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

27th October 2011

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 Approach Paper, released on 22 September 2011.

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 4.6 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 over 500,000 customer accounts on products such as GreenPower. As part of our commitment to innovate 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.

Origin supports the AEMC's intent to highlight the conditions that will enable Australia's energy markets to support the adoption of electric and natural gas vehicles in the most economically and operationally efficient manner. This submission focuses on electric vehicles in the National Electricity Market (NEM).There are a number of initiatives related to electricity market arrangements that are already underway that will support the efficient uptake of electric vehicles; Origin expects these will be complete by the time market penetration of electric vehicles becomes material. The best outcome for the customer and the market is a fully integrated smart home solution, not a standalone electric vehicle solution, and energy market arrangements should reflect this. It is Origin's view that energy market arrangements for electric vehicles do not warrant a separate review and would be best considered as part of the AEMC's Stage 3 DSP 'Power of Choice' review. Concerns that current market metering arrangements represent a barrier to the uptake of electric vehicles and that separate metering with an additional National Meter Identifier (NMI) for electric vehicle chargers are required are unfounded. There is no restriction on separate (or dual) metering today. The creation of an additional NMI at a supply point will not enhance the customer's supply experience, rather it will add complexities to the market and residential supply. Furthermore, customers can get the same or greater benefit using smart (advanced) metering and monitoring.

Origin Energy Limited ABN 30 000 051 696 • Level 45, Australia Square, 264-278 George Street Sydney NSW 2000
GPO Box 5376, Sydney NSW 2001 • Telephone (02) 8345 5000 • Facsimile (02) 9252 9244 • www.originenergy.com.au

Below is an overview of Origin's position. Our responses to specific questions in the Approach Paper are set out in the Appendix.

Origin's position

1. **Origin supports the uptake of electric vehicles in Australia as an opportunity to significantly reduce greenhouse gas emissions, ambient air pollution, and in the longer term, exposure to crude oil prices and oil import dependency.**
    - As consumers and industry become increasingly reliant on electricity and the redevelopment of the related infrastructure to support increasing demand, renewable and distributed generation, electric vehicles represent an opportunity to more efficiently utilise this infrastructure and develop reliable, lower cost transport and energy solutions.

2. **The material penetration of electric vehicles will take many years, which will provide the market with an opportunity to pilot test the impacts of electric vehicles before making any decisions on changes to market arrangements.**
    - There is strong commitment from vehicle manufacturers, technology providers and governments around the world to support the development of the electric vehicle industry. Many leading manufacturers are planning to make electric vehicles available in Australia over the next few years.
    - The key barriers to the material uptake of electric vehicles today are vehicle and battery cost, vehicle range and performance as well as consumer perceptions. These barriers will be overcome in time, although many market observers suggest that it is unlikely that there will be a material penetration of electric vehicles this decade.
    - This period of 'slow growth pilot testing' will enable real understanding of the costs and benefits of electric vehicles, consumer behaviour and advances in vehicle and charging technologies.
    - It would be premature to make significant changes to energy market arrangements at this time as the technology of the vehicles, batteries and related charging systems is expected to develop significantly in the coming years. Changes that seek to solve today's challenges could actually be inappropriate in the future. This risks imposing additional cost and complication and inhibiting a fledgling industry from being established and ignores the significant effort already underway to further the development of the NEM.

3. **Concerns by some market observers that electric vehicles will contribute substantially to peak demand (requiring substantial investment in the distribution network) are unfounded because electric vehicles can be charged at off-peak times.**
    - Some market observers suggest that electric vehicles could create the same peak load challenges that air conditioners have led to in recent years. However, unlike air conditioners, electric vehicle charging requirements are generally flexible and, with the

appropriate signals, can be shifted to off peak times so that the impact on the peak demand load profile is minimised. Time of use pricing and smart metering, which is already available in some regions, and being progressively rolled out to the majority of customers, is expected to provide sufficient signal and guidance to drive this behaviour.

- The nature of vehicle use means that it is likely that most consumers will not be using their vehicle during off peak times, particularly overnight. Given that the average required charge time is likely to be much shorter than the time the vehicle is not in use, this provides flexibility for when the charging session takes place overnight.
- Electric vehicles should lead to an overall decrease in network prices over time provided the appropriate price signals are available. This is because they have the potential to increase average load while flattening demand peaks, leading to a greater utilisation of existing energy infrastructure.

