Submission to the AEMC Review of Energy Market Arrangements for Electric Vehicles - *Issues Paper*

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Australian Energy Market Commission

PO Box A2449

Sydney South NSW 1235

Contact person for submission

Tim Watts
Better Place Australia
114 Balmain St
Richmond VIC 3121
Tel: (03) 8679 0800
Email: tim.watts@betterplace.com
Website: www.betterplace.com.au

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The AEMC's *Issues Paper* concluding section states that the Review's overall task is to answer 5 Key Questions:

1. **Should EV loads be treated differently to other loads?**
2. **If yes, then how can EV loads be separated from non-EV loads?**
3. **How can any technical barriers to EV services be addressed? For example, efficient metrology arrangements or licensing conditions.**
4. **How should the market allocate costs consistent with the causer-pays principle to ensure that inefficient cross-subsidies are minimised? For example, EV-related costs for connecting to the distribution network.**
5. **If it is not possible to allocate costs, what is the optimal way of incentivising EVs in order to minimise their impact on peak demand?**

Below are responses to these 5 Key Questions from Better Place Australia.

1. Should EV loads be treated differently to other loads?

Yes, EV charging loads should be treated differently to other loads.

They warrant different treatment because of the following combination of characteristics:

- **Compared to other common devices in the home**, **EV charging is a very big load** – When charging is occurring, a 2012 EV will add 3.7 kW to 7.4 kW to the amount of power a home is drawing from the distribution network. To put this in context, a recent study by Philip Paevere of the CSIRO *Electric Driveway* project reported that during waking hours a 3 Star-rated Australian home consumes between 0.5 kW to 2.2 kW for lighting and appliances.[1] While air-conditioning is running, the typical home's overall rate of consumption rises to 4 kW to 6 kW. So, EV charging is a very significant size of load. Furthermore, rates of EV charging will increase over time as EVs already announced from manufacturers like Ford and BMW with bigger batteries and with the capacity to be charged at faster rates, are brought to the market.
- **EV charging occurs at a different time to EV use –** Most consumer appliances for lighting, cooking, cooling, heating, and entertainment typically draw electricity from the distribution network at the same they are being used and enjoyed. Therefore, shifting the timing of these loads around must necessarily have a direct impact on consumers' lifestyle and personal habits. In contrast, EVs have high capacity batteries which store electricity via the charging process for later use in propelling the vehicle around the road network. EV charging occurs at a different time to EV use. EV charging load therefore has the potential to be shifted in time without directly impacting consumers preferred times for using their EVs for transportation.
- **EV drivers have a large window of time in which their charging can occur** – Our consumer research indicates that an average car is parked for 20 of the 24 hours in a day. Using a 3.7 kW charger, it takes only 2 to 3 hours to refill a battery in a 2012 EV after the average

[1] Paevere, P., *Spatial Modelling of Grid Impacts from EV Charging and Discharging,* CSIRO Energy Transformed Flagship, Presentation to Smart Utilities Conference, November 2011, Sydney.

Australian vehicle's daily journey of 40 km. So, an EV driver has a lot of flexibility in when their EV charging is scheduled.

- **EV charging is amenable to remote management by aggregators** – As flagged above, EV charging is well suited to being shifted in time because there is a large window of opportunity during which charging can occur without impacting driver amenity. It is also straightforward to monitor an EV battery's state of charge to identify those rare occasions when urgent charging is necessary. Therefore, EV charging is well-suited to active management by aggregators like Better Place who can schedule charging at periods which both: (I) Deliver the battery refill outcome which drivers need it; and (II) Keep electricity costs to a minimum by monitoring in real-time the wholesale price of energy and the real-time cost of network services. While the transaction costs for an individual EV owner of monitoring energy and network costs may be prohibitively high relative to the potential savings, this is not the case for an aggregator managing a portfolio of EV chargers at a range of different customer homes and workplaces.
- **EVs move around and charge in different places** – Home, work, shopping centres, train stations, airports and entertainment venues are all places where vehicles spend significant stretches of time parked. In many cases, the site owner is different to the party seeking to fill up their battery. An electricity retail customer is identified by their status as occupant of a particular property. In contrast, an EV charging services customer plugs in at a range of different locations and needs service at each.
- **The person or company responsible for an EV's fuel costs is often not the party who is the retail electricity customer for the premises where the charging occurs** – EVs that are company cars or salary-packaged vehicles are usually charged at employees' homes overnight. However the employer not the employee is the party responsible for paying the EV's charging costs. The reverse applies to employee-owned EVs parked in employer-provided carparks at offices or industrial facilities. Residential apartment buildings often provide residents with dedicated parking spots in their basements. The building's body corporate is typically the retail electricity customer for lighting, equipment and services in the basement, but it is the resident owner of the EV who is responsible for paying the EVs charging costs.

What are the implications of these distinctive characteristics of EV loads?

A. With the right regulatory settings, EV loads have higher potential than most other household loads to being actively managed to occur at times which improve the efficiency of utilisation of the existing electricity network and generation assets.
B. EV owners and service providers are seeking new types of network connections, metering installations, tariff structures and billing models which have not traditionally been available in the NEM. Current regulations which are based on the traditional 'sale of electricity' by electricity retailers to occupants of residential and commercial premises need reform.
C. Third party EV load managers like Better Place are active in the Australian market and will be substantial demand-side participants in the NEM, if the right regulatory settings are in place.

2. If yes, then how can EV loads be separated from non-EV loads?

Consumers will benefit from greater choice of business models, providers, and product features for their EV charging needs, if they have access to cost-efficient methods to separate EV charging loads from other loads at residential or commercial premises. This separation should not be mandatory, but available at a reasonable cost and on a timely basis if customers seek it.

By 'separate', we mean:

- Establishment of a metering configuration at the premises which captures the time and volume of the EV-specific consumption, and
- Allocation of a National Metering Identifier (NMI) for the EV charging load specifically.

The allocation of a unique NMI is important because the NMI serves as the customer or account number in the NEM. Like a telephone number in the phone system, the NMI is what allows that load to be a discrete, independent participant in the market. Each NMI holder has the right to secure their own contracting and billing arrangements for energy supply.

Under National Electricity Rules, each NMI is allocated to one Market Participant (an authorised Retailer or a Registered Market Customer) who is financially responsible for two main things:

I. Settlement in the wholesale market for the volume of electricity reported for this NMI.
II. Settlement with distributors for Network Use of System (NUOS) charges incurred for this NMI.

In general, wholesale market prices and NUOS prices are lower when there is spare generation and network capacity. Allocating a separate NMI to the EV charging load at a site enables the party managing that load to benefit financially from scheduling charging during periods when there is spare generation and network capacity, thereby contributing to the overall efficiency of the electricity system.

With access to separate metering and a NMI, consumers can:

A. Ensure their employer, their small business or fleet management organisation is the party billed for their EV charging load at home, while retaining their home electricity account and retailer, if required.
B. Choose providers with different business models than electricity retailers. For example, Better Place's subscription package provides the EV driver with a bundle of services for a fixed monthly fee, including:
    i. Use of an EV charging appliance, installed in their home and managed remotely by the Better Place network operations centre;
    ii. All the electricity drawn by that charger;
    iii. Use of an EV battery for their EV;
    iv. Unlimited access to Better Place battery switch stations and public charge spots at various convenient locations across the road network.
C. Seek pricing products from different retailers for their home and for their EV charging – For example, an EV-specific time-of-use tariff structure which suits their flexible EV charging load and a flatter tariff structure for their less flexible home electricity consumption.

