managed Charging scenario as the central take up scenario, indeed AECOM labelled it a "worst case scenario". If an un-managed charging scenario is to be used as a base case, then it is important that the assumptions that underpin this scenario reflect a central rather than extreme position, and are more reflective of the current business-as-usual environment. Given that TOU tariffs already exist in most regions, it is likely that a large proportion of EV owners will have access to off peak tariffs and therefore a strong incentive to not charge during peak times. Any base case scenario should reflect this. Also, it is unlikely that all drivers will charge their vehicle every evening, given the vehicle range and driver use may not require this.

Time of use charging

Origin notes that the time of use charging scenario is a real option today based on existing technology and market arrangements, and one that is likely to be taken up by EV owners given the very compelling financial benefit that can be immediately realised. Further, it is one that can be supported by existing, low cost technology such as a timer to control charging activity. AECOM have assumed that only 35% of all charging takes place at off peak times, this assumption was based on the view that only those households with two cars will take advantage of off peak charging. Given the strong price signal the consumer receives, as shown on page 44 of AECOM's modelling, and the ease with which this can be implemented, this seems very low, given that the majority of vehicles will not be used during off peak times.

Smart charging

Origin's comments on TOU charging from the previous scenario also apply to this scenario.

Controlled charging

As discussed above, Origin considers this scenario to be an extreme and overstated. In particular, it is unlikely that additional EV related peak demand under the controlled charging scenario would be zero. In the same way that it has been assumed that not all customers participate in TOU arrangements, not all would participate in controlled charging; some would override the arrangement and pay a premium and others would simply make their own arrangements. This is similar to the way controlled hot water example works - some consumption still happens in peak times if the consumer chooses to empty their tank during the day and they still want hot water. A more appropriate reflection of this scenario would be one that assumes a take-up level consistent with the other options, or at least a level of non-participation to reflect the opportunity for consumer choice that will be required.

2.2 Other costs to the electricity market

Question 3: Does this discussion capture all the potential costs impacts that EVs could impose on the electricity market?

The AEMC has described the following additional costs on the electricity market that will arise from a high penetration of EVs:

- Where EVs charge simultaneously, the increased need for the system operator to use Frequency Control Ancillary Services (FCAS) to keep the frequency of the power system within the regulated range during normal operation, or alternatively the development of a load staggering mechanism.
- Cost to the distribution networks if charging is unmanaged, particularly to the low voltage end of the distribution network and at the transformer and zone sub-station level.
- Cost to accelerate any need to replace ageing infrastructure.
- Cost of upgrading local networks where EV uptake clusters at particular locations, which again, might be managed through a staggered controlled load.
- Increased costs of network upgrades in rural regions.
- Costs of on network protection equipment if EVs were used for vehicle to grid/home capability.
- Costs of metering and EV charge control systems particularly under controlled or smart charging, including the development of new IT and communications systems, development of EV tariffs for controllable and smart charging, and potentially separate metering costs if different tariff arrangements were applied to EVs against the rest of the household.

Origin notes that there will be further cost impacts that EVs could impose on the electricity market, and also that the costs above will vary significantly according to the metering approach taken.

The parent-child NMI approach

We believe that institutionalising the parent-child NMI approach will be particularly costly, as it will require additional metering charges, costs of negotiating and managing

arrangements with third party meter providers at the mass market level, onerous (and likely manual) subtractive billing agreements between retailers, systems and process changes to support the complex contractual and financial relationships, and compliance costs for all parties. It is important to note that all of these costs will eventually be recovered from consumers, and this is in an environment of little consumer tolerance for further price rises resulting from network and technology upgrades that are not well utilised or understood. The current community discontent in Victoria related to the smart meter rollout shows us that improvements to metering infrastructure will be scrutinised, and costs will need to be defensible.

We believe that a cost-benefit analysis would need to be undertaken to determine if there are any benefits of further supporting or institutionalising the parent-child NMI approach over the simpler (and existing) market processes. It is also worth considering the possibility that institutionalising embedded networks with child NMIs will be a barrier to competition. *EV charging as the sale of electricity*

The AEMC has outlined a concept of EV charging businesses potentially being exempted from usual retail licensing or authorisation requirements because they are seen to sell something other than energy. In our view, this will be extremely risky, and we can anticipate that the financial, administrative and political costs will be high. If EV charging is not seen as the sale of electricity, third parties will be entering consumer premises to retail what amounts to significant energy load with no specific minimum standards of behaviour other than the Australian Consumer Law. We can anticipate significant consumer confusion, particularly as these third parties will have different and complex business models and no consistency in how they bill or communicate with the consumer. The methods that EV charging agencies use to recover debt, to manage insolvency and to address complaints will similarly be left open. As EV uptake increases the costs of managing this environment will be felt by existing market participants who will be referred to when there are problems, and by regulatory, policy and political staff across the jurisdictions who will similarly have to solve consumer problems with no common understanding of how third parties can or should engage with the market and no clear means of meeting consumer expectations.

