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Expert Advice on the Cost of Establishing a Second Connection Point

Prepared for the Australian Energy Market Commission by ENERGEIA

October 2020

ENERGEIA

Executive Summary

Background

The National Electricity Market (NEM) has seen a rapid increase in the adoption of Distributed Energy Resources (DER) over the last five years, which is forecast to continue over the next 30 years. The increasing ubiquity of these resources will change the way that customers interact with the energy system, which may require changes in market settlements, in how grid services are provided and in how energy services are provided to customers.

These changes, together with broader changes across the energy system, have driven the former COAG Energy Council to direct the Energy Services Board (ESB) to undertake a 2025 Market Design review. The two-sided markets Market Design Initiative, of which this project comprises a part, is one of seven workstreams being completed under this process.

Scope and Approach

Energeia was engaged by the Australian Energy Market Commission (AEMC) to determine the processes and costs faced by customers to establish a second connection point at a premise, which would be compared against the key findings of previous work provided by Energeia in 2015.[1] Second connection points at both small customer and large customer premises are to be considered.

Energeia's approach to delivering the AEMC's specified scope of work was based on our learnings from the 2015 project:

- **Research** – Energeia undertook desktop research and mystery shopping[2], mirroring our 2015 approach, to gain an understanding of the current processes and costs involved in establishing a second connection point for customers.
- **Stakeholder Interviews** – In our review of the 2015 approach, we identified that engaging with stakeholders to understand the barriers to reducing costs and timelines was a key gap in our prior work, we therefor included stakeholder interviews as part of this update.
- **Documentation and Engagement** – Energeia documented and presented all key findings to the AEMC through a series of meetings and presentations. We revised our analysis to address any feedback received from AEMC prior to including it in this report.

Connection Configurations

Section 2 of the National Metering Identifier procedure[3] regulates National Metering Identifier (NMI) allocation, which determine settlement points. It requires all connection points to be metered and for each metering point to be assigned a NMI. They do not appear to require one connection point per premise nor one NMI per premise, only that a connection point be associated with a metering point and each metering point be associated with a NMI.

[1] Energeia (2015) 'Advice on Establishing a Second Connection Point', available here: https://www.aemc.gov.au/sites/default/files/content/0d9db434-981e-4857-b94c-334e37a505a4/Report-to-AEMC-Energeia-Second-Connection-Point.PDF

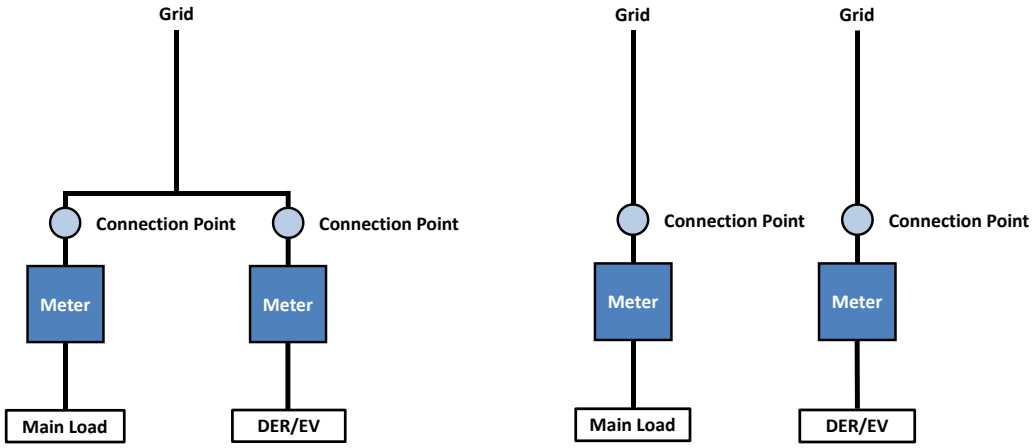
[2] Mystery shopping involves contacting potential suppliers to obtain first-hand information as a customer.

[3] AEMO (2017), 'MSATS Procedures National Metering Identifier', available here: https://www.aemo.com.au/-/media/files/electricity/nem/retail_and_metering/metering-procedures/2018/msats-national-metering-identifier-procedure.pdf?la=en&hash=243AA41A6FB95B4050E0B260EE56ED31

Current distribution network service provider (DNSP) industry standard practice is to allow one connection to the grid per small customer[4], such that they will not allow customer sub-loads or micro embedded generation to separately connect to the grid, as the DNSP establishes the NMI in the market.

This study assessed the processes and costs associated with establishing a second connection for the configurations shown in the figure below. The advantage of a second connection point for a sub-load such as a plug-in electric vehicle charger or behind-the-meter generation is that by being directly connected to the grid, it could allow the customer to unlock a range of different options that may be important to them, such as providing wholesale or other grid services[5] directly, using a more advantageous retail plan for a sub-load or enabling gross generation.

Second Connection Point, Single Linkage (LHS), Double Linkage (RHS)



Source: Energeia

It may be possible to extend the existing Small Generation Aggregator (SGA) framework[6] to allow sub-loads to be included under the framework and allow sub-loads and generation to "switch" between connection points. Here, the customer would still have two connection points to the main grid, but be able to "switch" between using their DER as either gross generation that feeds directly into the grid, or net generation that offsets consumption from the main load. They can also draw power from either connection in the case of batteries and EV charging. The key advantage of this configuration over those previously discussed is that a customer would be able to further maximise the return on investment from their DER or EV charger by enabling real-time arbitrage across two retail plans, while also allowing the customer to choose to use their DER system as a gross or net generator.

Energeia found that the costs and process of establishing a second connection point as shown above would be fairly similar to the cost of establishing a subtractive metering arrangement, with the key difference being the need for a second service wire not existing in a subtractive metering arrangement, but potentially required for a second connection point. A new service wire is estimated to cost $352 for a small, single-phase overhead connection.

[4] Though DNSPs more commonly provide multiple connections for large customers, where required on a commercial basis

[5] Grid services refers broadly to any function that DER can provide to enhance the reliability or security of the grid. They can be orchestrated by a retailer, network or other responsible third-parties

[6] AEMO (2020), 'Small Generation Aggregator Framework', available here: https://aemo.com.au/-/media/files/electricity/nem/participant_information/registration/small-generation-aggregator/small-generator-aggregator-fact-sheet.pdf?la=en

Key Findings

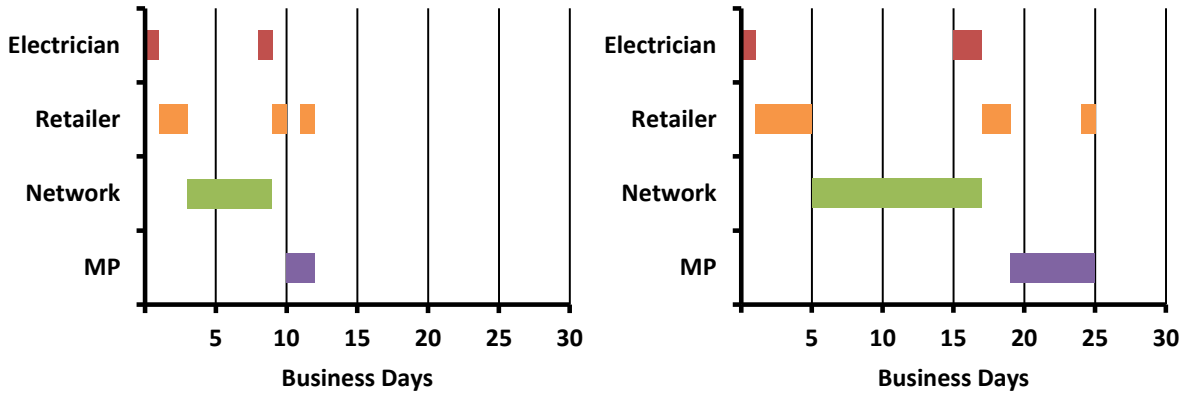
In addition to reviewing each DNSP's website for their connection process and associated costs, Energeia interviewed several retailers, networks, and metering providers (MP) to determine the process and costs from an industry-wide perspective. We also mystery shopped 5 retailers, 5 networks and 10 electricians to get firm pricing, process, and timeline information across each state.

Small Customer Process and Timeline

Based on our desktop and primary research, Energeia estimates that the timeline for a basic new second connection to be completed ranges from 12 to 25 business days, as shown in the figure below. This is based on the process of establishing a new connection to a premise, which Energeia considers to be very similar to the process of establishing a second connection point.

There are four major parties involved with the connection process: electricians, retailers, distribution networks (DNSP) and metering providers (MP). Their involvement is summarised in figure below for the best and worst-case scenario. Energeia determined that the key drivers of the timeline are the network's connection application approval process, the retailer's ability to process and submit applications and requests in a timely manner and an MP's availability to be at the premise.

Simple Basic Connection, No Delays (LHS), Complex Basic Connection, w/ Delays (RHS)



Source: Energeia

Small Customer Upfront and Ongoing Costs

Energeia estimates that for a basic new second connection, the average small customer will pay an upfront cost ranging from $650-$3,260. The key drivers of final cost paid by the customer are whether a new service wire is required and what type, whether a switchboard, meter box and/or main fuse (i.e. meterboard) upgrade is required, and whether the existing connection needs to be de-energised[7] to complete electrical and connection works. An itemised breakdown of upfront costs is shown in the figure overleaf.