D. Access the electricity market for their EV charging load in circumstances where they park and charge their EV in the shared garage at the bottom of their apartment building or at their workplace.

Australia is not unique in needing to develop new metering protocols for EV charging load. Regulators in a range of other jurisdictions have concluded that metering regulations need to be reviewed in light of the growing market for EVs.[2]

3. How can any technical barriers to EV services be addressed? For example, efficient metrology arrangements or licensing conditions.

Current regulatory arrangements act as a barrier to customers accessing the full range of EV charging services at a reasonable cost. These regulatory barriers serve to reduce customer choice and competition in the NEM. They also serve to reduce the competiveness of the electric vehicle relative its internal combustion engine (ICE) vehicle competitors. Electric vehicles offer low-cost, high-performance transportation which is demonstrably superior to petrol-fueled cars for many Australian drivers and fleet operators. Removing regulatory barriers to EV charging services in the NEM will have the positive flow-on benefit of strengthening competition and choice for consumers in the new and used vehicle markets.

Proposed Regulatory Change I – Two Financially Responsible Market Participants should have the right to share a connection and metering installation, if the premises occupant authorises it

Under current regulations, the only way to establish separate metering and a NMI for an EV charging load at home or workplace is to apply for a new connection to the distribution network and to essentially duplicate the connection assets and metering installation already in place at the property. Every NMI must have its own connection point and metering installation. This means physically tapping into the distribution network, putting in a new meter panel, a new supply disconnection device, new meter, and new switchboard with main switch, just for the EV charging load. Essentially, to request a new NMI under current regulations requires establishing a 'new occupancy' or 'premises' with its own unique electrical system. This typically costs $1000 to $8000 per site. Attachment 1 outlines the costs and delays incurred in establishing separate metering and a NMI for the EV charging load at 3 typical homes in suburban Melbourne in 2011-12 who were participants in the Victorian Government's Electric Vehicle Trial.

A more efficient alternative approach is to allow two NMIs to be allocated for one metering installation. This would mean that a customer is authorised to retain the use of their existing connection assets, switchboard and meterboard and simply upgrade the meter itself to make it capable of measuring the EV charging load, independent of the remainder of the premises. This can be achieved via use of a 2nd meter on the meterboard or the use of 2 or even 3 element meter. The AEMO-accredited Meter Data Agent responsible for the metering installation would then collect and distribute to the Market Settlement and Transfer Solution (MSATS) system two datastreams: (I)

[2] Better Place is aware of regulatory review processes on EVs and metering underway in Denmark, the European Union, and California.

consumption data for the existing NMI for the household load and, (II) consumption data for a new NMI for the EV charging load.

Figure 1 below outlines the difference between the inefficient duplication of connection and metering assets under current regulations and the model of 2 NMI at the one metering installation we are proposing:

	Under Current Regulations	Proposed Approach	Average Net Benefit
Item	**Second F.R.M.P. installs second metering installation and connection**	**Two F.R.M.P. share the one metering installation and connection**	
1. Meter panel	Replacement larger meter panel	Retain existing meter panel	Saving of ~$1000
2. Supply disconnect device	Additional supply disconnection device	Retain existing supply disconnection device	Saving of ~$50
3. Meter	Additional meter	Replacement of old meter with new two element meter	Saving of ~$150
4. Main switch	Additional main switch	Retain existing main switch	Saving of ~$50
5. Switch board	Additional switchboard	Retain existing switchboard	Saving of ~$500
		ESTIMATED TOTAL	$1,750

Figure 1 – Savings from Proposed Regulatory Change I

It is important to recognise that at thousands of small customer sites across the NEM, meter data providers are already collecting and distributing multiple datastreams to AEMO's MSATS system from a single site. This occurs for customers with metering configurations for off-peak hot water or slab heating and for customers with solar panels. These multiple datastreams are now aggregated into a single NEM-12 format file for the NMI. But with changes to metering regulations these datastreams could be reported into the MSATS database as separate NMIs.

Regulatory changes required include amendments to the Responsible Person (RP) clauses in the National Electricity Rules to clarify how the RP for a metering installation shared by two FRMP is determined. New regulations to govern disconnections in the case of non-payment of bills by the customer of one FRMP sharing the metering installation will also be required. Full customer consent will clearly be an important first step requirement before a shared metering installation is established at a home or workplace.

Proposed Regulatory Change II - The premises occupant should have the right to choose the features of their own metering installation. Right now this right is held by their retailer and distributor

If a premises occupant wishes to make changes to their metering installation, they cannot do so without their current retailer's and distributor's permission. The current design of the 'Responsible Person' clauses in the National Electricity Rules enables the incumbent retailer and, in some cases, the distributor, to block requests for metering installation changes using AEMO's MSATS Procedures.

For example, when a business provides an employee with a company car EV with a Better Place subscription our first step is to establish charging services for the employee at their home, including

a new NMI for which Better Place will be the billable party. Adding a new NMI to an existing premises requires change requests to be submitted via AEMO's MSATS system. Under MSATS procedures, the incumbent retailer can reject change requests involving a NMI for which they are the Financially Responsible Market Participant. This allows an incumbent retailer to block the customer from accessing Better Place services using their existing connection. Distributors are the only party authorised to issue NMIs for connection points to their network, so they too have the power to delay or block a request for changes to the metering at an existing connection point.

Changes to regulations are required to give the premises occupant the clear right to authorise changes to their connection point and their metering installation to facilitate the allocation of an additional NMI for their EV charging load, if they wish to do so.

This is important both in the case of the residential home environment and also at multi-occupant environments like apartment buildings and at business premises. The owner of an apartment with a dedicated parking spot in the basement who seeks to establish Better Place charging services for their new EV must, under current regulations, get the permission of the body corporate's electricity retailer before making changes to the site's metering installation and getting a new meter and NMI allocated. Where a business with a new EV takes out a Better Place subscription and Better Place seeks to establish our charging services at their corporate headquarters, we must seek the permission of the business's electricity retailer to make changes to their metering installation to enable the establishment of separate metering and a new NMI for the EV load. Having been through this process many times, Better Place can report that in these circumstances retailers do not authorise changes to their customers' metering installations. Our assessment is that this is because incumbent retailers have a commercial interest in (A) not allowing other parties to access any growth in load at the customer's site, and (B) not incurring costs for undertaking administrative tasks required of them to authorise the metering installation changes.

Proposed Regulatory Change III - Allow access to alternative meter installers than the distributor, if the premises occupant authorises it

At most small customer sites in the NEM, the distributor is the responsible person for the metering installations under the National Electricity Rules pertaining to type 5 and 6 meters. If a customer wishes to make changes to the metering installation at their premises – such as the upgrade to a 2 element meter outlined in Proposed Regulatory Change I above – they must both obtain the new meter from the distributor and pay the distributor for undertaking the installation. This requirement generally means that a minimum of two, usually three, separate visits from licensed electrical contractors are required to undertake the work. First step is the electrician from the distributor visiting the site to remove the existing meter. The second step is the electrician hired by the customer (or by their EV charge services provider like Better Place) undertaking changes to the meterboard. The third step is the electrician from the distributor returning to mount and wire-in the new metering configuration.