Origin believes that there should be a comprehensive examination of the role of third parties across the DSP and EV environments, resulting in a common set of policy and regulatory principles, if not standards. We strongly support third parties selling energy to consumers (or otherwise affecting energy supply, such as through direct load control and supply capacity control) being licensed or authorised to do so under some version of current retail standards.

3. Benefits of EVs on energy markets

Question 4: 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?

Origin considers the benefits outlined in this section of the Issues Paper to be comprehensive and credible.

In Origin's view the key benefits of EVs are their potential to:

1. Increase utilisation of existing infrastructure and therefore lower energy prices and consumer costs. We note for example AECOM's view that EVs will reduce retail energy prices by 2% a year by 2020 and 7% a year by 2030 due to improved load factor.
2. Integrate into the smart home, providing consumers an opportunity for material demand side participation; and in the long term,
3. Utilise battery storage with Vehicle to Grid/Vehicle to Home charging - As the cost of storage technology falls, partly driven by the development of EV technology, home energy storage is likely to become more viable and more prevalent. To realise this opportunity, the battery in an EV should not be treated differently from any other energy storage device in the home.

Origin notes that the benefits of EVs are likely to be greatest when EVs are integrated with all demand side participation. Take the potential for the integration of renewable energy for example, With EVs aggregated in isolation, the potential for renewable energy integration is dependent on the timing and scale of the EV uptake. However, if EV load is aggregated with other demand side activity, it is foreseeable that the renewable energy integration benefit could be realised at a greater scale and sooner.

4. Nature of the service provided when an EV is charged

Question 5: 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?

Origin supports the AEMC's preliminary view that all forms of electricity consumption by a household should be classified as a sale of electricity. We believe that the distinction between non-energy EV tariffs (such as per kilometre tariffs) and kilowatt hour EV tariffs is artificial, and not defensible as a reason to avoid licensing/authorisation under NECF or a retail exemption (with conditions attached). For example, it is hard to see why a residential customer of an EV service charging agency selling kilowatt hours as part of an EV package should be covered by consumer protections but a residential customer of an EV charging agency selling kilometres as part of an EV package should not. The objectives of the regulatory frameworks that gave rise to licences/authorisations were not tied to how energy was priced but to the expectations of communities in how they were to be supplied with a vital household amenity.



The AER's retail exemptions framework

Origin believes that the current AER exemption guideline (as referred to by the AEMC in its Issues Paper) does not seem to have been developed with EVs in mind. The current published view is that charging energy as an undisclosed part of another charge does not constitute a sale of energy. We note that this is a sensible approach for an assessment of traditional embedded networks such as caravan parks – the presence of which often preceded market creation and contestability – but believe it is not appropriate for EV charging agencies for the future. We address this issue further in our response to Question 17. If the current AER Guideline is interpreted by some to justify a position that a model of selling kilometres does not constitute the sale of energy, this should be modified. We expect that the AER would also be sympathetic to this position.

Further, even if the AER's primary criterion is interpreted to find that EV charging is not the sale of energy, the AER's subsequent criteria for individual exemptions (which reflect a high regulatory standard) are immediately relevant to EV charging and provide some indication of policy intent. These criteria require a higher exemption standard where the exempt seller sells energy as a core element of its business, where it has profit intentions, and where energy will be sold in large amounts. It is hard to see how EV chargers could be seen to not fulfil these criteria, at least based on current business models put forward by specialist EV charging agencies.

Implications of EV charging not being viewed as the sale of electricity

The implications for consumers and EV charging service business models if EV charging was not classified as a sale of electricity are significant. As discussed above, this approach will involve third parties entering the consumer premises to retail what amounts to significant energy load with no energy-specific minimum standards of behaviour. The EV charging agencies would not be subject to any of the regulatory provisions of their counterparts who are selling electricity for all other household load. The opportunities present will encourage any and all comers, some with solid business models and practices and some without. Consumers will have to take their chances when signing up to EV charging and will not necessarily understand that some EV charging is managed completely differently to all other energy consumption. There will be confusion about why some EV consumers will be covered by consumer protections (consumers sold kilowatt hours) and others are not, and this will be particularly problematic when it comes to unpicking any problems that might present, such as problems related to poor customer service, complaints management, provider insolvency and debt collection.

As noted above, as EV uptake increases the costs of managing this environment will be felt by existing market participants who will be referred to when there are problems, and by regulatory, policy and political staff across the jurisdictions who will similarly have to solve consumer problems with no common understanding of how third parties can or should engage with the market and no clear means of meet consumer expectations.