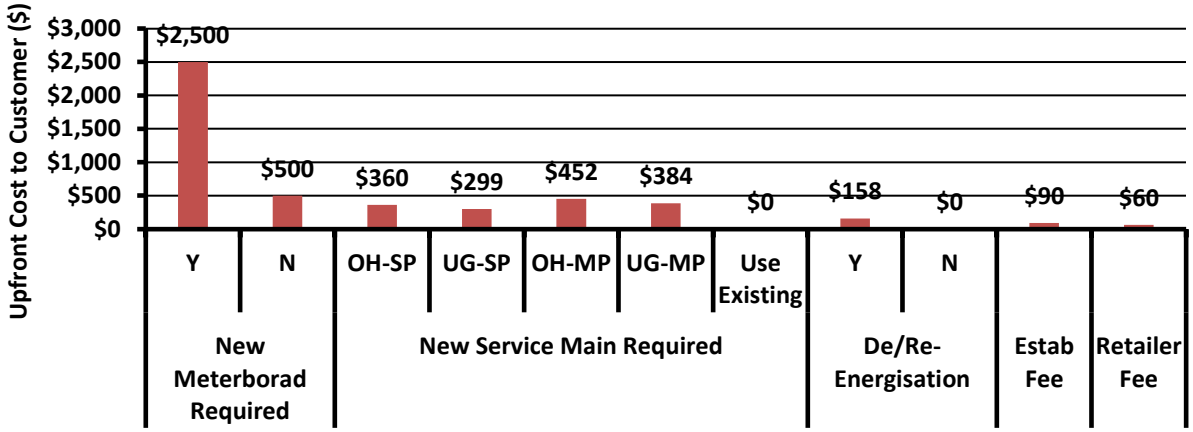
The 2015 analysis found that small customers wishing to install a second connection face an upfront average cost range of $404-$3,795 (in 2020$ terms). The difference in the cost range found is explained through several factors, including a change in metering installation procedure between 2015 and 2020, a refined understanding of network and retail cost drivers through the stakeholder interview process for the updated analysis, and a lack of comparability between the electrician fees found with 2015 considering the scenario of a granny flat connection, which would have different in-premise electrical works to the scenario of installing DER or EV charging.

[7] A new, separate connection would not need to be de-energised as not energised in the first place.

Stakeholders reported that there would be minimal additional costs for configuring the ability to switch DER or EV charging loads and grid exports.

Energeia has determined through researching pricing proposals and discussions with DNSPs that customers would likely incur additional tariff charges associated with a second connection point. On average across the distribution networks, Energeia estimates that a small customer would be charged $371 annually for the additional connection point, including network and retailer charges[8].

Upfront Cost Breakdown



Source: Energeia, Note: OH = Overhead Line, UG = Underground Line, SP = Single-Phase, MP = Multi-Phase, Estab = Network Site Establishment

Large Connections

Energeia found it difficult to estimate the cost and timeline associated with a new connection for a large customer. This is mainly because in most cases, large customers must use a negotiated connection service, meaning they go through rigorous non-standard approval, design, construction, and commissioning phases.

Based on Energeia's stakeholder interviews, it was estimated that the connection application process may take anywhere from between 4-12 months as the large customer will need to work with the DNSPs to establish a full design plan of connection and would require multiple studies. Once accepted, the construction and commissioning process would take between 1-2 years which would include the procurement, commissioning, and the implementation of the required work to upgrade the network (if deemed necessary to do so).

While only a rough estimate, Energeia's research and analysis suggests that the average large, low voltage customer pays $60,000 upfront to connect to the grid, and an extra $3,653 per year in fixed network tariff charges on average for the additional connection to the grid[9]

Key Barriers

Energeia identified three key areas where customers seeking to install a second connection point at a premise could encounter a barrier:

- **Network Policy** – Currently, networks generally do not allow the installation of a second connection point to a small customer's premise for the purpose of sub-loads or embedded generation, even though the rules do not disallow this.

[8] Based on the fixed costs for a standard primary tariff

[9] Assuming 200 MWh/p.a. of consumption on the low voltage network

- **Timeliness** – The process timeline for a second connection is not controlled by any one party, and is a multi-step process with multiple opportunities for delay
- **Tariffs** – Currently, each NMI is assigned a tariff with a network access charge, meaning a customer with multiple connection points to the grid would have to pay multiple access charges.

Energeia recommends that addressing these issues would provide a clearer path for customers to undertake the works required to engage with multiple financially responsible market participants (FRMPs) and achieve a two-sided market.

Disclaimer

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For further information, please contact:

Energeia Pty Ltd
Suite 902, 172 Clarence Street
Sydney NSW 2000

T: +61 (0)2 8097 0070
E: info@energeia.com.au W: www.energeia.com.au

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Structure of this Report

This report is structured as follows:

- **Section 1** – Background provides an overview of the drivers of potential changes to connection arrangements through the post-2025 Market Re-design process
- **Section 2** – Scope and Approach describes Energeia's methodology and approach to delivering this project, including research, stakeholder engagement and documentation
- **Section 3** – Connection Configuration outlines: the connection arrangements considered in the study; why they could be advantageous in certain circumstances compared to typical configurations, and; how similar or different the proposed connection arrangements are to subtractive metering arrangements with multiple settlement points
- **Section 4** – Key Findings details the results of the study, including the process, timing and costs of establishing a second connection, as well as a discussion of the barriers.

Supporting material is provided in the Appendices:

- **Appendix A** lists out a glossary of key terms
- **Appendix B** lists out a bibliography of key sources
- **Appendix C** provides supplementary information regarding stakeholder interviews, the relationship between key parties and our first principles cost analysis.

1 Background

The following sections provide background to the study, including a brief summary of the previous report published in 2015[10], the developments in the NEM that drove the need for changes to the current market design, and the Energy Security Board (ESB) driven process to deliver the post-2025 Market Design.

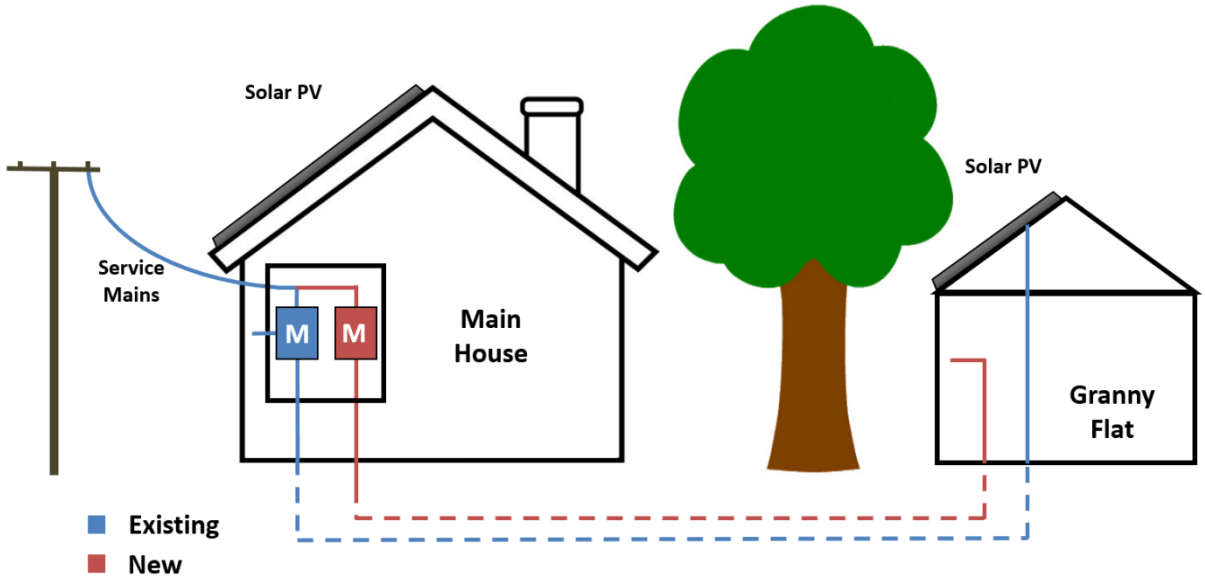
1.1 2015 Report

In 2015, the AEMC engaged Energeia to investigate the costs, timeframes, and barriers to establishing an additional connection point and associated agreements with multiple FRMPs under the National Electricity Rules (the Rules) at the time.

1.1.1 Scope and Approach

Energeia undertook desktop research and telephone conversations with networks, retailers, and electricians to gather information and determine the process and associated costs of establishing a second connection point.

Figure 1 – Arrangement of Scenario



Source: Energeia

The particular scenario investigated was a main residence and a granny flat at the far end of the backyard. In the scenario, the owner of the premises wished to meter the supply to the granny flat separately such that a relationship with a different retailer the granny flat supply could be arranged.

1.1.2 Key Findings

Energeia found that the basic cost of establishing a second, separately metered LV connection point to the grid was in the range of $366-$3,437 (in 2015$), finding that the amount of in-premise electrical works required and the need for a second or upgraded service main were the key drivers of overall costs.

[10] To which this report is considered an update of

Energeia also found that there was there was no material difference in the processes for establishing a second connection point and establishing the initial connection point, from the perspective of networks and retailers.