4. **Concerns that current market metering arrangements represent a barrier to the uptake of electric vehicles and that separate metering and NMIs for electric vehicle chargers are required are unfounded.**
   - There is no restriction on separate (or dual) metering today, however the same or greater benefit can be realised using smart metering and monitoring. Furthermore, the creation of an additional NMI at a supply point will not enhance the customer's supply experience rather it will add complexities to the market and residential supply.
   - Smart meters already allow for the separate measurement and control of load and support the development of pricing structures that are beneficial to electric vehicle users.
   - Charging technology, in use in many markets including Australia, has inbuilt metering and control capability and also allows for use and allocation of cost to multiple users of the one charger. This charging equipment can be deployed under the current market arrangements.

5. **A number of initiatives related to electricity market arrangements are already underway that will support the efficient uptake of electric vehicles.**
   - Current developments and advances in electricity markets to support the redevelopment of the network to meet future requirements including increased demand, dynamic fault and voltage management, distributed generation and renewable energy, will also support the efficient uptake of electric vehicles.
   - Smart metering and intelligent communication devices that enable separate measurement and control of load and generation downstream of a customer connection point are being progressively rolled out. This will allow consumers to dynamically monitor and control their energy consumption and the development of tailored pricing structures.
   - Network time of use pricing that supports efficient use of the network is being progressively rolled out and is already available in NSW, Victoria and Queensland. Given that customers are increasingly seeking choice, network tariffs need to be flexible enough for retailers to manage preferences by consumers for different tariff structures (as demonstrated in Victoria with the Advanced Metering Infrastructure roll out). This

will allow customers to receive the appropriate signal and benefit from off peak electric vehicle charging.

- Retail time of use pricing that enables network time of use pricing to influence consumer behaviour is already available in NSW and Victoria and will be available in Queensland from July 2012. This will allow customers to receive the appropriate signal and benefit from off peak electric vehicle charging.
- Electric vehicle charging infrastructure that allows customers to understand and control their electricity use exists and continues to improve as vehicle, battery and charger technology advances and new competitors enter this developing market.

6. **These initiatives, together with existing energy market arrangements, provide sufficient foundation for successful electric vehicle uptake, with only some variation in policy direction required such as retail price deregulation.**
   - The key barriers to the uptake of electric vehicles primarily involve technology and consumer perceptions - and on the whole do not pertain to energy market arrangements.
   - The fundamental electricity market arrangements to support electric vehicle uptake are either in place or are being addressed in the context of broader market concerns and rule change processes.
   - By the time electric vehicles become material the energy market will have changed and many of the required market arrangements that are not currently in place, such as the broad adoption of smart meters and time of use (TOU) pricing, will by then be in place.

7. **Retail price deregulation is fundamental to provide flexible price signals that facilitate the most efficient use of electric vehicles to manage wholesale and network peak demand constraints.**
   - Origin supports the AEMC in its review of electricity market competition by jurisdiction through the Australian Energy Market Agreement.
   - Retail price deregulation has occurred in Victoria and is becoming increasingly pertinent in the context of utilising more demand side participation (including electric vehicles) and smart meters in homes.
   - So long as retail prices remain regulated, the pricing structures that can be offered to customers are limited and the introduction of network time of use pricing poses significant risk to retailers and the energy market.

8. **Incremental changes to supporting regulatory instruments may also be required, however these are not unique to electric vehicles.**
   - Existing inefficiencies in distribution company connection rules and processes may inhibit efficiency or implementation of new technology. Examples of network arrangements that warrant improvement include consistency in: service and installation rules, codes and guidelines for connections; the efficiency of electrical safety checks; and, the timeliness of distributor site visits.

- Origin notes that these changes would be positive for the many services that require interface with the distribution network, including electric vehicles.
- Given that the instruments requiring improvement are at the code and guideline level, and not at the level of the law and the rules, the AER and state energy and safety regulators are best placed to oversee these changes. Origin believes input from State Regulators into this issue over time will be beneficial.

9. **Market arrangements that Origin does *not* consider to be required**
    - The installation of separate metering with additional NMI is an inferior option to smart metering and is not in the best interests of the customer or the market and is likely to lead to increased cost and complexity. Origin does not support separate NMI's for electric vehicle load and it should not be mandated.
    - Consumers should have the choice to install charging equipment without having to commit to complex approval processes or third party aggregators. For example, specific approval is not generally required for other home appliances such as air conditioners.
    - Significant additional investment in the distribution network or additional processes specific to electric vehicles could be avoided, so long as there is broad adoption of smart grids, smart metering, TOU pricing (outlined above) and charging solutions that are integrated into the smart home.
    - Additional scope for integrating electric vehicles with renewable generation can be reviewed over time as the electric vehicle and renewable generation markets mature. The smart metering and TOU pricing developments will likely allow for solutions to be developed that meet this requirement.