It is also worth exploring a hypothetical situation, where EV charging via kilometre tariffs is not seen as the sale of energy and an existing licensed/authorised energy retailer decides to compete with the EV charging agencies on the same terms, that is, the sale of kilometres or some other non-energy unit. Does this mean that the energy



retailer does not have to extend consumer protections to the consumer for EV charging? It is difficult to see how this absurd situation would be tolerated by policymakers and regulators and yet to do otherwise would be inequitable.

We could also consider other developments, such as specialist service providers seeking to split other load from the household, such as air-conditioning. For example, third parties could seek to separately meter air-conditioners and bill consumers of minutes of air at 24 degrees Celsius – the business models could evolve in many different ways and across many different consumer appliances. Also, following this logic, any existing electricity retailer could decide to charge consumers a packaged offer with a non-energy service, rename the units to something other than kilowatt hours, and naturally avoid all regulatory requirements. This is also a logical extension of a decision to view EV charging as something other than the sale of electricity.

EV charging as an essential service

Origin notes the AEMC's view that "it seems unlikely that the supply of electricity to EVs would be deemed to be an essential service" (p. 46), which in today's market – and for the short to medium term – would likely be true.

However, much household energy use could similarly be seen to be non-essential, such as home entertainment and pool maintenance, and as the AEMC has observed, current regulations do not distinguish between essential and non-essential use. All household electricity use is equally able to be counted for concessions and emergency grants despite some energy use being in fact less essential than other consumption. This is the current paradigm and if it is to change to define some consumption as more or less essential we are talking about a far more comprehensive and radical paradigm shift than just a consideration of EV charging market models.

What is seen as essential can also be relative, for example, consumers in need of medical cooling find air-conditioning to be essential despite many other homes doing without cooling, and homes reliant on gas for hot water heating and cooking find gas to be essential despite other homes not having gas supply. In the same sense, we can expect that in the future consumers with EVs will find energy supply to charge their EVs to be essential. It is not hard to imagine a one car (EV) family needing charging at the home to transport the family to school, work or medical care. If the provision of fair and equitable EV charging is compromised in these circumstances it is foreseeable that an essential services case could be made. It is even arguable that transport is more essential than home use (except for life support) as consumers' economic participation in society is affected and employment can be lost without transport. Origin believes that at some point in the future it will be reasonable for owners of EVs to have access to energy emergency grants and concessions schemes as for all household use. Retailers' hardship programmes will be as relevant for EV load as for other household load – particularly given the expected size of the load and costs involved – and any EV charging agency should have to offer such a programme in some form.

While it might be argued that petrol stations do not offer such programmes it is also the case that consumers have a choice of petrol station for every time they fuel the car, and that any one bill for one stop at a petrol station can be (a) rationed by the consumer to be as low as possible (b) paid individually. In contrast, EV charging at the home will be billed to an account, possibly every quarter or every month. It will not be

feasible or economic for a consumer to exercise choice to shift EV charging agency for every time they charge the car, and payment per charge in the home is also unlikely. What this means is that, unlike fuelling at a petrol station, an EV car owner is likely to do the bulk of charging at home, on contract, and with regular payments that cover multiple charges. While we acknowledge that electricity is currently significantly cheaper than petrol per kilometre, the circumstances described are exactly those that have been deemed to require consumer protection regulations - including payment plans - to be in place for energy consumption. The case is no different for EV charging. It should also be noted that petrol stations operate in a competitively neutral environment.

5. Should EVs be treated differently compared to other loads or DSP?

Question 6: Should the treatment of EVs in the electricity market regulatory arrangements be different in respect of any or all of their potential uses?

Origin does not support EVs being treated differently in the electricity market regulatory arrangements in any way. As discussed above, it is artificial to separate EV load from other household load, and we believe that creating such a separation will set an undesirable precedent for the energy market. Consumers are likely to want to control their home as one system, rather than making multiple separate sets of decisions around DSP.

Origin believes that as a policy community we must ensure that energy market arrangements for EVs support the best long term outcome for the market and consumers. This means we must avoid making changes that increase long term cost and system complexity. The best way to achieve this is through market arrangements that treat demand side activities in a holistic manner.

Advocates for the separate treatment of EVs in the electricity market arrangements argue for this on the basis that EV loads are 1. large and 2. mobile². Origin's comments on this are below:

1. Size: EVs constitute just one type of demand side participation and are a small component of future peak demand growth. In this context, exclusive arrangements for EVs are likely to cause unnecessary system complexity and costs, which would ultimately be borne by the consumer with no or little extra benefit. This is in an environment of little consumer tolerance for further price rises resulting from network and technology upgrades that are not well utilised or understood. Furthermore, if EVs are under separate arrangements to other appliances in the home then customer ability to aggregate and optimise all their multiple sources of DSP is limited, as is their ability to utilise the EV to power the rest of their home in the future.
2. Mobility: Mobile energy consumption has impacts on local network demand peaks only. Energy consumption already moves amongst and between local networks because people - the consumers of energy - are mobile. For example,

² Issues Paper, page 36

urban network peaks occur in the middle of the day when a lot of people are at work, whereas local suburb network peaks occur in the early evening when people return home. In this regard, just as EVs constitute one component of DSP and wholesale peak growth, they also constitute just one component of the movements in local network peaks. At this point it is worth reiterating that AECOM's modelling addresses wholesale market peaks and not local network peaks.