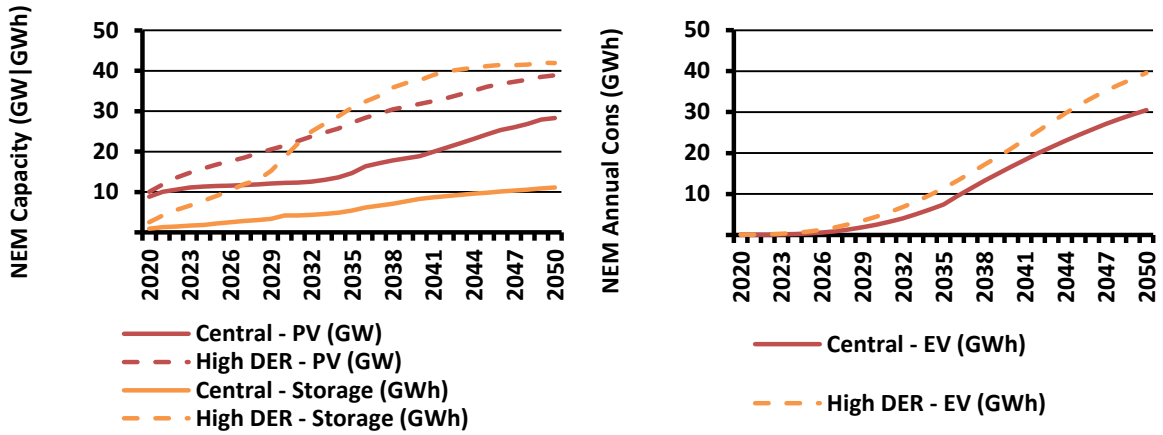
1.2 Developments in the NEM

The increasing prevalence of distributed energy resources (DER) in the National Electricity Market (NEM) may require change in market settlements and in the retail market to encourage greater participation of behind-the-metre (BTM) resources in providing grid services. Various market bodies are currently undertaking a range of initiatives to overcome the range of technical, regulatory and commercial barriers to further enablement of DER to provide grid services.

1.2.1 A Major New System Resource Type Emerges

Within the NEM, uptake of DER, including solar PV and storage systems, as well as plug-in electric vehicles (PEVs) is forecasted to rise substantially over the coming years. Figure 2 shows the that the adoption of behind-the-meter DER and annual electricity consumption by PEVs in the NEM are projected to at least double by 2050 compared to 2020 levels.[11]

Figure 2 – AEMO Behind the Meter DER (LHS) and PEV (RHS) Uptake Forecast (NEM)



Source: AEMO ISP Inputs and Assumptions (2020)

Together, AEMO is forecasting that solar PV and battery storage to comprise 13-22% of overall annual consumption in the NEM by 2040, depending on the scenario modelled.

1.2.2 Potential Barriers to Competition

Customers installing DER stand to benefit from energy bill savings from reduced grid consumption, as well as the provision of grid services which would unlock additional benefits to customers and to networks. However, current distribution network service provider (DNSP) arrangements do not allow sub loads and generation to be connected separately to the grid, despite allowing multiple National Metering Identifiers (NMI). This effectively requires that DER and load management services to be bundled with the retail electricity offer. Unbundling DER from uncontrolled customer loads could increase competition for DER services and result in more choice and better terms for customers with DER and EVs.

[11] AEMO (2020) 'Inputs and Assumptions Workbook', available here: https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/inputs-assumptions-methodologies/2020/2020-inputs-and-assumptions-workbook.xlsx?la=en

1.2.3 Rising Market Costs

DER is currently not separately metered, leading to uncertainty regarding its operation, and increasing AEMO's short term demand and supply forecasting error[12] and the associated level of reserves required. Separately metering DER would increase visibility of its behaviour, reduce demand and supply forecasting uncertainty, and the need for additional system reserves, lowering the overall operational costs of the system.

1.2.4 Policy and Regulatory Reforms to Unlock DER Benefits

Currently, there are various bodies looking to improve DER and EV integration processes and solutions through policy and regulatory reforms. Key initiatives include technical reviews and technical standards development, with key examples listed in Table 1.

Table 1 – Current or Recent Distributed Energy Resources Management Initiatives

Initiative	Sponsor	Purpose and Objectives	Participants
Post-2025 Market Design	ESB	To provide a fit-for-purpose market framework to support system reliability and meet the needs of flexible generation resources	Industry, regulators, customers, lobby groups
Distributed Energy Integration Program (DEIP)	ARENA	To maximise the value of customers' DER for all energy users	Industry, regulators, suppliers, government, customers, and academia
Electricity Network Economic Regulatory Framework Review	AEMC	To examine whether the economic regulatory framework is robust, flexible and continues to support the efficient operation of the energy market in the long-term interests of customers	AER, ARENA, DNSPs, Standards Australia, and others
AS 4777	Standards Australia	Sets out specifications, procedures and guidelines that aim to ensure products, services, and systems are safe, consistent, and reliable	Industry, customers, and government
Open Energy Networks	AEMO/ ENA	Consultation on how best to transition to a two-way grid that allows better integration of DER for the benefit of all customers	Industry, customers, suppliers, government, and academia

Source: Energeia Research; Note: AEMC = Australian Energy Market Commission, AEMO = Australian Energy Market Operator, AER = Australian Energy Regulator, ARENA = Australian Renewable Agency, DER = Distributed Energy Resources, DNSPs = Distributed Network Service Providers, ENA = Energy Networks Australia, ESB = Energy Security Board

The review of the current market design and arrangements by the Energy Security Board (ESB) as part of the Post-2025 Market Design[13] has driven this engagement of Energeia by the AEMC, who together with AEMO, have been tasked by the ESB with leading the Two-Sided Market Design Initiative.

[12] AEMO (2019), 'Forecast Accuracy Report', available here: https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/accuracy-report/forecast_accuracy_report_2019.pdf?la=en&hash=DCD762A3035664F4F4F53430FABB0846

[13] ESB (2020) 'Post 2025 Market Design Consultation Paper', available here: http://www.coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/P2025%20Market%20Design%20Consultation%20paper.Final_.pdf

1.3 Post-2025 Market Design

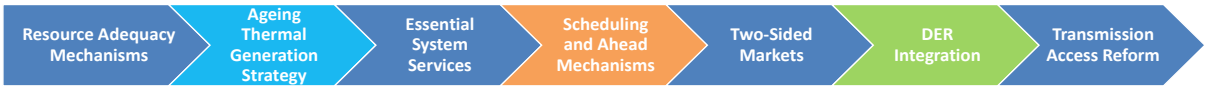
As the NEM is currently undergoing significant changes, particularly with the increased adoption of cleaner energy technologies, distributed energy resources and the exiting of the aging thermal generation fleet, the former COAG Energy Council was prompted to consider an optimal future market design that is fit-for-purpose[14].

The former COAG Energy Council therefore directed the ESB to lead the post-2025 Market Design, which involves the review and development of a new market design for the NEM for implementation post-2025 with the following key objectives:

- Deliver secure and reliable power at least cost to customers, and
- Accommodate the changes underway and expected in the future.

As such, the ESB established seven workstreams – or Market Design Initiatives – to consider the existing and potential issues and assist in developing potential solutions to address these issues, as shown in Figure 3.

Figure 3 – ESB Market Design Initiatives



Source: ESB Market Design Consultation Paper (2020)

1.3.1 Two-Sided Markets

This project acts as an input to the Two-Sided Markets (2SM) initiative, which seeks to resolve barriers to customers, in particular small customers, actively or passively (through intermediaries) participating in energy markets. As DER and PEVs are becoming increasingly widespread, customers are will be increasingly able to provide grid services. As such, understanding the associated costs and processes of establishing Multiple Trading Relationships (MTR) is of significance to implementing a two-sided market.

1.3.2 Potential Alternative Models

As part of the 2SM initiative, the team is developing various connection models which will expand upon current metering arrangements and allow customers to engage with multiple service offerings in real-time whilst:

- Supporting and protecting customer choice,
- Coexisting with the market design, and
- Facilitating greater participation via two-sided markets whilst optimally implemented to limit costs as the framework and market design evolves over time.

The potential arrangements will allow loads and/or generators to switch between NMIs and connection points, as shown in Section 3.3.2. This will enable DER to act as net generation for customer load or a gross generator, which would allow customers to engage with multiple retailer offers and achieve a better return on their investment through arbitraging[15].

[14] COAG Energy Council (2019), 'Post 2025 Market Design for the National Electricity Market', available here: http://www.coagenergycouncil.gov.au/publications/post-2025-market-design-national-electricity-market-nem

[15] Energeia notes that the cost benefit analysis of this proposed model is out of scope for this engagement.

However, additional issues will need to be reviewed and assessed, including additional network charges applied to the second connection point, potential avoidance of demand chargers, and barriers to connection work required by DNSPs or from compliance with technical requirements and standards for wiring and connection.

2 Scope and Approach

This section summarises Energeia's scope of work and the approach adopted to deliver it.

2.1 Scope

Energeia was engaged by the AEMC to determine the processes and associated costs faced by customers to establish a second connection point at a premise[16], which would be compared against the key findings of previous work provided by Energeia in 2015[17]. Second connection points at both small customer and large[18] customer premises are to be considered.