10. **The best outcome for the customer and the market is a fully integrated smart home solution, not an electric vehicle specific solution. Energy market arrangements should reflect this.**
    - Smart meters will deliver most of the expected benefits of separate metering with a NMI, and overall, offer a superior demand side participation solution for the customer at lower cost to the market.
    - It is in the customers' best interests to aggregate demand side response from electric vehicles with demand side response from other significant loads (such as climate control systems, dishwashing, clothes drying, pool pumps) and distributed generation sources (such as solar PV, battery storage or co-generation). In this respect, there is nothing that uniquely distinguishes energy consumed for electric vehicle charging from other significant loads at a customer site and electric vehicles do not warrant special arrangements (particularly in relation to metrology).
    - Customers are likely to want control over their vehicle charging activity, in the same way they are likely to want control over the rest of their home. Therefore a solution that provides customers with an integrated approach to managing their home energy requirements is the best outcome.

- Electric vehicle market arrangements should therefore be considered in the context of broader DSP considerations – this review should be integrated into the AEMC's Stage 3 DSP 'Power of Choice' review.

Should you have any questions about this submission please direct them to myself or Madeleine Lyons on (02) 8345 5207.

Yours faithfully,

Tim O'Grady
Head of Public Policy
(02) 8345 5250

Appendix 1: Origin response to specific questions

Question 1: What are the key drivers and likely uptake of EVs in the NEM? Are there any differences in these drivers between NEM and WA?

1. Drivers of Electric Vehicle uptake

The development of the electric vehicle market is being supported by very significant investments by key stakeholders including vehicle manufacturers, governments, technology providers and major customers. The potential greenhouse gas and ambient air pollution reduction benefits of electric vehicles, together with increasing concerns regarding energy security and the price of oil are also key drivers.

Electric vehicle investment

Significant investments are being made in electric vehicle technology by a range of stakeholders, including vehicle manufacturers, governments, technology providers and major customers around the world. For example:

- President Obama has stated that the United States aims to have 1 million electric vehicles on the road by 2015[1].
- German government announced that it would double its existing investment in the roll-out of electric vehicles to 2 billion Euros ($2.7 billion)[2] and have 6 million electric vehicles on the road by 2030.
- Nissan commits to new electric vehicle production facility that will have a capacity of 200,000 vehicles a year[3] from 2013.
- General Electric has committed to buying 25,000 electric vehicles worldwide by 2015[4].
- Google has deployed over 220 charging stations for use by the company and its employees[5]
- PepsiCo Frito-Lay (USA) will introduce 176 electric commercial trucks into its fleet making it the largest commercial electric truck fleet in North America.[6]

[1] http://www.whitehouse.gov/the-press-office/2011/01/25/remarks-president-state-union-address
[2] http://theage.drive.com.au/motor-news/german-push-for-electric-car-supremacy-20110519-1etp7.html (Accessed on 06/07/2011).
[3] Company Statement, March 2010
[4] Company Statement, November 2010
[5] Company Statement, June 2011
[6] http://www.smartplanet.com/blog/business-brains/electrifying-pepsico-ups-progress-on-fleet-updates/10048

Emissions benefit

Electric vehicles, depending on how the electricity is generated, can cut greenhouse gas emissions and ambient air pollution.

Globally, the transportation sector accounts for a large and growing share of greenhouse gas emissions. Motor vehicles alone emit over 900 million tonnes of carbon dioxide (CO_2) each year, accounting for more than 15 percent of global fossil fuel-derived CO_2 emissions[7].

Australia's transport sector currently accounts for approximately 15% of Australia's greenhouse gas emissions.[8] Road transport is the biggest source of transport emissions in Australia - this includes the 12.5 million passenger vehicles currently on the road today and growing in numbers at an average rate of 2% per year.[9]

For more detail, refer to Question 2 'Greenhouse gas emissions benefit relative to coal/oil'.

2. Barriers to Electric Vehicle uptake

The main barriers to electric vehicle uptake relate to vehicle and battery technology, as well as consumer perceptions.

The table below summarises various attributes of electric vehicles and their current role as a driver or barrier to uptake.

Table 1: Barriers to Electric Vehicle uptake

Attribute	Current Status	Comments
Purchase Price	Barrier	The price of electric vehicles is currently significantly higher than a comparable ICE vehicle. This is primarily due to the fact that these are new vehicles not yet being produced at scale and the current cost of the batteries used to power the vehicle. Both these barriers are expected to be resolved over time as manufacturers increase production capacity and battery technology improves.
Running Cost	Driver	Depending on the cost of electricity and charging behaviour, it could cost less than half to power a vehicle with electricity compared to petrol. Further an electric vehicle has a less complex driveline and so is expected to have lower ongoing maintenance costs.