6. Metering arrangements

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?*

As a preliminary point, we note that in its discussion of metering types, the AEMC has merged the notions of sub-metering, subtractive and parent-child metering. This loses a key differentiation, which is that the requirement for a separate NMI is not common to all. Parent-child and subtractive metering requires a separate NMI, whereas sub-metering does not.

Origin believes that EVs should be treated as a standard appliance load and that the best means of providing benefit is a form of sub-metering without a separate NMI. We do not think that parent-child NMIs provide an effective solution to the costs and time issues associated with separate metering installations, and, as discussed above, we do not support market rule changes to make parent-child NMIs for EVs a default or mainstream option. Creating an embedded network is hard to undo and impedes the consumer's choice to then aggregate household load under the one energy account with a retailer.

We also note that there are no existing market barriers to this approach for EV charging agencies, as long as they are prepared to pursue the required network exemptions (on the customer's behalf) and obtain licenses or retail exemptions. As discussed in our response to Question 17, Origin believes that EV charging agencies must have a form of retail licence or authorisation.

Our response to Question 13 provides diagrams of the metering options and their characteristics and relative costs. Please refer to this response for further detail on our position.

Origin's position is that roaming NMIs are unworkable due to the settlement processes required across multiple networks and multiple tariffs and times of day. The EV would need to register the network it was in and at what time so that the appropriate network price could be determined. It is hard to see how this approach would be beneficial, as the costs involved to set up the requisite systems and processes would be significant, and the management of queries and disputes would be complicated. This solution would also require charging equipment to be made available at all locations

that the roaming NMI was connecting to, which essentially defeats the purpose of this option as there are other simpler options to identify the user where charging equipment is installed.

Further, a mobile NMI (whether child or not) is a contradiction in terms because NMIs by definition need to be located at a permanent location in a single network. The NMI prefix indicates which network the NMI is located in, and it is this prefix that allows market responsibilities to be allocated. There is no concept in the market of a NMI being linked to multiple networks. Under the market rules each NMI would also require a meter provider and a retailer of last resort. NMIs also do not change, and so second hand sales of EVs (or moving homes with an EV) would be problematic. The alternative option of creating and removing NMIs is also not feasible as the market would be overwhelmed as uptake increased and EV car churn occurred.

• Should metering costs for EVs be recovered any differently than for other existing metering equipment?

Metering costs for EVs should not 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?

Origin believes that the current metering data confidentiality arrangements are appropriate, but would support a more comprehensive analysis of the issues, particularly the questions of who has access to data and under what circumstances.

7. Different options for EV charging

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?

In Origin's view, TOU pricing delivers the majority of the benefits based on current market arrangements and technologies and smart metering will augment this over time. Beyond this, we consider changes to energy market arrangements to be of limited benefit. We note that controlled charging is a viable option, but not in the mandated form suggested in AECOM's modelling, which represents an extreme position that offers no consumer choice.

Origin therefore does not support changes to the regulatory arrangements to allow different battery charge management scenarios. Changes should only be made if there is clear evidence that network peak demands will require significant investment in infrastructure, which is not the case to date. Regulatory intervention is unnecessary as TOU tariffs will appeal to consumers: for convenience most charging will occur in the home, and at night, which will make TOU tariffs attractive as EV charging will use off-peak electricity. By the time EVs have significant uptake, TOU tariffs are likely to be a mainstream product offering, and consumers will see the benefit of using these tariffs.

Furthermore, for the customer the smart home solution that incorporates EVs in a seamless manner is likely to be of most benefit. As the cost of storage technology falls, partly driven by the development of EV technology, home energy storage is likely to



become more viable and more prevalent. To realise this opportunity, the battery in an EV should not be treated differently from a battery in the basement.

• 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?

The system costs can only be apportioned in any visible and objective sense between existing market participants and customers. Nothing prevents contracts being formed to hold non-market participants responsible for costs, but this will be on a case-by-case basis and invisible to the market and policy-makers. In Origin's view, the only way to apportion costs in any clear and observable sense to third parties would be if they are explicitly brought in to the equation as per our suggestion in this submission for third parties to be licensed or authorised under the NECF.

In conjunction with this, smart meter charging is crucial to the facilitation of the appropriate allocation of all system costs to the party in control of charging and ultimately the customer.

Regarding the second question of information provision for smart meter charging, the only way for the market to have certainty is for smart meter charging to occur through existing market processes.

7.1 Pricing of services for EV charging

Question 9: 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?

We reiterate our position above that the sale of electricity for recharging should not be treated any differently to other loads. The only modification we would make to this view is that retail price regulation should not obstruct retailer-set TOU tariffs being part of an EV product offering.