Energeia focused on the following key areas:

- Describing the overall process of establishing a second connection point at a premise for a small customer, including the roles and responsibilities of the key parties involved
- Breaking down the costs and timelines associated with each sub-process
- Identifying how this process differs between small and large customers
- Determining the key barriers that might impede the ability of a customer to establish a second connection point in order to engage with multiple retailers

Energeia notes that analysis of the following items is out of scope for this engagement:

- Downstream meters, embedded meters, and virtual meter solutions
- Benefits and net benefit estimates

2.2 Approach

Energeia's approach to deliver the scope of work was based on our learnings from the 2015 project:

- **Research** – Energeia undertook desktop research and mystery shopping[19], mirroring our 2015 approach, to gain an understanding of the current processes and costs involved in establishing a second connection point for customers. This approach included not just first principles desktop research of the National Electricity Rules, current network connection arrangements and other pertinent material, but also included mystery shopper calls to understand how the process works in practice.
- **Stakeholder Interviews** – In our review of the 2015 approach, we identified that engaging with stakeholders to understand the barriers to reducing costs and timelines was a key gap in our prior work. We recommended to the AEMC that the scope should be expanded to include focused consultation with impacted stakeholders, and the AEMC adopted our recommendation.

[16] Although related to AEMC work on DER and EV Uptake, AEMC is only interested in the cost of the second connection point.

[17] Energeia (2015) 'Advice on Establishing a Second Connection Point', available here: https://www.aemc.gov.au/sites/default/files/content/0d9db434-981e-4857-b94c-334e37a505a4/Report-to-AEMC-Energeia-Second-Connection-Point.PDF

[18] Regulation 7 in the National Energy Retail Regulations sets the upper consumption limit to 100 MWh per annum, available here: http://classic.austlii.edu.au/au/legis/sa/consol_reg/nerr335/s7.html. South Australia (160 MWh pa) and Tasmania (150 MWh pa) apply different consumption limits (https://www.aer.gov.au/system/files/AER%20Annual%20Retail%20Markets%20Report%202018-19_0.pdf).

[19] Mystery shopping involves contacting potential suppliers to obtain first-hand information as a customer.

- **Documentation and Engagement** – Energeia documented and presented all key findings to the AEMC through a series of meetings and presentations. We revised our analysis to address any feedback received from AEMC prior to including it in this report.

These areas are discussed in further detail in the sections below.

2.2.1 Research

Energeia's research task included the following sub-tasks:

- **Desktop Research** – Energeia undertook desktop research to identify the costs and processes involved in arranging a new connection to the grid from public domain resources including thirteen DNSP standard control and alternative control service pricing lists, connection policies and tariff structure statements, as well as multiple retailer websites.
- **Mystery Shopper Calls** – Energeia obtained first-hand information regarding the actual costs and processes that a customer would experience through a series of mystery shopper calls to various networks, retailers, and electricians in Australia.

2.2.2 Stakeholder Interviews

Energeia undertook a stakeholder engagement process to obtain stakeholder input and to clarify our understanding regarding the processes, costs, and timelines for establishing a second connection point. Energeia consulted with a wide range of impacted stakeholders, including:

- Distribution Network Service Providers (DNSPs)
- Retailers
- Market Bodies
- Large Customers, and
- Metering Providers (MPs).

Through this process, Energeia was also able to identify key issues with the current process and outlined potential improvements.

2.2.3 Documentation and Engagement

All key findings of Energeia's research and analyses were documented and validated in a series of meetings and presentations, including:

- **Progress Meetings** – Energeia facilitated weekly progress meetings to update the AEMC with findings and issues from the research, mystery shopping and stakeholder interviews.
- **Preliminary Results Presentations** – Energeia presented and validated our preliminary findings to AEMC for feedback before drafting the report.

Energeia revised our analysis to address feedback received from AEMC prior to including it in this report.

3 Connection Configurations

This section summarises the current regulatory framework and industry arrangements governing second connection points before outlining the connection configurations considered for this analysis and their advantages compared to the typical current connection arrangement for DER and EV charging. The section first outlines the typical current arrangement and then explains potential connection configurations that could be used to support multiple grid connections.

3.1 Current Regulatory and Industry Arrangements

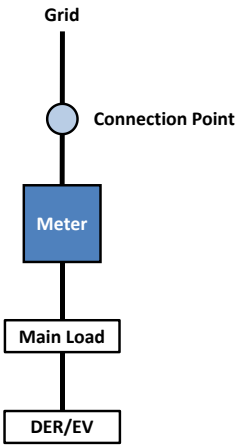
Section 2 of the National Metering Identifier procedure[20] regulates National Metering Identifier (NMI) allocation, which determine settlement points. The Rules require all connection points to be metered and for each metering point to be assigned a NMI. They do not appear to require one connection point per premise nor one NMI per premise, only that a connection point be associated with a metering point and each metering point be associated with a NMI.

Current distribution network service provider (DNSP) industry standard practice is to allow one connection to the grid per customer, such that they will not allow customer sub-loads or micro embedded generation to separately connect to the grid, as the DNSP establishes the NMI in the market.

3.2 Current Configuration Arrangements

Currently, when customers install DER or EV charging at their premise, it is installed behind the same meter as the main load, with the net load passing through the meter and into the grid to determine how much a customer has imported/exported from the grid. This configuration is demonstrated in Figure 4 below.

Figure 4 – Typical Connection of DER / EV Charging[21]



Source: Energeia

This method of connection lends itself well to net feed-in solar PV tariffs, where DER generation is offset against energy consumption, and any excess generation is fed back into the grid at a pre-determined rate.

[20] AEMO (2017), 'MSATS Procedures National Metering Identifier', available here: https://www.aemo.com.au/-/media/files/electricity/nem/retail_and_metering/metering-procedures/2018/msats-national-metering-identifier-procedure.pdf?la=en&hash=243AA41A6FB95B4050E0B260EE56ED31

[21] In Figure 3, all assets above the connection point (the premise connection assets) are belong to the DNSP, the assets below the point of connection are on the consumer's premise.

In some jurisdictions, it is possible to have a load sub-metered for a controlled load tariff, most commonly for hot water. In this configuration an appliance is separately metered[22] to the remainder of the premise's load and is typically controlled by the network via a time clock or ripple control system, who determines when it can be operated. It is still connected to the grid via the same connection point as the main load, meaning the customer is unable to engage with other FRMPs with that load. The configuration looks most like

[22] Either through a two-element meter or an additional meter

Figure 7 (section 3.3.2).

3.3 Potential Options for Multiple Grid Connections

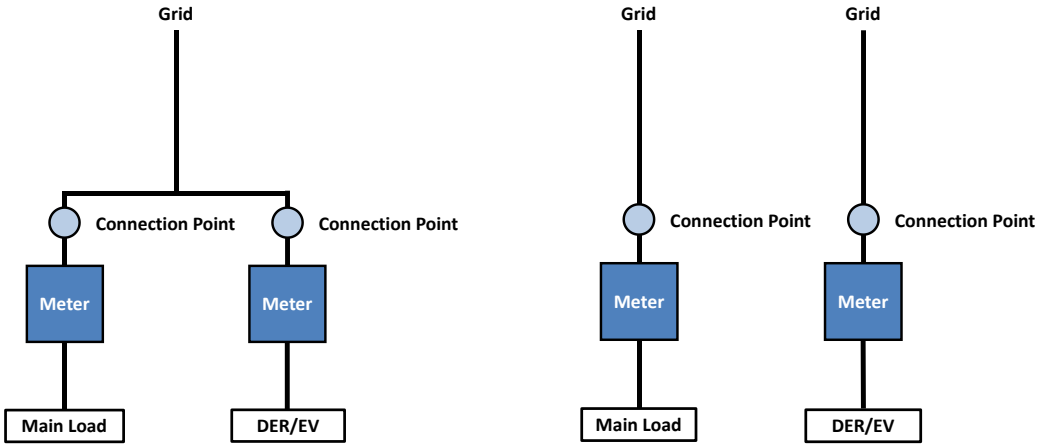
3.3.1 Multiple Grid Connections, Fixed Wiring

Figure 5 displays a configuration with two connection points from the one premise, where each circuit is separately metered and connected to the grid.

The left-hand side represents a situation with two connection points but one service wire, whereas the right-hand side represents an alternative configuration with a second service wire to the main grid (i.e. each connection point is connected to the grid via a separate service wire).

This study assessed the process and cost of establishing a second connection and metering point for a customer for the configurations shown in Figure 5.

Figure 5 – Second Connection Point, Single Linkage (LHS), Double Linkage (RHS)



Source: Energeia

Energeia's review of the current regulatory framework found that it allows DER and EV charging to be configured like this, however this is seldom the case, and DER resources are normally added as a sub-level connected device rather than as an independently metered load. An example of this type of configuration that is typical could be a granny flat that is separately metered, or a gross solar PV arrangement.[23]

The advantage of allowing a second connection point for a sub-load or generation is that it allows the customer to unlock a range of different options that may be valuable to them, which are discussed in the following sections.[24]

3.3.2 Multiple Grid Connections, Switchable Wiring

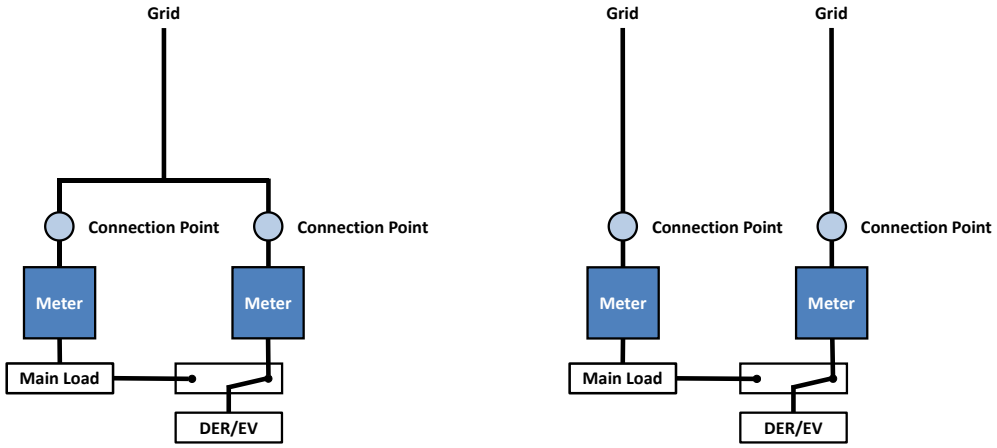
As discussed in Section 1.3.2, the 2SM project team is considering changes to facilitate the configuration shown in Figure 6. Here, the customer would still have two connection points to the main grid, but be able to "switch" between using their DER as either gross generation that feeds directly into the grid, or net generation that offsets consumption from the main load.