Having multiple electricians completing essentially the same job is very inefficient and imposes unreasonable costs on the customer:

- **Duplicated travel costs** - Two different electricians must incur travel time to visit the site to complete a job that could be completed on one visit by one of them. In Victoria, a third visit from a licensed electrical inspector must also occur.
- **Costs from double-handling** – With multiple electricians completing the job, inefficiencies and extra costs in labour time are incurred as one technician waits around for the other to arrive and/or complete their part of the job.
- **Customer delays** - There is wasted time for the customer who must be present during this unnecessarily lengthy process and therefore away from work or other commitments during business hours.

Attachment 1 provides detailed case studies of the process of implementing metering changes at small customer sites in three distributor territories in Victoria.

In NSW, metering installations can be undertaken by any electrician who has been accredited for completing this type of work.[3] This significantly reduces the cost and delays involved. Better Place proposes that the same model be adopted in all other jurisdictions.

Proposed Regulatory Change IV – Direct distributors to offer a network tariff for small load sites that doesn't bundle metering services charges with network use of system (NUOS) charges

The cost of providing metering services for small customers in the NEM includes the provision of the meter hardware itself, the maintenance of this hardware, collection of the consumption data from the meter, validation of this data, and distribution of the data into the market via the AEMO MSATS system.

Most distributors performing metering services for small customers recover the cost of providing this service by bundling it into the overall network tariff they levy on the customer via their retailer. They bundle together metering services charges and the network use of system (NUOS) charges into a single tariff.

In Victoria and South Australia, customers who seek an alternative metering provider to the distributor are now able to access classes of network tariff which are purely NUOS - metering is unbundled from NUOS in these tariffs. This allows the small customer to choose their own AEMO-accredited metering service provider and pay for these services separately from their network tariff.

However, in NSW and QLD, small customers do not have access to a network tariff which separates the metering charges from the NUOS charges. This means if a small customer in NSW and QLD seeks to use an alternative metering provider, they pay for metering twice: once from their metering provider and once in their network tariff. The absence of an unbundled network tariff for small customers which does not bundle in cost-recovery for metering, serves to effectively create a monopoly for distributors over metering for small customers.

Unbundling metering from network tariffs is important because it promotes a competitive, innovative market in metering services for small customer sites which have EV charging load.

[3] Details on the NSW Accredited Service Provider scheme are available here: http://www.trade.nsw.gov.au/energy/electricity/network-connections/contestable

Further, innovation in metering enables innovation in business models for electricity services and EV charging services.

Proposed regulatory change V – Amend metrology regulations to support the use of on-market sub-meters at sites like apartment buildings and corporate office parks

At premises like apartment buildings and corporate office parks where vehicle parking facilities are located in basements or spread across a large campus, there are often significant costs in reaching unmetered supply to establish a new connection to the distribution network for the new EV charging appliance. The most cost-effective metering configuration is an on-market sub-meter for the EV charging load, with the accredited Meter Data Agent for the site taking responsibility for undertaking the subtraction task and preparing separate datastreams for the EV charging load and the rest of the premises. The cost savings derive from:

- No costs associated in lengthy cable runs from the site of the EV charging load to the nearest point of unmetered supply – This can involve trenching, drilling through walls, hundreds of meters of cabling, and other complex structural work at large sites.
- No requirement to take the entire site off supply (which will inconvenience all occupants of the premises, not just the EV owner)
- No requirement to make changes to the existing meter panel and connection assets.

This metering configuration is currently only permitted in some parts of the NEM (not QLD or ACT) and, where it is permitted, it is hampered by a set of guidelines for embedded networks which are widely acknowledged by retailers, distributors and AEMO to be lacking clarity on key issues.

We propose that changes to Chapter 7 of the National Electricity Rules be considered to give consumers the right to implement on-market sub-metering.

4. How should the market allocate costs consistent with the causer-pays principle to ensure that inefficient cross-subsidies are minimised? For example, EV-related costs for connecting to the distribution network.

Under current regulations, an EV driver who simply installs their EV charger at home and upgrades the capacity of their home's connection to the distribution network (say from a maximum demand level of 40 amps to a 60 amp or 80 amp connection) to enable use of the EV charger at any time does not pay the additional cost of distribution network augmentation which ultimately must occur to serve this capacity upgrade.

Instead, this augmentation cost is cross-subsidised by other consumers connected to that distribution network. Collectively, consumers' network tariffs fund the distribution network service provider's investment in augmentations required over time.

Regulatory change to reduce or eliminate this extremely consequential cross-subsidy is warranted.

The AEMC and the AER (as the economic regulator of distributors) should consider an approach which presents a new owner of an EV with a choice about the way they make use of the distribution

network to charge their car. Where a customer (or their EV charging services provider) is seeking to increase the capacity of their network connection to charge their new EV, the distributor could present a choice:

A. Pay an upfront network capital contribution charge to the distribution network operator to fund the permanent augmentation of the network which shall be required to maintain reliability now that they are seeking a high-capacity connection for their EV charging;
   OR
B. Switch to an EV specific network tariff for their EV charging load which features (for example) a 3 part structure with (i) Off-peak, (ii) Peak, and (iii) Critical Peak periods, under which:
   - The distributor has the right to nominate in advance (say) 10 Critical Peak periods per year of a total duration of (say) 8 hours each;
   - Any EV charging during the nominated critical peak periods incurs a very high per kWh charge to reflect the extreme scarcity of network capacity at these times;
   - The customer or their EV charging services provider must receive notification from the distributor no less than (say) 4 hours in advance of the timing of nominated Critical Peak Periods.

This choice can be presented to customers at the time of their application for an increase in the capacity of their network connection.

5. If it is not possible to allocate costs, what is the optimal way of incentivising EVs in order to minimise their impact on peak demand?

Appliance-specific network tariff arrangements for hot-water and slab heating have a long history across the NEM. This suggests there is no reason why it should not be possible to implement a mechanism like the one described above for EV charging.

However, if it is not possible, some alternative approaches worth considering are:

- **Clearing the barriers to establishing separate metering and a NMI for EV charging load to enable load aggregators like Better Place to participate actively in the NEM.** At small load sites in the NEM, a range of regulatory and transaction-cost factors serve to reduce or eliminate the price signal felt by the electricity consumer for network capacity and supply during periods of peak demand. So maximum demand grows faster than average demand. But, if EV charging load is being managed by businesses like Better Place which have a direct financial interest in lowering their costs to deliver this service, there is a stronger chance that self-interest will be harnessed to slow the growth of maximum demand.
- **Open up consumer access to metering data** – Providing consumers and their authorised third-parties access to real-time metering data from their distributor-provided smart meter would be a useful step forward. This could be achieved by revising the terms of the standard distribution network connection agreement set by State and Territory regulators. In conjunction with time-of-use network and energy tariffs, this step would enable providers like Better Place to strengthen the price signal felt during peak periods and produce a financial pay-off for charging EVs during off-peak periods.

- **Cap the maximum power of EV chargers which can be installed at premises under regulated flat network tariffs** – High-power EV charging under regulated flat network tariffs is a nightmare outcome for the electricity system. This outcome basically allows EV owners to free-ride on other electricity consumers who will fund extra network capacity through higher NUOS charges. A cap of say 10 amps on the maximum power of EV chargers which can be installed at a premises benefiting from a regulated tariff designed to protect the vulnerable, small consumer could limit the cross-subsidisation. As a guide, 10 amps is the maximum capacity of a standard Australian power outlet. Such a cap could be introduced via a variety of regulatory instruments such as the standard distribution network connection agreement which is set by State and Territory regulators.