It is also worth addressing a misconception: the AEMC has stated that if the EV load is not metered separately then the opportunity to price electricity differently from all other electricity usage occurring at the same time will not arise. This is not completely accurate: in fact, a meter with a separate circuit and timer, or a smart meter with a separate circuit can provide different tariffs. Multi-element meters are available today and are a reasonable means of minimising metering costs but allowing for measurement of separate loads and tariff differentiation for these loads.

7.2 The structure of retail pricing for EVs

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?*

Origin does not support pricing rules for EVs. While we agree that it is desirable for EV charging to be undertaken at off-peak times of day, TOU tariffs (or other tariff variations) do not need to be mandated. As discussed above, regulatory intervention is unnecessary as TOU tariffs will be appealing to consumers and TOU tariffs are likely to be a mainstream product offering by the time that EVs reach significant levels of uptake. Again, EVs do not need to be treated differently from any load.

7.3 Network pricing for EVs

Question 11: 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?

New or bespoke network tariffs are not warranted for EV charging. Developments in the smart meter environment can be expected to suffice, and TOU tariffs will evolve in the coming months and years to address issues pertaining to household load as a whole and consumer response. The only concern we would have is where retail prices are regulated in a way that is not consistent with the underlying network tariffs, such as flat retail tariffs with an underlying network TOU structure. If there is to be regulatory intervention in pricing (which we do not support in any event) this intervention must account for both retail and network business requirements and allow price signals to be passed through to the end user.

8. Network Infrastructure Issues

8.1 Forecasting the take up of EVs for the system operator and NSPs

Question 12: Are measures required to facilitate more effective forecasting of EV take up for network operator and NSPs?

Whilst measures may be required in the longer term to assist NSPs in their forward planning, it is not yet clear what an effective mechanism might be. The rate of EV take up, development of charging technology and potential for battery storage as well as export capability could all contribute to the concerns that NSPs may have.

8.2 Connection Services

Question 13: 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?

It is important to note that different connection scenarios will have different issues.

Figure 1 below plots four possible scenarios in terms of their system complexity and cost. More detailed summaries of the different characteristics and cost aspects of each scenario are also provided below.

Origin notes that each one of these scenarios is able to be installed under the current energy market arrangements. The costs associated with each scenario would need to be incorporated into the business case of the EV proponent as part of their process for choosing between the scenarios available.

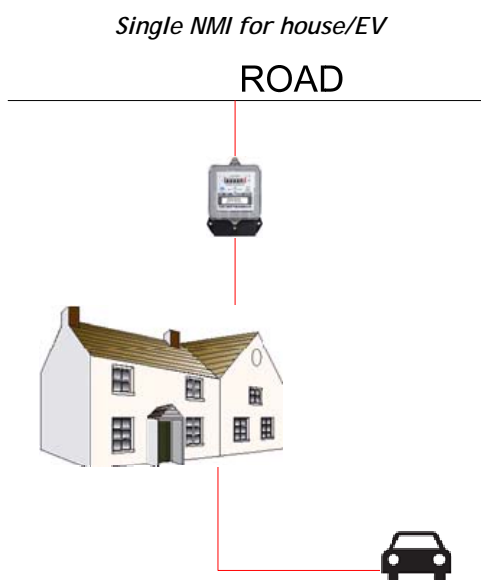
In Origin's view, the most cost effective scenario, for both the consumer and the energy system, is the fourth option - Single NMI for house/EV, with sub-meter (non-market).

Figure 1: Plot of metering scenarios- cost vs complexity

		Cost	
		Low	High
Complexity	Low	Single NMI for house/EV without sub-meter	Separate NMI/separate connection
	High	Single NMI for house/EV with sub-meter	Child NMI/same connection

a. Single NMI for house/EV without sub-meter

- Characteristics: Simple, but EV cannot be measured separately
 - EV is counted as an additional appliance.
 - All usage on the house meter is billed to the customer.
 - Load control is customer controlled - can charge any time.
 - Unable to separate EV usage from household load.
 - TOU tariffs can be offered at the household level.
- Costs: Low
 - Minimal - meter upgrade not required.

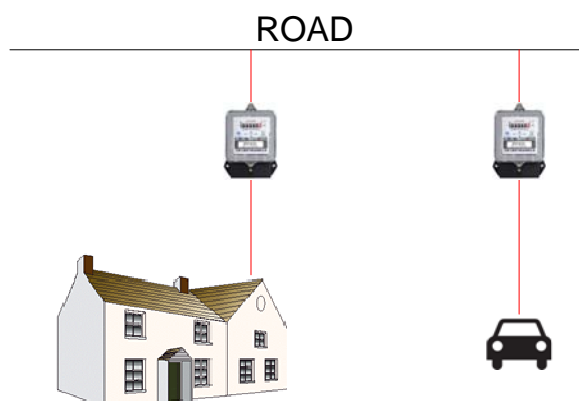


b. Separate NMI/Separate connection

- Characteristics: Simple, EV can be measured separately
 - Two accounts, two sets of network and metering charges.
 - Settlement is easy as the connections are separate customers.
 - Load control can be set easily.
 - Customer can choose to have a separate electricity retailer for each account.
 - No meter upgrade required at the house.
 - Vehicle to Grid connection is totally separate from house - cannot be used internally as connection direct to grid.
- Costs: High
 - High costs of creating separate connection point: infrastructure, site visits and labour.