[23] Gross metered solar is now quite uncommon as most of these installations have aged out of the market, and these connections, although separately metered, are registered under the same NMI as the main load.

[24] Separately metering their load can enable customers to participate in the small generator aggregator framework under the existing connection and metering arrangements, see: https://aemo.com.au/-/media/files/electricity/nem/participant_information/registration/small-generation-aggregator/small-generator-aggregator-fact-sheet.pdf?la=en

The key advantage of this configuration over those previously discussed is that a customer would be able to further maximise the return on investment from their DER and/or EV charger by enabling arbitrage for withdrawals for battery storage or EV charging from the grid across two retail plans. It also would enable arbitrage for injections into the grid against offsetting main load depending on what would be optimal for the customer at any given time.

Figure 6 – Second Connection Point w/ Switching, Single Linkage (LHS), Double Linkage (RHS)



Source: Energeia

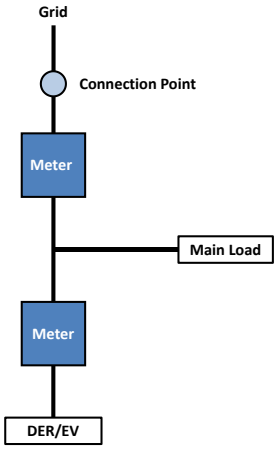
3.3.3 Subtractive Metering Arrangements

From inspection of the configuration diagrams, it could be surmised that the process and cost of establishing a second connection point like the arrangements shown in Figure 5 and Figure 6[25] would be fairly similar to the process and costs involved with a subtractive metering arrangement shown in Figure 7, which was a previously considered in the 2015 MTR rule change.[26]

[25] As previously noted, this study investigates the process and costs involved with the addition of second connection points, as shown in Figure 5 and Figure 6.

[26] AEMC (2016), 'ERC0181 Multiple Trading Relationships', available here: https://www.aemc.gov.au/rule-changes/multiple-trading-relationships

Figure 7 – Subtractive Metering Arrangement w/ Two Settlement Points



Source: Energeia

A subtractive metering arrangement would still require electrical works and network approval, as well as installing a sub-meter. Key differences include not needing an additional NMI or second service wire to the premise, which could reduce costs compared to establishing a second connection point. However, it is not clear whether a service wire upgrade is needed for a second connection.

4 Key Findings

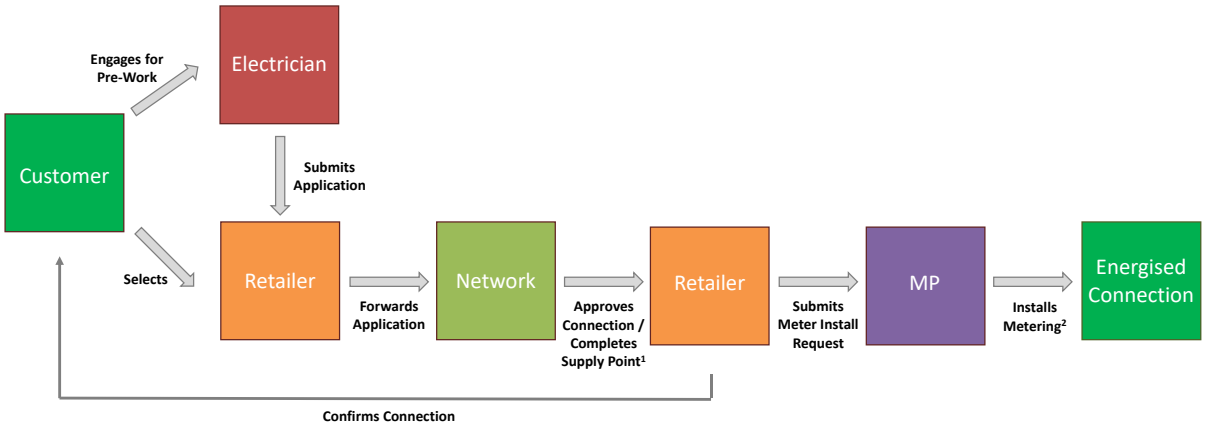
This section presents Energeia's key findings related to establishing a second connection point, including a breakdown of the basic connection process and timing for small customers, the upfront and annualised costs of establishing a second connection point, how this process differs for large customers, and a discussion of the key barriers that may prevent customers from establishing a second connection point.

4.1 Basic Connection Process and Timing

A basic connection is defined by the Australian Energy Regulator (AER) as relating to a connection between a distribution system and a retail customer that involves minimal or no augmentation of the network to enable[27]. For residential and small business customers, establishing a second connection to the network would almost always be classified as a basic connection service since it would most likely not involve network augmentation or expansion.

Besides the customer, there are four main parties involved in establishing a new connection to a premise: an electrician, a retailer, the distribution network, and the MP. A diagram of the basic connection process is shown in Figure 8.

Figure 8 – Basic Connection Process



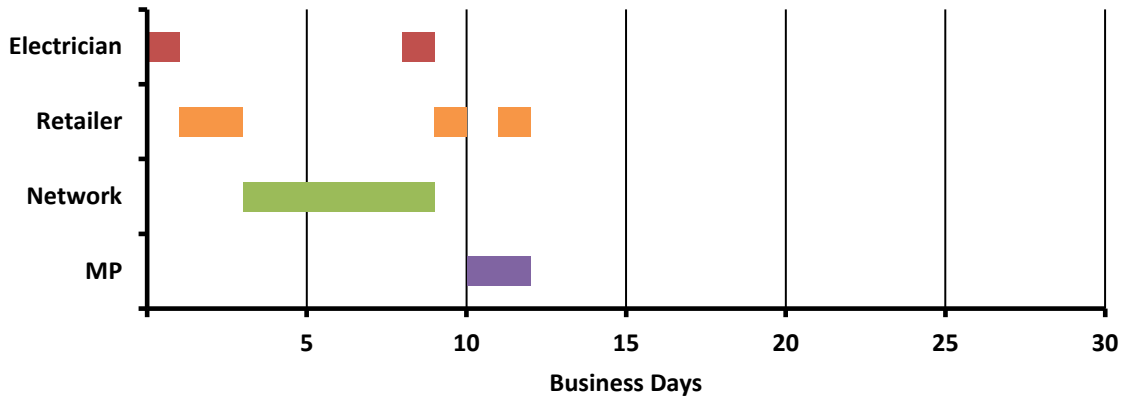
Source: Energeia; Note: 1. Service wire is connected to the grid by an electrician in NSW, 2. Meter is installed by the network in Victoria

Energeia estimates that the timeline for a basic second connection to be completed ranges from 12-25 business days, beginning from when the electrician delivers a site inspection and quote (i.e. excluding appointment wait times). This is based on the process of establishing a new connection to a premise, which Energeia considers to be very similar, and our interviewed stakeholders agreed.

Figure 9 and Figure 10 below provide a visual representation of a best and worst-case scenario timeline for the basic new connection process, including the timing and duration of each party's involvement.

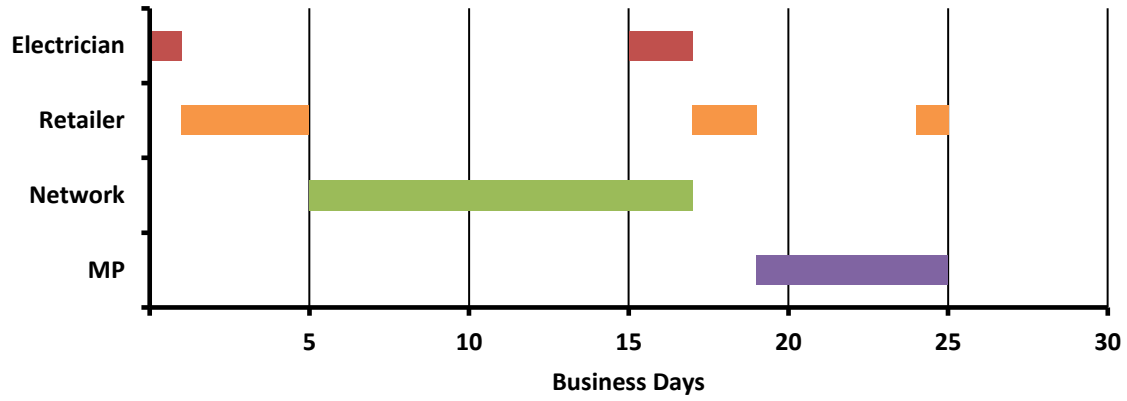
[27] AER Service Classification (2018), https://www.aer.gov.au/system/files/AER%20-%20Service%20Classification%20Guideline%20-%2028%20September%202018.pdf

Figure 9 – Simple Basic Connection, No Delays



Source: Energeia

Figure 10 – Complex Basic Connection, w/ Delays



Source: Energeia

A standard or negotiated connection, which applies when it is deemed that a new connection will require an upgrade to the network or an expansion of the existing network, will still follow the same general process as a basic connection, however the network application process is far more in-depth, requiring a detailed design assessment and construction and commissioning phase, all of which the network collaborates with the customer to achieve. This situation usually only applies to large customers and rural connections in some cases and is explained further in section 4.3.