[7] World Resources Institute, Proceed With Caution: Growth in the Global Motor Vehicle Fleet, http://www.wri.org/trends/autos.html
[8] Department of Climate Change http://www.climatechange.gov.au/publications/projections/australias-emissions-projections/emissions-projection-2010.aspx#transport
[9] ABS 2011 http://www.abs.gov.au/ausstats/abs@.nsf/mf/9309.0.

Attribute	Current Status	Comments
Resale Price	Barrier	As with any emerging technology, the current generation of electric vehicles are at risk of being superseded early in their life and the long term performance and replacement cost of batteries is not yet clear, introducing significant uncertainty and risk to vehicle resale prices.
Total Cost of Ownership	Not Clear	Based on the current cost of electric vehicles, and particularly in markets such as Australia where purchase subsidies are not currently available, the lower ongoing running costs do not appear to yet outweigh the upfront purchase premium, particularly when the resale price risk is also considered.
Range	Not Clear	The current range of electric vehicles generally have a battery range of around 160 km per full charge.[10] Research suggests that the average consumer covers 52km/day on average and 90% cover less than 100km/day[11]. So whilst vehicles generally have the capacity to meet the average driver's requirements, consumer perception and range anxiety suggests that this is still likely to be a barrier for many people. PHEVs could clear this hurdle and prove an effective interim step to support the longer term adoption of BEVs.
Driving Experience	Driver	Significant advances have been made in the development of electric vehicles that possess driving characteristics that are comparable with ICE vehicles and some observers suggest that electric vehicles offer a superior experience given the dynamics of the drivetrain and charging method.
Emissions Benefit	Driver	Electric vehicles convert around 75% of the energy they consume into driving power compared to around 25% for an ICE vehicle, and also produce no tailpipe emissions. If an electric vehicle is powered by renewable energy, then no emissions are produced through either charging or driving. The energy efficiency of electric vehicles means that emissions can be reduced, even if they are powered by coal fired generation. See response to Question 2 for further information.

Table 1 continued: Barriers to Electric Vehicle uptake

[10] Mitsubishi (Ashley Sanderson) and Nissan(Darren Holland) presentations - Australian Electric Vehicle Conference Brisbane (2011)
[11]http://www.accenture.com/us-en/Pages/insight-plug-in-electric-vehicles-changing-perceptions-summary.aspx).

Question 2: What are the costs and benefits that EVs may introduce into Australia's electricity markets? Please provide evidence if available.

Given the material penetration of electric vehicles will take many years, the market has an opportunity to pilot test the impacts of electric vehicles and develop a comprehensive understanding of the costs and benefits over time. While the evidence for actual costs and benefits is not yet available based on widespread experiences, this section outlines some of the market implications that can expected from electric vehicles usage.

1. Network and energy impacts

To determine the costs and benefits to the electricity market of electric vehicle charging, the most salient issue concerning industry is that of charging behaviour. Electric vehicle charging may occur over a range of potential charging scenarios including:

- Unmanaged charging - whereby electric vehicle owners charge anytime as required;
- Managed charging - whereby electric vehicle owners are provided with time of use tariffs and encouraged to charge during off-peak periods through pricing signals; and,
- Controlled or 'smart' charging - whereby electric vehicle charging is managed automatically using preset parameters or by a third party utilising direct load control or smart grid applications.

Peak demand

Concerns by some market observers that electric vehicles will contribute substantially to peak demand (requiring substantial investment in the distribution network) are unfounded because electric vehicles can be charged at off-peak times.

- Some market observers suggest that electric vehicles could create the same peak load challenges that air conditioners have led to in recent years. However, unlike air conditioners, electric vehicle charging requirements are generally flexible and, with the appropriate signals, can be shifted to off peak times so that the impact on the peak demand load profile is minimised. Time of use pricing and smart metering, which is already available in some regions, and being progressively rolled out to the majority of customers, is expected to provide sufficient signal and guidance to drive this behaviour.
- The nature of vehicle use means that it is likely that most consumers will not be using their vehicle during off peak times, particularly overnight. Given that the average required charge time is likely to be much shorter than the time the vehicle is not in use, this provides flexibility for when the charging session takes place overnight.
- Electric vehicles should lead to an overall decrease in network prices over time provided the appropriate price signals are available. This is because they have the potential to increase average load while flattening demand peaks, leading to a greater utilisation of existing energy infrastructure.