Approaches with problems

- **Distributor load control** - Our consumer research and experience serving early customers suggests there will be few if any EV owners interested in taking up an offer for their EV charging which includes distributor load control like that which has been used for decades to control hot-water system consumption. The car is central to most consumers' daily lives. Responsiveness and active customer service is key to ensuring that an EV is flexible enough to meets drivers' varied daily needs. Relinquishing control of charging times to a monopoly network operator will be avoided by nearly all consumers at any cost.

6. Responses to the Full List of Consultation Questions in the Issues Paper

Question 1 - Assessing the take up of EVs
Is the range of estimates provided by AECOM appropriate for assessing the potential impacts of EVs on the electricity market and developing our advice? Does the range of scenario estimates provide a credible view on the potential penetration of EVs?

Yes, the AECOM scenarios provide a credible view on the potential market penetration of EVs. Australian consumers have a strong interest in the cheaper, cleaner, and quieter motoring which EVs provide. This will lead to significant uptake of EVs over the decade ahead.

We disagree with the split between PHEV and BEV in AECOM's forecasts. We think a significantly higher proportion of EVs sold in the period to 2020 and beyond will be BEV based on the significant advantages in total cost of ownership enjoyed by BEV owners. Table 6 on page 15 of the AECOM report includes an assumption that BEV prices are identical to PHEV and that price parity with ICE vehicles will be 2025 for both. This assumption does not take into account that a PHEV is manufactured with two powertrains (ICE and electric) and a BEV has only one. This means that at volume BEV are substantially cheaper to produce than PHEV. In addition, analysis on ICE powertrain manufacturing cost trends over the next decade commissioned by Better Place suggests that increasingly stringent regulatory requirements on emissions are driving a 4% per annum increase in manufacturing costs. By 2020, we expect a 15-20% cost premium for PHEV, over the equivalent size and specification BEV.

Combined with the substantial advantages of BEVs in running costs compared to PHEV and ICE vehicles, this suggests that a much higher proportion of EVs on the road will by BEV in 2020 than AECOM's forecasts indicate.

The implications of a higher overall number of BEV will be higher electricity consumption per driver and greater consumer demand for faster home charging to maximise refuelling convenience. This means even greater impact on peak demand if unmanaged EV charging becomes the norm.

Question 2 – Cost of additional system peak demand
Are these estimates on the cost of additional peak demand provide the current magnitude of the potential impacts of EVs? Are there any categories of costs not included in this discussion?

AECOM's commentary suggests its modelling about peak demand impacts is very sensitive to the rate of home charging which EV owners and their service providers undertake. We expect that customer demand for more rapid home charging than 32 amps will grow as EVs with bigger batteries are brought to market by car makers. Already we are seeing announcements from companies like BMW, Ford and Renault which suggest vehicles with sophisticated power electronics enabling charging at over 50 amps on a 3 phase connection will be on the market by 2015. As a result, we think that AECOM's analysis understates the potential peak demand problem if the "Un-Managed Charging" model becomes the norm.

In our view, AECOM's analysis overstates the effectiveness of the 'Time of Use' and 'Smart Meter' charging management options in reducing peak demand. The table below presents the AECOM estimates which are included in Table 3.1 on page 19 of the *Issues Paper*.

Charge Management Option	**Description**	**AECOM estimate of the additional EV related peak demand in 2020 (MW)**	**Reduction of additional peak demand relative to the 'Un-managed charging' scenario**
Un-managed charging	Consumers charge their EVs whenever they want. 80% of all charging occurs during peak periods.	740	
Time of Use charging	Consumers respond to peak prices 30% higher than off-peak prices.	20	97%
Smart Meter Charging	The individual EV owner makes use of real time price and load data to schedule their charging at off-peak periods.	10	99%
Controlled Charging	Distributor ripple control ensures 100% of EV charging occurs during off-peak periods.	0	100%

We see very little evidence in the academic and industry research on the impact of Time of Use (TOU) tariffs on consumer behaviour to support AECOM's claim that a simple 30% cost premium for charging at peak times will virtually eliminate the peak demand from EVs. A recent paper by AGL's Paul Simshauser discussed the results of 70 small scale trials on TOU pricing in the US, Europe and Australia and reported that:

> "Pricing pilots reveal that the mere shift from average to TOU tariffs reduces peak demand by 4.7% on average, although to be sure some trials elicited a response as low as 2%."[4]

AECOM's forecast that TOU tatiffs will lead to a 97% reduction in the peak demand contribution from EVs therefore seems unrealistic.

Furthermore, Better Place's market research suggests that customers are unlikely to voluntarily adopt the types of TOU tariff which are often proposed for EV charging if they must expose their entire household load to that pricing structure. Most customers consume electricity at home at the times they do for good reasons. In general, they see their everyday electricity consumption as not being amenable to timeshifting. Residential consumers are generally interested in flatter pricing structures for their household load which doesn't penalise them for consuming during peak times.

AECOM's 'Smart Meter' charging scenario also seems to be based on little evidence. It assumes that individual EV owners will be willing, ready and able to manage their EV charging away from critical

[4] Simshauser, P. and Downer, D., *Limited-form dynamic pricing: Applying shock therapy to peak demand growth,* AGL Applied Economic and Policy Research, Working Paper 24, February 2011.

peak periods for the network and in the spot market. A handful may do this, but our feedback from customers is that the time and effort required to implement and monitor such solutions is too great compared to the financial reward.

AECOM does not include a scenario based on Better Place's proposed model for EV load management where the load manager (not the EV owner) is the party financially liable for energy and network charges. We recover the cost of monitoring and management of network and energy costs across a portfolio of customer sites, and offer the EV owner simple, fixed subscription pricing for their charging. As discussed earlier in our submission, we see this model offering a clearer price signal between the underlying cost of the energy at any moment in time and the party controlling the load. However, bringing this model into the market requires regulators to address the regulatory barriers in metering highlighted above.

Question 3 - Costs imposed by EVs on electricity markets
Does this discussion capture all the potential costs impacts that EVs could impose on the electricity market?

This is a comprehensive overview of the impacts.

Question 4 - Benefits of EVs on the electricity market
Have we correctly identified the range of benefits of EVs on the electricity market? What are stakeholders view on the materially of these benefits and the appropriate arrangements of capturing such benefits?

The Issues Paper effectively identifies the range of benefits of EVs on the electricity market.

These benefits are substantial. The analysis commissioned by the AEMC for its 'Demand-side Participation' reviews have clearly highlighted the major efficiency gains for the market that will flow if greater demand-side participation can be encouraged. EV charging load has a range of characteristics which make it ideally suited to demand-side participation (see Section 1 above). Changes to metrology rules which reduce the barriers to EV charging load aggregators like Better Place becoming the billable party for NUOS and energy charges at EV owners' homes and workplaces will maximise the realisation of these benefits (see Sections 2-3 above).

Question 5 - Nature of service provided when an EV is charged
Does the EV charging service need to be prescribed as a sale of electricity? What are the implications for consumers and EV charging service business models if EV charging was not classified as a sale of electricity?