Energeia's summaries of the basic and standard connection processes are based on a variety of sources, including network connection policies, retailer connection process explanations and FAQs and mystery shopper telephone calls to networks, retailers, and electricians. The roles and responsibilities of each party in the new connection process are explained below.

4.1.1 Electrician

The electrician is engaged by the customer to:

- Perform the site inspection to determine if what the customer wishes to do is electrically feasible and to quote the customer a price for the work
- Fill out the new connection application form for the DNSP and submit the request for a new connection to the retailer

- Carry out any electrical works required in-premise, including pre-wiring and any necessary upgrades to the switchboard, main fuses and/or meter box, once the application has been approved by the network

In NSW, under the Accredited Service Providers (ASP) scheme, a Level 2 ASP qualified electrician is required to also complete the connection to the network, with network approval[28].

From the mystery shopper calls, an electrician's timeline is fairly stable, requiring 1 day to inspect the site, quote the customer and fill out the application, and 1-2 days to complete the electrical works required. The duration of the latter depends on the complexity and difficulty of the circuitry, and the upgrades required to the switchboard, main fuses, and meter box.

4.1.2 Retailer

The retailer selected by the customer performs the following roles in the process of establishing a new connection:

- Process and submit new connection applications received by the electrician to the distribution network
- Confirm the new connection with the customer and set up the account and energy plan
- In Power of Choice (PoC) regions (all NEM jurisdictions excluding Victoria), notify the MP to install the meter once the connection works have been completed

In Victoria, it is the networks who install, operate, and maintain meters, as the Power of Choice rules have not been adopted in that jurisdiction[29].

In the case of installing DER, the retailer may also offer grid services, however this could also be done by a third-party.

Based the our mystery shopper calls, desktop research and stakeholder interviews conducted, a retailer can take 2-4 days to process and submit the new connection request to the network, 1-2 days to notify the MP to install the meter and 1 day to confirm the connection with the customer. Delays in their process are driven by either internal resourcing constraints or errors in the application forms received by the electrician on behalf of the customer.

4.1.3 Network

The distribution network is determined by the customer's location and is not customer-facing. They perform the following roles in the process of establishing a new connection:

- Assess and approve the application for a new connection to the network[30] received from the retailer
- Allocate a NMI to the connection and populate its standing data
- In all states except NSW, provide the service mains from the connection point to the grid
- In Victoria only, install the meter

[28] NSW Government (accessed 2020), "Installing or altering your electricity service", https://energysaver.nsw.gov.au/households/you-and-energy-providers/installing-or-altering-your-electricity-service

[29] Victorian Government Gazette (2017), "No. S 346", https://resources.reglii.com/VGG.2017.10.12.S346.pdf

[30] This process may involve an inspection of the site, but site inspections are generally not necessary for basic connections

As explained above, networks have a slightly reduced role in NSW where they do not provide the grid connection services. Victorian networks have maintained their role as the metering coordinator and therefore have a greater role in the process compared to networks in other NEM jurisdictions.

According to the findings of the desktop research and stakeholder interviews, a network will typically take 5-6 business days to approve a basic new connection application but may take up to 10 business days. This can be due to application approval delays from errors that need correcting, or whether an inspection is required on-site for approval. If they are tasked with energising the connection, this will usually take 1-2 business days, depending on the difficulty of the job, for example, how easy the connection point is to access, whether traffic control is required, etc.

4.1.4 Metering Provider

In all PoC jurisdictions, the MP is selected by the customer's retailer, and plays the role of metering co-ordination, and installing the meter at the new connection once notified to do so by the retailer.

They are not chosen by the customer, nor are their services directly paid for by the customer. The retailer negotiates with the MP on the delivery of this service. Examples of these relationships are explored further in Appendix C.2.

As learned through desktop research and the stakeholder interviews, the MP will usually take 2-3 days to install a meter once notified by the retailer but can sometimes take up to 6 business days. This timeline is based on the availability of field service resources to get to the site and does not account for delays due to a site being deemed not ready or unsafe for the installation of a meter.[31]

4.2 Costs

Energeia has split the cost of installing a second connection onto a premise into two main categories:

- **Upfront** - an initial cost paid by the customer to establish the connection; and
- **Annual** - an ongoing cost paid by the customer as a result of establishing a second connection.

This section provides a breakdown of the costs in each category for a basic new second connection. Energeia has utilised information about establishing a new connection on a premise to determine the cost estimates, as the process of establishing a second connection point is largely similar.

Note that the costs for standard and negotiated new connections were not included in this breakdown, since they are determined on a case-by-case basis, and the issues impacting on larger customers are further explored in Section 4.3. However, through our stakeholder interview process, Energeia learned that a small customer will usually pay an additional $10,000-20,000 in the case of a network extension.

4.2.1 Upfront Costs

Energeia estimates that for a basic new second connection, the average small customer will pay an upfront cost ranging from $650-$3,260. The key drivers of final cost paid by the customer are whether a new service wire is required and what type, whether a switchboard, meter box and/or main fuse (i.e. meterboard) upgrade is required, and whether the existing connection needs to be

[31] MP practice is to batch connections: i.e. they wait until they have a certain number of connections in the same area to reduce field service costs

de-energised[32] to complete electrical and connection works. An itemised breakdown of upfront costs is shown in the figure below.

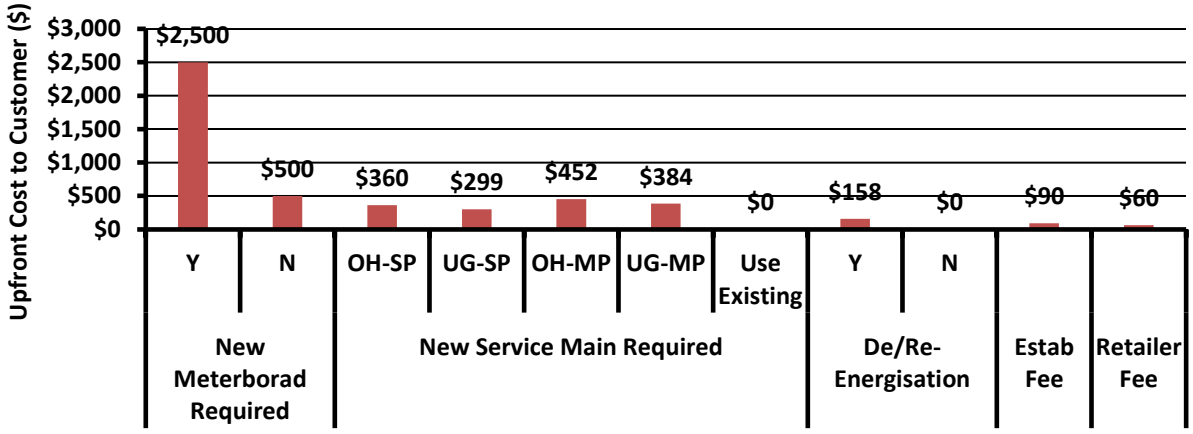
The estimated total upfront cost to the customer by each given connection scenario is shown in Table 2, and an itemised breakdown of the cost by variation is provided in Figure 11.

Table 2 – Basic New Connection Cost Matrix

New Service Main Required	New Meter Board Required	De/Re-Energisation	Network Site Establishment Fee	Retailer Admin Fee	Total Upfront Cost
Overhead - Single Phase	✓	✓	✓	✓	$3,168
	✓	×	✓	✓	$3,011
	×	✓	✓	✓	$1,168
	×	×	✓	✓	$1,011
Underground - Single Phase	✓	✓	✓	✓	$3,108
	✓	×	✓	✓	$2,950
	×	✓	✓	✓	$1,108
	×	×	✓	✓	$950
Overhead - Multi Phase	✓	✓	✓	✓	$3,260
	✓	×	✓	✓	$3,103
	×	✓	✓	✓	$1,260
	×	×	✓	✓	$1,103
Underground - Multi Phase	✓	✓	✓	✓	$3,192
	✓	×	✓	✓	$3,034
	×	✓	✓	✓	$1,192
	×	×	✓	✓	$1,034
Use Existing	✓	✓	✓	✓	$2,808
	✓	×	✓	✓	$2,650
	×	✓	✓	✓	$808
	×	×	✓	✓	$650

Source: Energeia

Figure 11 – Upfront Cost Breakdown



Source: Energeia, Note: OH = Overhead Line, UG = Underground Line, SP = Single-Phase, MP = Multi-Phase, Estab = Network Site Establishment

[32] A new, separate connection would not need to be de-energised as not energised in the first place.

Electrician

Works to the meterboard are carried out by an electrician hired by the customer. Based on our mystery shopper findings, Energeia has determined that upgrades to the meterboard add an additional $2,000 to the electrician's fee, which also include the cost of inspection, applications and any pre-wiring or circuitry works required in-premise, which Energeia estimates to cost $500 on average. Meterboard upgrades are therefore the biggest driver of cost in the process of establishing a second connection to a premise and represent the strongest cost barrier to a customer.