Origin Energy Limited ABN 30 000 051 696 • Level 45, Australia Square, 264-278 George Street Sydney NSW 2000
GPO Box 5376, Sydney NSW 2001 • Telephone (02) 8345 5000 • Facsimile (02) 9252 9244 • www.originenergy.com.au

Network pricing

Electric vehicles have the potential to put downward pressure on network costs. This is because firstly, it will limit the impact of electric vehicle load on peak demand and therefore reduce expensive network upgrades. Secondly, it has the potential to actually create a reduction in energy bills, or a reduction in bill rises, through reduced network rates by a more efficient utilisation of existing infrastructure.

For these benefits to be realised, time of use network pricing is required to ensure customers receive the appropriate signal and benefit to undertake off-peak electric vehicle charging.

2. Generation impacts

Smart metering and TOU pricing developments will likely allow for solutions to be developed that meet the additional scope for integrating electric vehicles with renewable generation. This can be reviewed over time as the electric vehicle and renewable generation markets mature.

In addition, customers who want to power their vehicles with green power, will play a role in underpinning new renewable energy investment.

3. Customer impacts

See response to Question 3 'Smart home'.

4. Environmental impacts

Greenhouse gas emissions benefit relative to coal/oil

The most effective way to compare greenhouse gas emissions of conventional and electric vehicles is on the basis of 'well-to-wheel' emissions, which cover tail pipe emissions whilst driving and emissions from the production and distribution of petrol or electricity. On this basis, using figures from the National Greenhouse Accounts Factors (July 2010), the emissions of an average new conventional car are 230 gCO_2/km, while the emissions from an electric vehicle can be zero -provided they are powered by 100% renewable energy. Table 2 below illustrates this point by comparing a selection of conventional and electric vehicles.[12]

Note: this comparison excludes consideration of embedded emissions from vehicle manufacture, which also contributes to vehicle life cycle emissions.

[12] Green Vehicle Guide, adjusted for well-to-tank emissions.

Table 2: Comparison of vehicle well-to-wheel greenhouse gas emissions

Make/Model	Year	Fuel Source	Well-To-Wheel Emissions (g/GHG/km)
Average new passenger car	2010	Unleaded petrol	230
Mitsubishi i-MiEV	2010	Charged without GreenPower in Victoria (brown coal)	181
Mitsubishi i-MiEV	2010	Charged without GreenPower in NSW (black coal)	144
Toyota Prius	2010	Unleaded petrol	89
Mitsubishi i-MiEV	2010	Charged with 100% GreenPower	0

Source: Green Vehicle Guide, Department of Infrastructure and Transport. Includes driving and fuel production emissions

Question 3: What are the appropriate electricity market regulatory arrangements necessary to facilitate the efficient uptake of EVs?

A number of initiatives related to electricity market arrangements are already underway that will support the efficient uptake of electric vehicles:

- Current developments and advances in electricity markets to support the redevelopment of the network to meet future requirements including increased demand, dynamic fault and voltage management, distributed generation and renewable energy, will also support the efficient uptake of electric vehicles.
- Smart metering and intelligent communication devices that enable separate measurement and control of load and generation downstream of a customer connection point are being progressively rolled out. This will allow consumers to dynamically monitor and control their energy consumption and the development of tailored pricing structures.
- Network time of use pricing that supports efficient use of the network is being progressively rolled out and is already available in NSW, Victoria and Queensland. Given that customers are increasingly seeking choice, network tariffs need to be flexible enough for retailers to manage preferences by consumers for different tariff structures (as demonstrated in Victoria with the Advanced Metering Infrastructure roll out). This will allow customers to receive the appropriate signal and benefit from off peak electric vehicle charging.
- Retail time of use pricing that enables network time of use pricing to influence consumer behaviour is already available in NSW and Victoria and will be available in Queensland from July 2012. This will allow customers to receive the appropriate signal and benefit from off peak electric vehicle charging.
- Electric vehicle charging infrastructure that allows customers to understand and control their electricity use already exists and continues to improve as vehicle, battery and charger technology advances and new competitors enter this developing market.

Retail price deregulation is fundamental to provide flexible price signals that facilitate the most efficient use of electric vehicles to manage wholesale and network peak demand constraints.

- Origin supports the AEMC in its review of electricity market competition by jurisdiction through the Australian Energy Market Agreement.
- Retail price deregulation has occurred in Victoria and is becoming increasingly pertinent in the context of utilising more demand side participation (including electric vehicles) and smart meters in homes.

- So long as retail prices remain regulated, the pricing structures that can be offered to customers are limited and the introduction of network time of use pricing poses significant risk to retailers and the energy market.