- Metering and network costs will be in addition to household connection.
- Bi-directional metering would be required for any energy exported back into the grid, and an interval meter would likely be installed as a default.
- No other additional costs for Vehicle to Grid customer.
- Network will have grid concerns regarding charging and then returning energy – same issues as PV.

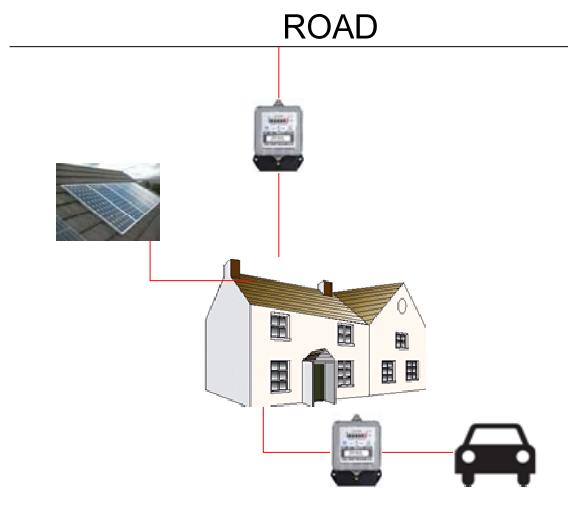
Separate NMI/Separate connection



c. Child NMI/Same Connection

- Characteristics: Complicated, but EV can be measured separately
 - All usage on house meter is billed to customer.
 - Separate off-market settlement required for child NMI/meter for EV.
 - Customer is billed separately for EV usage.
 - Meter upgrade required – Type 5 for both house and EV- customer may also need switchboard upgrades.
 - Load control can be set.
 - Able to separate usage from household load.
 - Separate measured EV usage.
- Costs: High
 - High costs of metering and potential switchboard upgrades.
 - Meter upgrade required for Vehicle to Grid – similar to Solar PV.
 - Substrative billing complexity and cost if separate retailers for house and EV.
 - Billing and settlement issues would be escalated with Vehicle to Grid – how to measure and assign usage back from car to house and then house to grid.
 - No way to separate solar export from Vehicle to Home or Vehicle to Grid.

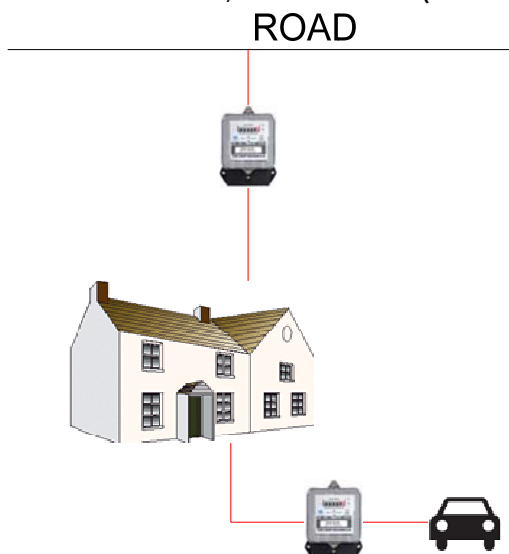
Child NMI/Same connection (showing PV option)



d. Single NMI for house/EV, with sub-meter (non-market)

- Characteristics: Easy, EV can be measured separately
 - EV is counted as an additional appliance.
 - All usage on house meter is billed to the customer.
 - Able to separate EV usage from household load.
 - Would not necessarily require meter or switchboard upgrade: no need for a meter upgrade or a change of tariff but an interval meter would be required for Vehicle to Grid.
 - Sub meter (could be interval) could be installed by registered electrical contractor or could be contained within the EV charging equipment.
 - Load control is customer controlled - can charge any time, can also include own time switch or remote control by charging network operator.
- Costs: Low-Medium
 - Possibly interval meter as above.

Single NMI for house/EV, with sub-meter (non-market)



8.3 Network reinforcement and augmentation

Question 14: 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?

If separate connection points are required, the network may charge the additional connection point costs for upgrading the network. Alternatively the network may refuse the task until work is done on supporting the network.