It should be noted that, from our stakeholder interview process, it was determined that there would be minimal additional material cost for configuring the ability to switch DER or EV charging loads

Network

A new or upgraded service main to energise the connection would add an additional cost to a second connection, if the existing service line does not meet the requirements for the additional load applied by the second connection point. The cost of this service is paid by the customer to the network (or the accredited electrician in NSW), though it is billed by the retailer. The cost of this service is unique to each network, but Energeia's analysis of network connection fees estimates that it will cost an average of $360 for an overhead, single-phase service main line, with costs increasing if a multi-phase service is used, and decreasing if the service main is underground. The average cost was determined by an analysis of quoted new connection service prices in network pricing proposals. See Appendix C.3 for more details.

In most cases, a premise will have to be de-energised by the network for the electrical works to be completed, with the exception of an entirely new linkage being established for a DER or EV charger installation, with wiring independent of the original connection point. The customer would pay the network an average fee of $158 to temporarily disconnect/reconnect the premise, based on quoted fees in the network pricing proposals.

It should be noted that the bulk of this cost is driven by the requirements to be on-site for the network. If the original connection has a smart meter, like almost all customer connections in Victoria and an increasing number of connections in the remainder of the NEM, then the network will be able to de/re-energise the premise remotely. This dramatically reduces the significance of this cost, as evident by an average energisation fee of $20 for customers on Victorian networks (where the smart meter rollout has been completed), well below the national average. The rollout of smart meters would help to alleviate the cost barriers a customer may have in establishing a second connection point for DER or EV charging at their premise.

A network site establishment fee will always apply, paid by the customer to the network. This is to cover the cost of the processing the connection application and allocating a NMI to the connection point. Through an analysis of the network pricing proposals, Energeia estimates that the average customer would be charged $90 for this service.

Retailer

Some retailers elect to charge their customers an administration fee for processing the new connection request and organising a meter installation. Energeia's research found that this fee can be up to $60, however some retailers choose not to directly charge the customers for their services in this part of the new connections process. Retailers were found to not charge for the signing up to grid services programs.

It is worth noting that retail charges are not regulated costs that need to be recovered but are a business decision made by the retailer. Though the cost is optional at the discretion of the retailer, Energeia has chosen to include it in our final upfront cost calculations.

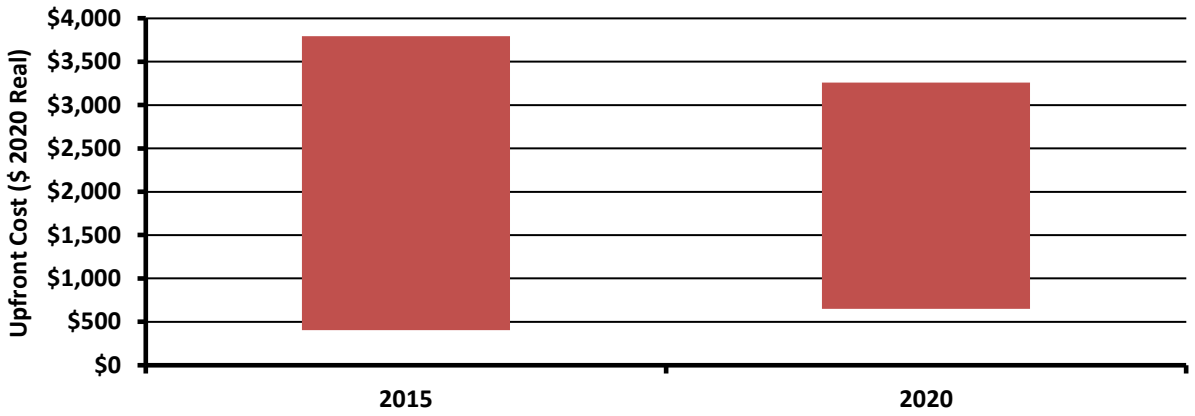
Metering Provider

MPs do not directly charge the customer for installing their meter, but rather negotiate a bulk price with the retailer for the provision of a certain number of meters for their customer, which the retailer may choose to integrate into their prices charged to all customers. While the average price per connection is commercially sensitive, our stakeholder interview process revealed that MPs typically charge retailers approximately $150-$200 per connection point, which includes the cost of the meter, installation, and any other overhead charges.

4.2.2 Comparison with 2015 Findings

A comparison of upfront cost findings between the 2015 and updated report is shown in Figure 12, with the 2015 finding adjusted for inflation. The 2015 analysis found that small customers wishing to install a second connection face an upfront average cost range of $404-$3,795 (in 2020$ terms). The updated analysis found that small customers face a similar average cost range of $650-$3,260.

Figure 12 – Comparison of Upfront Connection Costs for Small Customers



Source: Energeia, Note: 2015 findings have been adjusted for inflation at an assumed 2% p.a.

The differences in the results are attributable to several factors. Firstly, there was a significant change in the laws regarding meter installations between 2015 and 2020 (the PoC rules), which has resulted in metering installation costs to the consumer being moved from an upfront cost to a hidden cost in retail tariffs.

Secondly, through the stakeholder interview process for this report (which was inspired by the issues faced in the last report), Energeia gained a firmer understanding of the key network and retail cost drivers, which has allowed us to improve the accuracy of the network fee and service mains connection costs.

Finally, the 2015 report used the scenario of configuring a granny flat to be separately metered, as described in section 1.1.1; which was not used this time around as DER and EV charging were the specific focus. This therefore means that the electrician fees established in 2015 are not directly comparable to the electrician fee findings for this report.

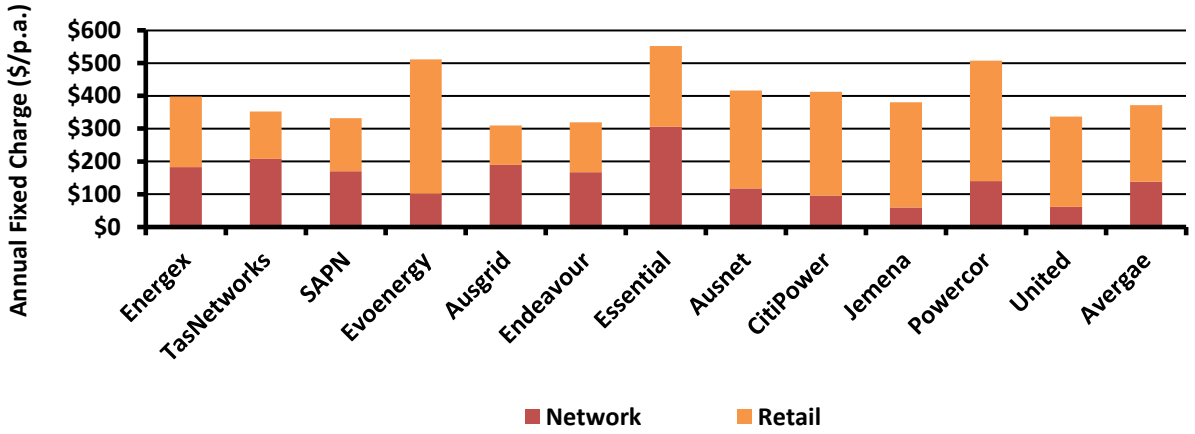
4.2.3 Annualised Costs

Energeia has determined through researching pricing proposals and discussions with DNSPs, that customers would likely incur additional tariff chargers as well as the upfront costs associated with a second connection point. This is because a second connection point would be treated as a separate connection for the purposes of tariff assignment, and therefore a separate customer on the network despite originating from an existing premise.

The additional cost mainly consists of the fixed charge associated with electricity tariff offerings, as shown in Figure 13 for each DNSP in the NEM. On average across the DNSPs, a small customer would be charged $371 annually for the additional connection point. This additional charge mainly incorporates the following:

- **Network Component** – This covers the cost of distribution, transmission, jurisdictional and metering operation charges.
- **Retail Component** – This includes the retailer cost of business, as well as AEMO fees and the charges passed through to customers for PoC metering services. We have observed that in almost all cases, that retailers choose to include the meter installation costs, which are roughly $150-200 per connection point, into the annual fixed cost rather than charged directly to the customer by the retailer. The relationships that retailers have which determine their tariff settings is explored further in Appendix C.2.

Figure 13 – Annual Fixed Tariff Cost for a Small Customer by DNSP



Source: DNSP Pricing Proposals, Retailer websites, Energeia Analysis, Note: Data not found for Ergon

It would appear that this is compliant with the National Electricity Rules (NER), as DNSPs are able to bill each distribution customer[33] for their usage of the distribution network and services[34]. Additionally, DNSPs are required to pay the transmission service charge for all connection points in their distribution network, where additional costs for secondary connection points would be passed through the to the retailer and effectively to the customer.

In Appendix C.3 Network and Retail Cost Summary, Energeia has also provided the daily fixed charges for network secondary tariffs for small customers costs for completeness. While Energeia does not believe that these tariffs would be applied to a second connection point with its own NMI, as they would cover the fixed cost of servicing a controlled load connection rather than an independent connection to the grid. This includes similar data, market and other overheads. It is worth noting that they are universally much lower than the primary fixed tariff cost. Energeia posits that a new network tariff or surcharge on top of the primary tariff fixed fee may be needed to ensure cost reflective fixed charges for multiple connection points.

[33] Under the NER, a distribution customer refers to a customer, DNSP, non-registered customer, franchise customer, or retail customer having a connection point with a distribution network.