So long as retail prices remain regulated, the pricing structures that can be offered to customers are limited and the introduction of network time of use pricing poses significant risk to retailers and the energy market.

Market arrangements that Origin does *not* consider to be required are:

- Separate metering with a NMI
- Significant additional investment in the distribution network necessary to support Electric Vehicles;
- Additional scope for integrating Electric Vehicles with renewable generation, at this time

*The best outcome for the customer and the market is a fully integrated smart home solution, not a separate stand alone electric vehicle solution, and energy market arrangements should reflect this.*A more detailed discussion of appropriate energy market arrangements for electric vehicles is provided in this context below.

1. The Smart Home

Smart metering and the smart home

Bundled demand side participation (DSP) with flexibility and control at the appliance level – ie Electric Vehicles bundled with other discretionary and time-shiftable loads - increases incentives for time shifting and improves system load shape. Ultimately, it enables a technology and demand source neutral whole-of-DSP solution that aggregates the maximum quantum of demand side activity enabling maximum participation by customers.

While early generation smart meters enable visibility and understanding of consumption at the whole-of-house level, new generation smart metering provides for separate measurement and control of loads and generation downstream of a customer connection point at the appliance level. Figure 1 below illustrates the potential composition of a smart home.

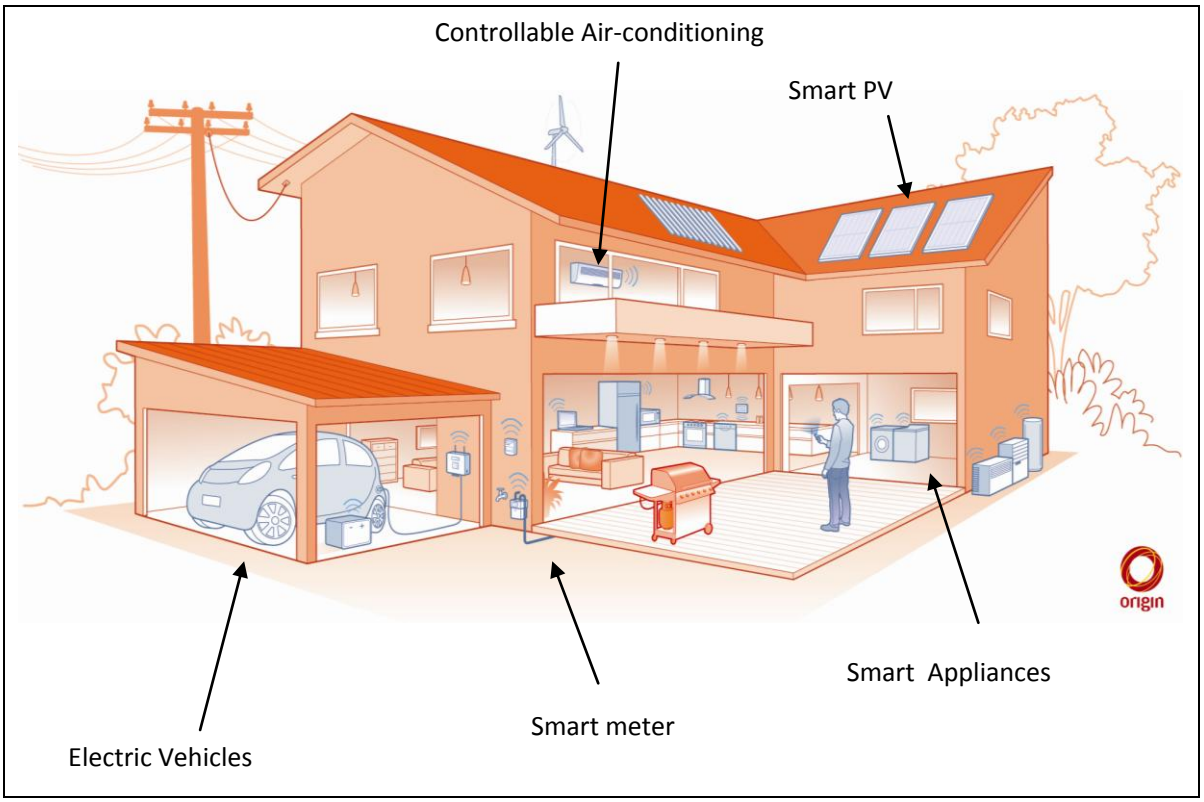

Figure 1: Potential composition of a smart home

There are a range of smart metering technologies available today that will support the introduction of Electric Vehicle charging at premises. For example, smart plugs, wireless measurement and control, and home area network technologies are capable of managing Electric Vehicle charging with minimal effort required from the customer while optimising the impact of charging on the electricity distribution network.