The EV charging services market is at an early stage of development. Different providers are developing different business models to serve customer needs. As the volume of EVs on the roads

grows, the market for charging services will no doubt evolve and providers will adapt and refine their product offerings as competition grows. Our view is that the regulation of EV charging services needs to reflect the early-stage nature of the market and encourage innovation and competition among business models and providers. When the California Public Utilities Commission completed its 2010-11 review into energy market arrangements for EVs, it concluded that treating the EV charging services market as a regulated utility service would not be in the best interests of consumers because it would:

> "…prevent market competition that could be beneficial for introducing new technologies and reducing the ultimate cost of [EV charging services]."[5]

Better Place supports this approach to regulation of EV charging services in the Australian market. It would be a mistake to limit participation in this emerging market to one or both of the mature categories of service provider in the NEM: distributors and retailers. The regulation of distribution networks stems to a large part from the fact that they provide a monopoly service. The regulation of retailers flows from the status of their product as an essential service which consumers (including vulnerable or disadvantaged consumers) universally rely upon for their basic day-to-day needs. Neither criterion applies to charging services for drivers of EVs.

Better Place is a competitor in the transport fuel market. Millions of Australians procure petrol from transport fuel retailers located out on the road network every week. It's a mature, very competitive $37 billion p.a. market with substantial choice of providers including supermarkets, convenience store outlets and traditional service stations. We are offering an alternative transport fuel product that is cheaper, cleaner and which can be accessed by the driver without leaving their home.

While an EV owner certainly can choose to make use of a retail electricity supplier to fuel their car, there is no reason we can see why they should be forced to do so. EV service providers have different business models and seek to deliver value to consumers with service offerings that can be fundamentally different to retail electricity supply and distribution network services. Better Place's subscription package includes use of our EV batteries and battery switching stations, use of our in-car navigation and driver support system, and use of our charging appliance that we install, manage and supply with electricity on the customer's behalf. Compared to the cost of providing the other features in Better Place's product bundle, the cost of the electricity is very low. No doubt other combinations of features will be offered by other providers in the years ahead.

Australia's general consumer protection regime, enforced by the ACCC, has strict requirements regarding the conduct of any party offering goods or services for sale, including EV charging providers. We do not see a strong case for additional electricity market regulation of EV service providers for the purpose of protecting consumer rights.

In the area of demand-side participation from EV charging providers and others aggregating load, there may a case for a regulatory regime to streamline and structure the interaction with distribution network operators. Distribution network capacity constraints arise dynamically over time and in different zones in each network. A licensing regime for parties seeking to contract with

[5] California Public Utilities Commission, Phase 2 Decision Establishing Policies to Overcome Barriers to Electric Vehicle Deployment, 16 March 2011. Page 37.

distributors to reduce their load in real time at distributors request could serve to lower the transaction costs for both sides, and encourage more demand-side participation and less unnecessary network augmentation than would otherwise occur.

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

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

Yes. See Better Place's responses above to the AEMC's 5 key questions in Sections 1-5 above.

Question 7 - EV metering issues

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

Better Place's responses to these questions are presented in Sections 1-5 above.

Question 8 - Options for EV charging

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

Better Place's responses to these questions are presented in Sections 1-5 above.

Question 9 - Retail pricing and EVs

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

As our answer to Question 5 above makes clear, we do not support regulation of all EV charging services as electricity retailing or distribution. If a customer seeks to procure their EV charging services from Better Place where we, not the customer, are the billable party for the kWh consumed for EV charging, then we would seek to be classified as a large multi-site business customer outside the retail price regulation regime for that load. We do not seek the protection of the retail price

regulation regimes for our electricity procurement at our customers' homes and workplaces. Instead we are seeking to contract freely in the market with authorised retailers for our electricity supply.

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?

Question 11 - Network pricing and EVs
Are new or bespoke network tariffs warranted for EV charging? If so, what form should these network tariffs take? How can these network tariffs be better integrated with overall retail tariffs? If there are to be separate tariffs for EV tariffs, should there be regulations for identifying the EV household and for monitoring consumption? If so, how?

As we argue in Sections 3, 4 and 5 above, we have concerns that if new EV owners are simply allowed to increase the capacity of their connection and retain a flat regulated tariff for their total household load, including the EV, then we will see a repeat of the widely discussed air-conditioner problem in the NEM. This outcome will allow EV owners to enjoy a cross-subsidy at the expense of other users.

We welcome the availability of TOU and dynamic critical peak tariff structures to incentivise active management of EV charging load, either by Better Place, other providers or customers who prefer to be hands-on. As we argue in Section 1, EV charging is both a big load and a load which is amenable to being shifted dynamically in time. The earlier that price regulators, distributors and retailers across the NEM make available efficiency-promoting tariff structures for this load, the better.

Question 12 - Forecasting the take up of EVs for the network operator and NSP
Are measures required to facilitate more effective forecasting of EV take up for network operator and NSPs?

Yes. These forecasts are material for distribution network operators (DNSPs) revenue reset proposals to the AER. There is a danger if the wrong assumptions about impact on maximum demand are made, we will see unnecessary investment in augmentation by DNSPs, funded by all consumers.

Question 13 - Network Issues: Connection services
What issues arise in regard to connection services for EVs? Are there further connection issues if additional capabilities such as Vehicle to Grid arise? How should these issues be addressed?

Under the Victorian Government's Electric Vehicle Trial, Better Place has undertaken a series of new connections for EV charging load at homes in 3 distributor territories in suburban Melbourne. We have documented the issues we've encountered in the connections process in Attachment 1. In summary the issues encountered were:

1. **Overly complex processes with double-handling** – Establishing separate metering currently requires a sequence of 10 main tasks to be completed by 5 different parties: the electrician completing the installation of the EV charger, a Licensed Electrical Safety Inspector, the premises retailer, the retailer for the EV charging service provider, and the distributor. Each task in the sequence can only start when the previous task in the sequence is complete. The number of parties involved makes communication difficult and leads to delays and misunderstandings.

2. **Duplication of service charges** – Service charges on both the premises owner and their EV charging services provider are levied by distributors when separate metering is established. One charge is levied for detaching and for reattaching the old meter. Another charge is levied for attaching the new meter for the EV charging load. These tasks are completed by the same technicians from the distributor on the same meterboard on the same day so the rationale for two sets of service charges is questionable.

3. **Uncertainty and inconsistent interpretations of Service and Installation Rules** – At these sites, we have encountered substantial differences of interpretation in the Victorian Service and Installation Rules (SIRS) between distributors, Licensed Electrical Inspectors and electricians. For example, can electricians isolate a site by removing and replacing the service fuse without requiring a distributor truck visit, under the VESI code of practice[6]? Or, can a 2nd meter be installed on a new meterboard adjacent to the existing meterboard, rather than the more costly option of replacing the old meterboard with a new one large enough to hold both the old and new meters?

4. **Lack of choice for small customers in connection and metering configurations –** Distributors have a monopoly on metering and connections for small customers in Victoria. A small number of 'standard' connection and metering configurations are offered by distributors for a price set by the Australian Energy Regulator. But customers seeking alternative meter configurations that deliver them lower costs or greater control of their electricity consumption face real barriers. For example, while a customer with electric hotwater or slab heating can access separate metering for this load from distributors, a customer seeking this configuration for a new electric car charger cannot. Under the terms of their licenses, distributors are expected to be responsive and cost-efficient when customers request connections to their networks. But the experience of this project so far is that they are not.