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

As already noted by stakeholders and the AEMC, at a household level EV charging is the same as large air-conditioning units, but without the peak load impact if suitable load control is in place. The use of EVs at off-peak times can reduce the difference between peak and minimum load and ensure the network is operating more efficiently. Additional connection charges to the network would not be necessary with the EV load as part of the household load, as this would be invisible to network. The customer would then pay the network costs associated with increased usage but not network reinforcement.

It is worth noting that the consumer would need a connection agreement with the network for Vehicle to Grid exports, so the network is aware of load going back to the grid, as well as ensuring connection is isolated and meets safety requirements. Further, an EV Vehicle to Grid connection (if via the house) would not work during an outage: the house could not use the battery for household use unless safety protections were installed to separate the site from the network. However, this would still be unappealing to a network as the risks would remain that supply could go back to the grid.

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?

As noted above, at the small customer level all users should pay (smeared costs) through the usual mechanism, with appropriate network tariffs (TOU) to ensure costs are more reflective of when usage occurs (assuming retailers are not limited in passing through network TOU tariffs).

9. Retail Market Issues

9.1 Retailer and NSP exemptions and embedded (private) networks

Question 15: 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?

The above question appears to presume that EV charging will be found to be the sale of electricity, which Origin supports. We also believe that changes to the existing framework are not required as long as there is recognition of this point. While Origin does not agree that retailer and NSP exemptions should be institutionalised for home EV connections, we acknowledge this may be appropriate for public charging.

There are two potential categories of public charging – either a company such as a shopping centre providing a non-core business charging service to attract customers or an EV charging company rolling out a wide scale network. These two categories may need to be treated differently and existing arrangements can adequately cater for this.

9.2 Allocation of EV charging loads to suppliers - wholesale settlement

Question 16: 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?

Wholesale settlement with mobile charging could become very complex if the ideal is to have any consumer’s EV be able to be charged at any point, with the cost allocated back to the customer. This is the most complex model, and we believe that the settlement arrangements required to support this model will be costly and infeasible. The options become more manageable where there are specific arrangements between parties that consumers move within, such as only using the one charging agency (and retailer) regardless of the location of the charging.

This is manageable with public and commercial charging points, as contractual arrangements can be made between the customer’s charging agency, a partner retailer, and any other relevant entities (such as chain restaurants or cinemas) where a consumer may want to quick-charge. This will not require a separate NMI, but sub-metering within the car or charging cable.



Origin notes that the much simpler solution is to rely on dedicated charging equipment to identify and charge the customer for public charging - every time a customer plugs into a charge they have to be identified any way so why not use this for charging? This solution is already operating effectively in the market today.

9.3 Licensing arrangements

Question 17: 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?

As a preliminary point, we note that the AEMC has said that licensing arrangements remain jurisdictional, which is currently true. However, this should not be the case from 1 July 2012, when the National Energy Customer Framework (NECF) is scheduled to be implemented across most jurisdictions. With the NECF, jurisdictional licensing shifts to national authorisations granted by the AER and a national exemptions regime for energy retailing. This renders the jurisdictional licensing approach largely irrelevant, particularly given the long timeframes for significant EV penetration. With EVs unlikely to have material uptake in the next few years it would not matter even if the NECF was to be delayed: by the time the licensing question has particular relevance the NECF will have been implemented.

EV charging agencies should be covered by the NECF

It has been suggested by the AEMC that it may be worth making changes to the market rules and regulatory framework to provide for competition at the point of the EV load. Origin acknowledges that consumers cannot easily choose different service providers for different appliances, however we question whether there is a genuine consumer preference for this approach. Certainly we would expect the consumer benefit of choice of service provider for different appliance load to be heavily outweighed by the costs of creating a child NMI and creating an embedded network. We cannot accept that it could be appropriate to net off significant load from a household and call it something other than energy - as we have argued above this is entirely artificial and would create a risk for consumers that they are unlikely to fully appreciate. This risk will also be felt across the industry as the inevitable problems of inviting unregulated entities (from an energy-specific perspective) into an essential service environment are felt.

Therefore, in Origin's view, EV charging agencies should be brought under the NECF. As the AEMC has noted, if EV charging is seen to be the sale of electricity, the issue should instead be whether the EV charging service provider would either need to acquire a retail licence (authorisation) or obtain an exemption.

It is worth noting that if choice of EV charging agency (compared with keeping all household load under the one NMI) is highly valued, this choice may not be as intended in a longer term sense. If the EV charging agency is not covered by the consumer protection framework under NECF there will be no way of guaranteeing that a consumer will not be locked into a contract with what would be seen as unreasonable



terms from an energy policy perspective, including the terms under which they switch to another provider.

Retailer authorisations are required

Origin strongly believes that retailer authorisations are required for EV charging agencies. While the parent/child NMI approach suggested by some proponents may lead to a view that providing retail exemptions within embedded networks is a viable approach, we do not agree that this is appropriate, even if conditions are attached to the exemption.