In Origin's experience, it is in the customers' best interests to aggregate DSP from Electric Vehicles with DSP from other significant loads (such as climate control systems, dishwashing, clothes drying, pool pumps) and distributed generation sources (such as solar PV or co-generation). In this respect, there is nothing that uniquely distinguishes energy consumed for Electric Vehicle charging from other significant loads at a customer site and Electric Vehicles do not warrant special arrangements (particularly in relation to metrology).

Customers are likely to want control over their vehicle charging activity, in the same way they are likely to want control over the rest of their home[13]. Therefore a solution that provides them with an integrated approach to managing their home energy requirements is the best outcome.

[13] *Plug-in electric vehicles Changing perceptions, hedging bets*, Accenture Page 25

Origin therefore strongly recommends that Electric Vehicle market arrangements be considered as part of broader DSP arrangements - for example this review should be integrated into the Power of Choice review,

Smart vs separate metering with an additional NMI

There is a position taken by some industry participants that a separate (or dual) meter and NMI, for example child meter with a NMI, for electric vehicle charging load at residences and commercial properties is a prerequisite to the efficient uptake of electric vehicles. Origin does not support this proposition because it is at odds with the capabilities created by smart metering and smart homes (outlined above).

The case made by some participants for separate metering with a NMI is that it enables isolation benefits such as the following:

- Separate DSP for Electric Vehicles - measurement, monitoring and charging of Electric Vehicle electricity consumption
- Separate accounting for renewable energy consumed by Electric Vehicles
- Management of tax and related matters for commercial fleet vehicles

While separating the EV charging load using a separate meter and NMI can support these benefits, it is not a necessary condition, nor is it the most efficient option. Smart meters and home area networks will likely deliver all the expected isolation benefits, whilst offering a superior DSP solution for the customer at lower cost to the market:

- Separate metering with an additional NMI is not in the best interests of the customer, as a customer has an interest in aggregating and optimising all of their DSP.
- As outlined above, there are already a range of smart metering technologies available today that provide for separate measurement and control of loads downstream of a customer connection point (including Electric Vehicles)
- Additional costs associated with the creation of a separate NMI involve not just the initial metering installation costs, but also the ongoing flow-on costs associated with the administrative market complexity caused in effect by having more than one energy supplier connected to a single home.
- Historically, dual metering was used to separately measure general use domestic consumption and off-peak hot water consumption. For full retail competition, a separate NMI was not created for each meter; such a practice would involve additional costs and involve an administrative burden on the NEM. A type 5 metering installation replaces the need for dual metering, as it has the capability of measuring both general use consumption and off peak load, not requiring a further NMI.
- In addition to the wholesale market complexity of separate NMI's, the customer has the burden of managing additional supply contracts, separate billing and likely invoking two connection supply charges for the site. This complexity is not likely to be a desirable

option for customers who tend to prefer simple and clear price signals that maximise efficient use and minimise the cost of all electricity consumed on site.

- To preserve market integrity and maintain equality amongst participants, anyone that wished to be the Financially Responsible Market Participant for a separate NMI created under this arrangement would need to be subject to existing market and prudential requirements; hence the current market structure is likely to be less costly given the avoidance of duplicate processes.

At most, separate metering may be an interim solution in instances where smart metering solutions have not already been installed. However, Origin considers it preferable to consider the option of installing a smart meter with every Electric Vehicle, in a similar way to some regions that have required a meter upgrade at the cost of the customer when installing a solar PV system. Separate metering with a NMI should certainly not be mandated.

Origin notes that while it does not consider separate meters as the best approach, the installation of separate metering is already possible now, without changes to energy market arrangements.

- Current metering competition means that customer choice for metering already exists in current NEL/NER framework. While the responsibility for most basic meter services (provision and data services) for small customers is assigned to distribution businesses (e.g. type 5-7 meter services), where a customer or service seeker is willing to install a remotely read meter (type 4 or higher), there is a choice of provider for metering and meter data services. This provider may be the local network distributor, another distributor or a third party. To the extent that regulated meter services are too costly, Electric Vehicle service providers, their customers and retailers can seek out more competitive services where this is commercially viable. Again, Origin believes the current provisions, particularly in the National Electricity Rules, accommodate these alternatives and no significant changes are required.
- Current settlement rules allow for more than one NMI at a customer site and there is no need to alter this process in the NEM. Parent and child NMI arrangements are recognised under the existing rules and are understood by participants.