[6] Victorian Electricity Supply Industry *Code of Practice for Low Voltage Service Fuse Removal* (http://www.victoriansir.org.au/documents/POW01001A4.pdf)

Question 14 - Network Issues: Network reinforcement and augmentation
What new issues arise regarding requirements for network reinforcement and augmentation to support EV charging and recovery of the costs incurred, and how should they be addressed?
How should the connection services for EV households be classified? It is necessary to differentiate between EV and non-EV households?
Does the take up of EVs require a departure from the current method of recovering the costs of grid augmentation from small customers, with the costs spread across all customers, towards a "causer pays" approach?

See our response to these questions in Section 4 above.

In general, we think there is merit in EV households being known to distributors and being served with metering and tariff options which support demand-side participation in the manner we have outlined above.

Question 15 - Retail issues: Retailer and NSP exemptions and embedded networks
Should the provision of commercial charging (both in public spaces and in dedicated charging stations) be classified as on-selling? Do retailer and NSP exemptions and embedded networks provide an appropriate framework to apply to EV charging? What would be the preferable arrangements?

The act of selling EV charging services at publicly-accessible locations across the road network is significantly different to retailing electricity to a premises. The value that the EV owner derives from the charging service is much more than the electricity supply, and includes:

- The convenience and accessibility of the location on the road network where the charging service is made available;
- The features of the charging device itself, including the rate of charging it provides;
- The information and controls the charging appliance offers to users – For example a 'Full battery alert' delivered by text message to the customer's mobile phone so that they can shop or have a meal while charging is underway and then return to their car as soon as its battery is fully charged.
- The types of payment method offered to users – Providers can differentiate themselves by offering credit card, membership card, mobile phone-based payment systems, and so on.

Imposing the standard regulatory conditions which apply to businesses retailing electricity to premises upon businesses providing EV charging services would limit participation in the market and reduce competition and customer choice.

One approach worth considering is the development of a new deemed class of exemption in the AER's Exempt Selling Guideline. Such deemed classes exist for parties like body corporates and caravan park operators. A new deemed class for EV charging services could involve automatic exemption for parties providing EV charging services, if certain conditions are met. The conditions could include minimum standards for metering, billing and receipts, customer information disclosure rules and so on.

Question 16 - Retail issues: Settlement
What new issues for wholesale settlement arise with EVs, and to what extent do they depend on the metrology arrangements in place? How can these issues be addressed?

Implementation of the Proposed Regulatory Change I discussed in Section 5 above, will require modifications to the procedures and systems supporting AEMO's Market Settlement and Transfer Solution.

Question 17 - Retail issues: Licensing arrangements
What licensing issues arise with EVs, if licences are required? Do new issues arise because of the nature of EV loads or from new business models for EV charging? Are the existing licensing arrangements still appropriate?

See above.

Question 18 - Vehicle to Grid/Home issues
What additional issues arise from EV discharging and to what extent are those issues different from those that arise from any other on site small scale generation? Are there any unique issues or requirements if the electricity is only provided to the home and not exported to the grid? Who should control discharging schedules? How can the right incentives be provided to facilitate the use of EV discharging to support DSP?

Better Place has no current plans to offer Vehicle-to-Home or Vehicle-to-Grid services to customers in Australia.

Question 19 - Issues specific to Western Australia
Are there any additional issues in WA as against in the NEM? How might these issues be addressed?

We have not identified any WA-specific issues at this stage.

Appendix - Profile of Better Place

Better Place is the world's leading electric car charge network company and has raised over US$750M in equity financing in the last 3 years from investors including HSBC, GE, Morgan Stanley and UBS AG. The company works with all parts of the transportation ecosystem, including automakers, battery suppliers, energy companies, and the public sector and therefore has a detailed and up-to-date knowledge of global developments in this rapidly moving space.

To accelerate the mass adoption of electric cars, Better Place is building an intelligent network of plug-in charge spots at private homes, corporate and public car parks, which will provide most of the energy required. For extended range we will also deploy battery switch stations that allow the driver to swap their depleted battery for a full one in under five minutes and, where applicable, high-voltage quick charge outlets.

Australia is the third country in which the Better Place solution will be deployed (following Denmark and Israel), while publicly announced partial deployments in Japan, the US and Canada presage wider implementation shortly afterwards. As such, Australia is well positioned to be at the forefront of the transformation from petrol to electric cars.

For more information visit www.betterplace.com.au

PROGRESS REPORT

Project to Establish Separate Metering and Billing for Electric Vehicle Charging at Victorian Homes

February 2012

Prepared by Better Place for the Victorian Government Electric Vehicle Trial

Contact: Tim Watts, Better Place (Australia) Pty Ltd | tim.watts@betterplace.com | +61 403 924 465

Summary

Establishing separate metering and billing for electric vehicle (EV) charging load at homes is critically important. First, the home is the location that cars spent the greatest amount of time parked, so this is where the majority of charging occurs.[1] Second, separate metering provides a series of benefits for drivers and for the efficiency of the electricity system:

- **Driver benefits** – Separate metering allows vehicle fuel costs to be separately priced and billed separately from the rest of the home. This allows application of off-peak rates for the car to lower drivers' fuel bills. It also ensures that employees with company cars or salary-packaged cars and small-business owners can ensure that their company, and not the employee, is billed for their vehicle fuel costs. More than 200,000 cars sold in Australia each year are company cars or salary-packaged cars.
- **Electricity system benefits** – As a range of studies by organisations like CSIRO have shown, there are significant benefits for the electricity system if EV charging takes place during off-peak periods. This outcome promotes improved utilisation rates of network and generation assets, lowering costs for all electricity consumers. Separate metering and billing of the EV charging load allows drivers to access EV-specific pricing to reward off-peak charging. It also allows drivers to use charge management service providers, such as Better Place, who actively manage the charging of their car battery into off-peak periods to minimise their fuelling costs.

The purpose of this project was to illustrate the challenges involved in establishing separate metering for EV charging loads at residential premises in Victoria. Sites in 3 different distributor territories have been tested so far and at each the costs and delays incurred were significant:

Site	Total costs[2]	Total delays
Edgevale Rd, Kew 3101	$3,202.56	18 weeks
Hillhouse Rd, Templestowe 3106	$3,677.05	8 weeks
Taylors Lane, Rowville 3178	$1,715.05	9 weeks

The three installations undertaken so far for this project have highlighted a range of issues with the current Victorian electricity industry processes for establishing separate metering for EV charging load at residential premises. These include:

1. **Overly complex processes with double-handling** – Establishing separate metering currently requires a sequence of 10 main tasks to be completed by 5 different parties: the electrician completing the installation of the EV charger, a Licensed Electrical Safety Inspector, the premises retailer, the retailer for the EV charging service provider, and the distributor. Each task in the sequence can only start when the previous task in the sequence is complete. The number of parties involved makes communication difficult and leads to delays and

[1] This has been confirmed by a range of trials and studies of EV driver behaviour. These include *Data Analysis Report of Ultra-low Carbon Vehicles from the CABLED Trial,* Aston University, June 2011; the *Mini-E Field Trial Report*, BMW North America, 2011.

[2] The costs cited here are only those related to establishing a separate meter with NMI for the EV charging load. The cost of the charging equipment for the EV and installing this charging equipment is not included.

misunderstandings. The process in other states, such as NSW, is much more streamlined and efficient.