To explain, retail licence and authorisation exemptions have been an uncomfortable reality for policymakers and regulators for some time: exemptions tend to be required where retail competition or separate billing has not been possible under existing licence/authorisation regimes and there is no practical alternative. Some entities such as caravan parks and apartment blocks existed for decades before industry reform brought privatisation, licensing and full retail competition, and, as such, they were not geared toward full consumer participation in the competitive market. The regulatory approach to exemptions has then endeavoured to account for a diverse range of commercial and not-for-profit entities selling to consumers who often cannot receive separate energy bills or retailer choice. It has always been less than ideal that these consumers are essentially invisible to regulatory oversight and their rights to an essential service on equal terms to their neighbours cannot be guaranteed.

The exemptions framework has always thus been problematic from a consumer protection viewpoint, and even the AER's new approach for the NECF will not eradicate issues or create equal rights for all consumers. The problem is not with the exemptions regime itself (and thus able to be 'fixed') but the complex connection, metering and practical issues it was created to address.

This is not the case for the environment that EV charging agencies are seeking to enter; instead we are speaking of households with separate NMIs, access to the full customer protection framework and retailer choice. (There are exceptions, as with current embedded networks, but the general EV charging household will be covered by the NECF.) We do not see a reason for institutionalising exemptions in embedded networks for these customers; certainly there would seem to be intractable problems with bringing this legacy approach to a new market which over time will reflect significant household load and increase in essentiality.

The need to develop a policy framework that includes third parties more generally

As a final point, we observe that the issues described above will apply for every third party service provider which seeks to net off appliances in the way suggested by some EV charging agencies to date. This is, by definition, not an EV issue but an issue of new technologies opening up perceived opportunities to businesses seeking to enter the household energy market. Whether it is an EV charging agency seeking child NMIs to separately sell kilometres, or a white goods retailer seeking child NMIs to offer an air-conditioning service that markets units of cold air, the issues remain the same.

Rather than viewing energy market issues through the lens of different business models, Origin would prefer to see policy debates address how we can conceptualise

third parties' involvement in a regulated market for an essential service. This is vital if we are to be able to manage the complexity in this area going forward, and to provide certainty to all stakeholders, including consumers. The current approach of recalibrating third parties as agents of the retailer or customer (or customers themselves) is not appropriate, as the definitions are fluid and jeopardise equitable coverage of consumer protections and clarity about market relationships.

In Origin's view, the issue has not been framed correctly in policy debates to date: the paradigm shift should not be to provide unauthorised (under the NECF) third parties access to competition at every level, but for authorised entities in the market to commercialise the new opportunities that emerge, such as mobile charging. The issue is then how to authorise third parties; certainly the existing licence arrangements are not appropriate if they are seen to exempt third parties selling energy to small consumers.

Origin believes that the NECF authorisation regime warrants a reassessment in light of likely third party and consumer requirements. The AER's work to date has been reasonable and comprehensive, but naturally limited by the NECF itself, which does not contemplate the presence of third party service providers in the sense that we now need to. There should be a comprehensive review of third party responsibilities to consumers and an examination of how third parties can be brought under the NECF efficiently and effectively. We would support the AEMC taking the lead in this area, in consultation with jurisdictions. To not do this is to risk revisiting the same policy issues for every business model that arises across the smart metering, DSP and EV policy space, and there will be an associated risk of unintended consequences from a fragmented approach. The key questions that should drive how we assess third parties relate to how the end user sees the service relationship and what rights they would expect compared to basic energy use. It may be that the best result is a series of policy criteria and questions that lead to the (consistent) application of specific retail authorisations for third parties of certain types.

10. Vehicle to grid (V2G) and Vehicle to Home (V2H)

Question 18: 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?

Origin is not aware of issues that arise from EV discharging that do not arise from other on-site small scale generation. An obvious key difference between existing on-site small scale generation and EV discharging for the home is that EVs also use energy, and so meters will need to be able to measure consumption as well as generation.

It should be noted that existing solar PV units do not tend to use separate NMIs, and discharge to the grid via the home. As discussed above, we believe that EV charging (and discharging) should be managed the same way.

The question above implies that electricity could only be discharged to the home and not exported to the grid. However, while this may be true where the home uses all discharged energy from the battery it cannot be set as a default. Any Vehicle to Home



connection must also be Vehicle to Grid to ensure system security in the event of the home not using the energy discharged by the car battery.

Further, adding EV discharging to a house with existing solar PV will create complex policy and technical issues, as there will need to be an ability to measure and manage two separate sources of on-site generation that may have different feed-in values. If the EV exports via the home to the grid (that is, there is no separate connection) it will be impossible to tell which of the electrons exported came from the PV unit and which from the EV. Even with three meters (PV, EV and home) this cannot be gauged accurately. Alternatively, if the EV exports straight to the grid it will require a separate (expensive) connection point with a separate NMI, and electricity generated from the EV cannot be used in the home.