2. Network time of use pricing

As smart metering is rolled out on a broader scale, time of use pricing will become more prevalent and this will underpin efficient EV uptake. EV charging will be a new discretionary load – like climate control systems, dishwashing, clothes drying, pool pumps - that lend themselves to time-varying price structures. Such pricing structures can and will provide incentives for customers with EV charging facilities.

There is a recognised need for flexibility in network tariff assignment, as consumer acceptance of new pricing structures will be encouraged where they are provided with the opportunity to choose the pricing structure that is right for them. Mandatory network tariff reassignment without a similar reassignment of retail prices will not result in the delivery of effective price

signals, nor will it improve the utilisation of the distribution network. In Victoria, this issue has resulted in some controversy. In New South Wales, customers have opted out of (network) time of use tariff structures and reverted to flat prices.

Separate retail pricing of Electric Vehicle loads, ahead of community acceptance and experience with whole of house time of use pricing, may confuse customers and result in decreased take up of time of use pricing more generally.

3. Deregulated retail pricing

As discussed above, retail price deregulation is fundamental to provide flexible price signals that facilitate the most efficient use of electric vehicles to manage wholesale and network peak demand constraints.

Current regulated retail pricing with time of use tariffs, while preferable to flat pricing structures, still inhibits innovation, particularly where regulated structures and price levels discourage alternatives through lack of cost reflectivity (structure) or use of an inefficient price ceiling (price level). In markets where competition is found to be effective, the removal of retail price regulation increases the range of potential product offerings that can improve incentives for the Electric Vehicle market, as well as other forms of DSP.

Question 4: What are the required changes to the current electricity market regulatory arrangements and suggestions for reform to facilitate the efficient uptake of EVs?

Existing energy market arrangements provide sufficient foundation for successful electric vehicle uptake, with only some variation in policy direction required such as retail price deregulation.

The key barriers to the uptake of electric vehicles primarily involve technology and consumer perceptions - and on the whole do not pertain to energy market arrangements.

The fundamental electricity market arrangements to support electric vehicle uptake are either in place or are being addressed in the context of broader market concerns and rule change processes.

By the time electric vehicles become material the energy market will have changed and many of the required market arrangements that are not currently in place, such as the broad adoption of smart meters and time of use (TOU) pricing, will by then be in place.

The only fundamental market arrangement that requires change is deregulation of retail pricing.

In this regard, as discussed in Question 3, Origin supports the AEMC in its review of retail electricity market competition by jurisdiction through the Australian Energy Market Agreement. So long as retail prices remain regulated, the introduction of network time of use pricing poses significant risk to retailers and the market and limits the pricing structures that can be offered to customers.

Supporting regulatory instruments may require incremental changes, however these are not unique to Electric Vehicles.

Existing inefficiencies in distribution company connection rules and processes may inhibit efficiency or implementation of new technology. Examples of arrangements that may warrant improvement include consistency in: service and installation rules, codes and guidelines for connections; the efficiency of electrical safety checks; and, the timeliness of distributor site visits. Origin notes that these changes would be positive for the many services that require interface with the distribution network, including electric vehicles.

As noted previously, reform and improvement of these rules and processes are state-based and affect a range of network services and consumer and retailer needs.Given that the instruments requiring improvement are at the code and guideline level, and not at the level of the law and the rules, the AER and state energy and safety regulators are best placed to oversee these changes. Origin believes input from State Regulators into this issue over time will be beneficial.

Table 3 below summaries the status of some of the key market arrangements pertaining to electric vehicles.

Table 3: Electric Vehicle Market Arrangements - Summary table

Market arrangement	*Status*
Fundamental market Arrangements	
Smart metering	On track under states responsibility, expect to have broad adoption by the time Electric Vehicle market is material. In the meantime, can consider mandating smart metering with Electric Vehicle purchase. No additional changes to market required specific to Electric Vehicles (that are not already being considered through other channels and processes).
Separate metering with a NMI	Already possible, no changes to market arrangements required. Improvements to connection processes in the regulations will benefit all users connecting to the NEM, including Electric Vehicles.
Network TOU	Required and in place, managed by AER, consistent network tariff assignment policies may be required.
Retail price deregulation	Required and not in place outside Victoria.
Investment in the distribution network	Not required or minimal, provided there is effective network TOU and appropriate signals to retail customers. Responsibility of AER.
Scope for integrating Electric Vehicles with renewable generation	Not required at this point in time. Slow growth pilot testing of Electric Vehicles will assist in developing clarity on future requirements
Supporting market Arrangements	
Distribution company connection rules and processes	No material issues preventing Electric Vehicle uptake. Incremental improvements will always be possible eg review to enhance efficiency of network processes. Responsibility of states and AER.