2. **Duplication of service charges** – Service charges on both the premises owner and their EV charging services provider are levied by distributors when separate metering is established. One charge is levied for detaching and for reattaching the old meter. Another charge is levied for attaching the new meter for the EV charging load. These tasks are completed by the same technicians from the distributor on the same meterboard on the same day so the rationale for two sets of service charges is questionable.
3. **Uncertainty and inconsistent interpretations of Service and Installation Rules** – At these sites, we have encountered substantial differences of interpretation in the Victorian Service and Installation Rules (SIRS) between distributors, Licensed Electrical Inspectors and electricians. For example, can electricians isolate a site by removing and replacing the service fuse without requiring a distributor truck visit, under the VESI code of practice[3]? Or, can a 2nd meter be installed on a new meterboard adjacent to the existing meterboard, rather than the more costly option of replacing the old meterboard with a new one large enough to hold both the old and new meters?
4. **Lack of choice for small customers in connection and metering configurations –** Distributors have a monopoly on metering and connections for small customers in Victoria. A small number of 'standard' connection and metering configurations are offered by distributors for a price set by the Australian Energy Regulator. But customers seeking alternative meter configurations that deliver them lower costs or greater control of their electricity consumption face real barriers. For example, while a customer with electric hotwater or slab heating can access separate metering for this load from distributors, a customer seeking this configuration for a new electric car charger cannot. Under the terms of their licenses, distributors are expected to be responsive and cost-efficient when customers request connections to their networks. But the experience of this project so far is that they are not.

[3] Victorian Electricity Supply Industry *Code of Practice for Low Voltage Service Fuse Removal* (http://www.victoriansir.org.au/documents/POW01001A4.pdf)

The Current Process for Establishing Separate Metering

Figure 1 below summarises the key steps involved in establishing a separate meter at a residential premises in Victoria. The following abbreviations apply: REC: Registered Electrical Contractor (electrician). LEI: Licensed Electrical Inspector DB: Distributor. EWR: Electrical Work Request form.

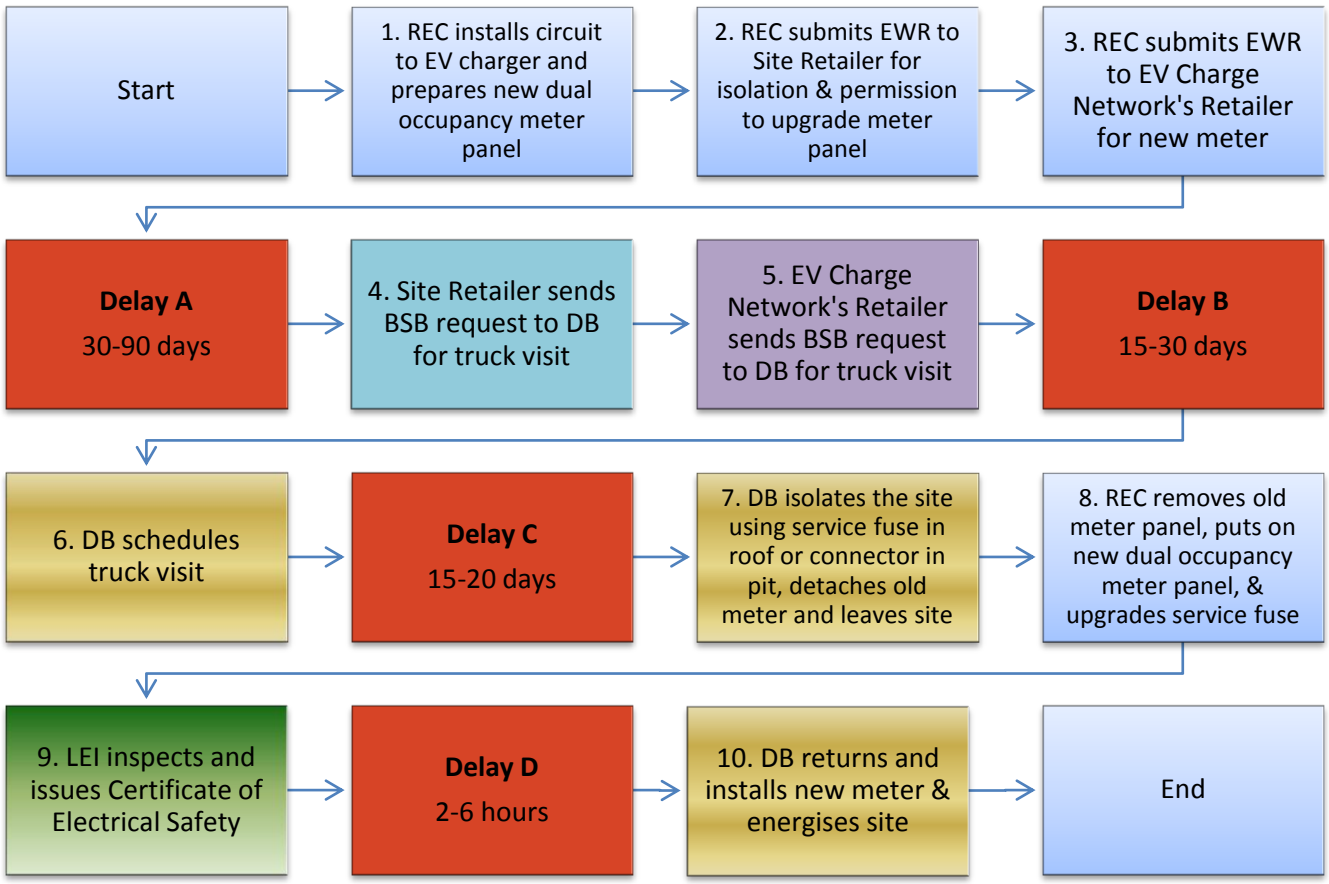

Figure 1 - Process for Establishing Separate Metering

Site reports

Site 1	Edgevale Road, Kew VIC 3101	
Distributor	Citipower	
Existing house retailer	AGL	
EV charge network's retailer	Powerdirect (It was necessary for Better Place to open a new account with AGL to get the Citipower truck visit scheduled. Once the truck visit occurred, we then switched our account back to Powerdirect.)	
Registered electrical contractor	Silcar Pty Ltd	
Licensed Electrical Inspector	Techsafe Pty Ltd	
Costs incurred	New connection fee to EV charge network: (This amount contains fees levied by Citipower and by retailer AGL for establishing the new connection point and meter.)	$603.39 (*Estimate: final amount to be billed in the months ahead)
	Service fee to home owner: (The Service Truck Visit fee to be billed by Citipower to the home owner via AGL for removing the existing meter from the meterboard and replacing it on the new meterboard.)	$143.90 (*Estimate: final amount to be billed in the months ahead)
	Silcar Pty Ltd • Install new meter panel. • Install new main switch. • Install new master control circuit breaker. • Complete and submit two EWR forms. • Two certificates of electrical safety.	$2,418.65
	TOTAL	**$3,202.56**
Delays experienced	**18 weeks** New connection request submitted: 21 July 2011 New connection established: 15 November 2011	

Site 2	Hillhouse Road, Templestowe, VIC 3106	
Distributor	United Energy	
Incumbent site retailer	Origin	
Charge network retailer	Powerdirect	
Registered electrical contractor	Twin Electrics	
Licensed Electrical Inspector	Techsafe Pty Ltd	
Costs incurred	New connection fee to EV charge network: (This amount contains fees levied by United Energy and by retailer Powerdirect for establishing the new connection point and meter.)	$605.00 (*Estimate: final amount to be billed in the months ahead)
	Service fee to home owner: (The Service Truck Visit fee to be billed by United Energy to the home owner via Origin for removing the existing meter from the meterboard and replacing it on the new meterboard.)	$109.75 (*Estimate: final amount to be billed in the months ahead)
	Twin Electrics • Remove old metal meter board • Install new Drav meter box combination circuit breaker board. • Install new master control breaker and new panel fuses. • Wire up panel and run in new earth cable. • Re-run power to EV charger unit. • Complete and submit two EWR forms. • Two certificates of electrical safety.	$2,962.30
	TOTAL	**$3,677.05**
Delays experienced	**8 weeks** New connection request submitted: 30 November 2011 New connection established: 23 January 2011	

Site 3	Taylors Lane, Rowville VIC 3178	
Distributor	SP AusNet	
Incumbent site retailer	TRUenergy	
Charge network retailer	Powerdirect	
Registered electrical contractor	Twin Electrics	
Licensed Electrical Inspector	Techsafe Pty Ltd	
Costs incurred	New connection fee to EV charge network: (SP AusNet service fee for establishing the new connection point and meter. Retailers also add administrative fees to this figure.)	$605.00 (*Estimate: final amount to be billed in the months ahead)
	Service fee to home owner: (SP AusNet Service Truck Visit fee to the home owner via TRUenergy for removing the existing meter from the meterboard and replacing it on the new meterboard.)	$159.05 (*Estimate: final amount to be billed in the months ahead)
	Twin Electrics • Install new meter panel. • Install new main switch. • Install new master control circuit breaker. • Complete and submit two EWR forms. • Two certificates of electrical safety.	$951.00
	TOTAL	**$1,715.05**
Delays experienced	**9 weeks** New connection request submitted: 30 November 2011 New connection established: 30 January 2011	

Issues Arising in the Installations

I. Overly complex processes with double-handling

Establishing separate metering currently requires a sequence of 10 main tasks to be completed by 5 different parties: the electrician completing the installation of the EV charger, the premises retailer, the retailer for the EV charging service provider, the distributor, and a Licensed Electrical Safety Inspector to issue a certificate of electrical safety once the job is complete. Each task in the sequence can only start when the previous task in the sequence is complete. The number of parties involved makes communication difficult and leads to delays and misunderstandings.

At all sites so far we have encountered difficulties at the stage in the process where the electrician has submitted EWR (electrical work request) forms to the retailer at the site and the new retailer for the electric vehicle charging load (Labelled Delay A in Figure 1 above). As we understand it, the next step is for these EWRs to be forwarded to the distributor via an established BSB protocol between distributor and retailers. However at each site retailers' new connections departments have been a bottleneck with confusion, uncertainty and queries back to the electrician, to the site owner and to Better Place about:

- The street addresses of the new connection for the EV charger – Some retailers administration systems do not appear to allow an account to be established for a second meter at the same address but for a different customer.
- The status of the new connection as a domestic or business customer account
- Whether or not two retailers can serve the same site in a multi-occupancy new connection
- What role the current site retailer needs to play in the new connection

For at least some retailers, it is not possible to get the request forwarded through to the distributor for the new connection unless the new account is being established with incumbent site retailer. At the 10 Edgevale Rd, Kew site where AGL was the incumbent retailer, it was necessary for Better Place to open a new account with AGL to get the Citipower truck visit scheduled. Once the truck visit occurred, we then switched our account back to our nominated retailer Powerdirect.

There are also delays once the retailers have submitted their EWR forms to the distributor. (Labelled Delays B and C in Figure 1 above.) Under distributors' licenses, they are obliged to complete a new connection request no more than 20 business days after the retailer has submitted the EWR. In 2 of the 3 sites, this deadline was not met and we have received no explanation why this occurred.

The process in other states, such as NSW, is generally much more streamlined and efficient. In NSW, an electrician with ASP accreditation (of which there are thousands)[4] simply visits the distributors depot, submits the EWR form for the new connection, and is supplied on the spot with the model of meter requested on the EWR form. He or she then visits the site of the new connection, establishes the new connection, installs the meter and notifies the distributor it is complete by email.

In the NSW model, 1 electrician completes the work. By contrast, at the Rowville site we had 4 different trucks visit the site during the day of the installation with 7 personnel from various organisations involved in completing work. Having so many different people performing different

[4] http://www.trade.nsw.gov.au/energy/electricity/network-connections/contestable

roles creates cost and delays. For example, Delay D in the Figure 1 above occurs because the distributor truck departs the site between detaching the existing meter and reinstalling the new meter to allow the electrician time to complete the meterboard replacement. This allows the distributor truck to go off to complete another job but means the electricians have to wait around for them to return, thereby costing the customer more in labour time.

II. Duplication of service charges

Service charges on both the premises owner and their EV charging services provider are levied by distributors when separate metering is established. One charge is levied for detaching and for reattaching the old meter. Another charge is levied for attaching the new meter for the EV charging load. These tasks are completed by the same technicians from the distributor on the same meterboard on the same day so the rationale for two sets of service charges is questionable.

III. Uncertainty and inconsistent interpretations of Service and Installation Rules

At the sites completed so far, we have encountered substantial differences of interpretation in the SIRS between distributors, Licensed Electrical Inspectors and electricians. For example, the Victorian Electricity Supply Industry *Code of Practice for Low Voltage Service Fuse Removal* (http://www.victoriansir.org.au/documents/POW01001A4.pdf) indicates that an electrician can de-energise or isolate a small residential premises for the purposes of undertaking work on the metering configuration for "increased industry efficiency and decreased costs by reducing the necessity of Electricity Distributor personnel site visits." Contrary to the published code of practice, distributors do not allow this practice and instead require an additional service truck visit to isolate a site for which they can charge a service fee of $100-$200.

Another area of uncertainty is the appropriate meterboard specifications for multi-occupancy metering installations. At two of the sites, it would have been more cost-effective to install the new meter for the EV charging load on a separate meterboard mounted immediately adjacent to the existing meterboard rather than replacing the meterboard with an larger one and wiring it for the two separate meters (the old meter for the house and the new meter for the home). This method appears to be permitted under clause 8.8.3 in the SIRS but was not supported by distributors at the project sites in this project.

IV. Lack of choice for small customers in connection and metering configurations

Distributors have a monopoly on metering and connections for small customers in Victoria. They each offer a range of standard connection and metering configurations and levy prices for them based on efficient cost calculations approved by the Australian Energy Regulator. Under the terms of their licenses, distributors are also expected to serve at efficient cost those customers on their networks seeking non-standard, alternative connection and metering configurations. But the experience of this project so far is that they are not.

For example, upgrading from a single element meter to a two element meter, with the electric car charger load being measured by the second element, could be a low-cost solution for a customer seeking to access electricity for their new EV from the same electricity retailer serving their home, but on different pricing terms. (For example time-of-use tariffs which offer cheap off-peak rates for

overnight charging of the EV). None of the three distributors engaged as part of this project to date can provide customers on their network with a 2 element meter.