[34] Clause 6.20.1 of the National Electricity Rules, available here: https://www.aemc.gov.au/sites/default/files/2020-09/NER%20-%20v150%20-%20Chapter%206_0.pdf

4.3 Large Customers

A large customer is defined in the National Electricity Retail Law (NERL)[35] as a business customer who consumes energy at business premise at or above the upper consumption threshold set by each jurisdiction's electricity legislation.

The connection process for large customers is more complicated and differs greatly from small customers who would usually connect to the grid under a basic connection service. This is mainly as large customers consume and require significantly larger amount of electricity, and in most cases will require negotiated connection services.

As such, Energeia found that it is difficult to gauge a timeframe and a total cost to establish a large customer connection to the grid. Costs and timeframes are quoted on a case-by-case basis as the level of work required by the network is dependent on various factors. These may include the following:

- The connection sizing of the large customer based on the peak demand required by the large customer,
- The strength and reliability of the network in the location that the large customer is requesting to connect to, or
- Whether the network will require any new assets to be built or augmentation of existing network infrastructure to accommodate the expected future grid consumption and demand of the large customer.

However, rough estimates of overall timeline and cost are provided in the sections below.

4.3.1 Process and Timing

Based on Energeia's stakeholder interviews, it was estimated that the connection application process may take anywhere from between 4-12 months as the large customer will need to work with the DNSPs to establish a full design plan of connection and would require multiple studies. Once accepted, the construction and commissioning process would take between 1-2 years which would include the procurement, commissioning, and the implementation of the required work to upgrade the network (if deemed necessary to do so).

4.3.2 Costs

Based on information provided to us from Energeia's stakeholder consultations, it is estimated that the average large low voltage, separately metered customer pays $60,000 upfront to connect to the grid, which was estimated based on the gifted asset values to the network from a sample of large low voltage connections.

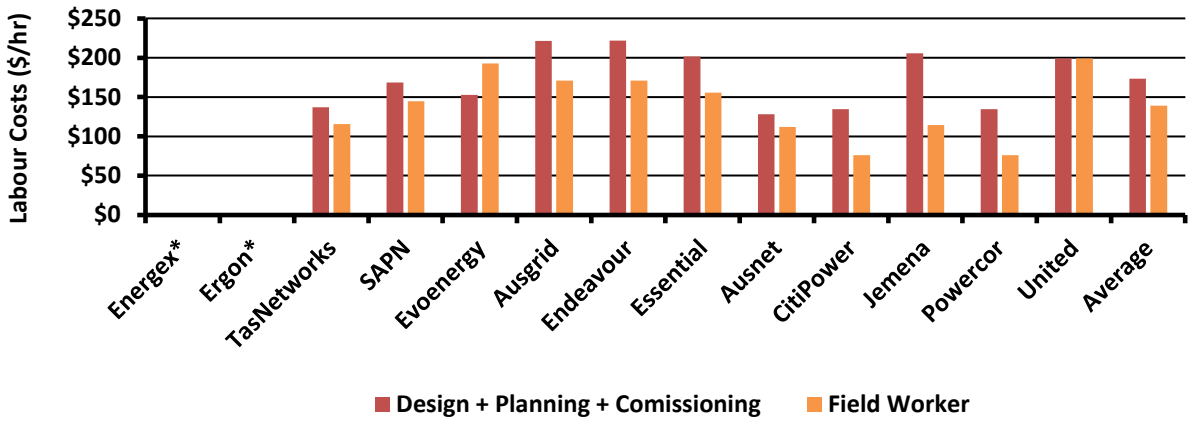
Taking the example of a 200 MWh/year large low voltage commercial customer, Energeia estimates that they would have to pay an additional $3,653 in fixed network tariff charges on average to add another connection to the grid, based on current DNSP network tariff schedules.

While these are rough estimates, Energeia can conclude that cost of adding a second connection point for a large customer is significant.

[35] Section 5 of the National Electricity Retail Law, available here: https://www.legislation.sa.gov.au/LZ/C/A/NATIONAL%20ENERGY%20RETAIL%20LAW%20(SOUTH%20AUSTRALIA)%20ACT%202011/CURRENT/2011.6.AUTH.PDF

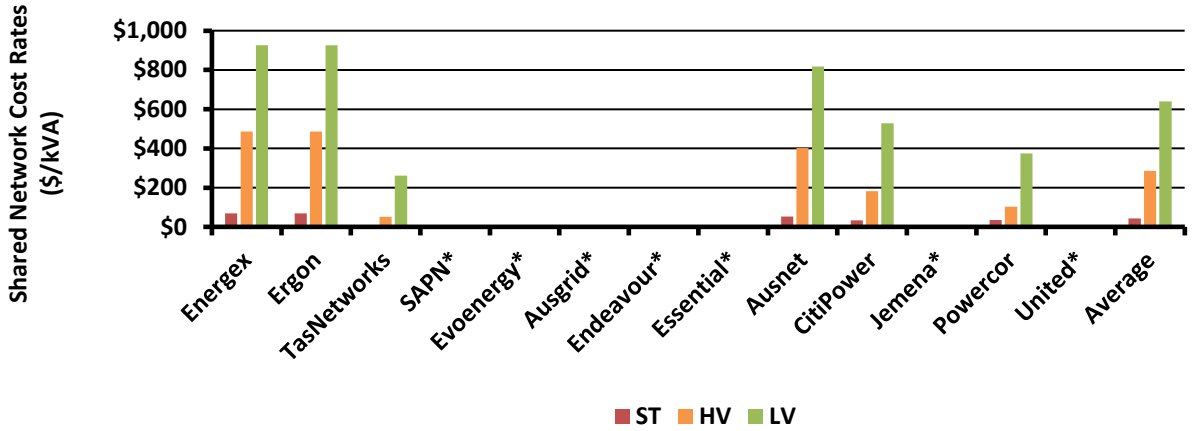
Additionally, Energeia have shown the reported labour rates on an hourly basis and capital contributions[36] cost rates on an power basis in Figure 14 and Figure 15 respectively to provide an idea of how the network fees involved in the connection process of large customers differ by jurisdiction.

Figure 14 – Network Labour Cost Rates



Source: DNSP Pricing Proposals; Note: *= Rates not provided

Figure 15 – Capital Contribution Cost Rates



Source: DNSP Connection Policies; Note: *= Rates are on a quoted basis

4.4 Barriers

Predominantly through the stakeholder interview process, Energeia identified three key areas where barriers could exist for customers to install a second connection point on their premise:

- **Network Policy** – Currently, networks do not allow the installation of a second connection point to a small customer's premise for the purpose of sub-loads or embedded generation, even though the rules do not disallow this.
- **Timeliness** – The process timeline for a second connection is not controlled by any one party, and is a multi-step process with multiple opportunities for delay

[36] Capital contributions refers to an upfront cost incurred by a consumer looking to connect to the grid. The cost encompasses all additional costs associated with any network upgrades that will not be recovered by the network over a given time period through network tariffs.

- **Tariffs** – Currently, each NMI is assigned a tariff with a network access charge, meaning a customer with multiple connection points to the grid would have to pay multiple access charges.

These issues are explored further below, along with proposed improvements that would mitigate these barriers

4.4.1 Network Connection and NMI Allocation Policies

Based on Energeia's research, networks currently will not allow an individual customer to connect DER or EV charging through a separate connection to a premise, with its own NMI, even though the NER does not prohibit it, and the SGA framework exists in the NER to allow customers to connect generation through a second connection point. This may inhibit a customer from using their DER to provide grid services, particularly if the framework were to be expanded to allow for DER to switch between connections, as shown in section 3.3.2.

Reasons provided by DNSPs for the current policy include that implementation of multiple connection points and/or DER switching would create difficulties for the network's NMI allocation method, which for some DNSPs would result in significant IT costs to amend. The costs of the changes are difficult to estimate without an understanding of the flexibility of each system. They are likely to range from a major change like B2B or Power of Choice implementations, to almost nothing, if more like a routine and/or minor system change, which are coordinated by AEMO.

There are also concerns in how to classify customers with switchable wiring, in that they could potentially avoid demand charges, leading to increased network augmentation requirements in the long-term.

Energeia notes that establishing a second connection point to a premise is a process that is done frequently when duplex houses are built and for new granny flats, which could imply that the similar process of connecting DER and EV charging would not involve significant additional costs for DNSPs.

4.4.2 Industry New Connection Arrangements

Energeia identified several areas in the new connection process where the overall new connection process could be streamlined.

- Firstly, the current procedure regarding the installation of a meter in PoC jurisdictions is for the network to notify the retailer of the completed connection works for the retailer to then notify the MP to install the meter. If networks were able to either notify MPs directly or notify retailers and MPs together of connection work completions, it would remove any time spent waiting on the retailer process.
- Secondly, based on the feedback from the stakeholder interviews, the networks have reported that there have been delays in the provision of standing data from retailers. This is as a result of PoC rules, which split a function that used to belong to one party (the network), between three parties (network, retailer, and MP). However, over time, it is expected that the efficiency of this process will be improved through practice and repetition between parties, and potentially via automation of the communication steps.
- Finally, the basic connection process could involve greater levels of automation in the application and approval process, from both networks and retailers. According to the stakeholders interviewed, some networks have automated the basic connection application approval process and claimed that they are able to approve a correctly submitted application in under 30 mins.

4.4.3 Tariff Design and Assignment

Currently, as network policies require each NMI be assigned to a primary tariff, a customer establishing a second connection point of DER and EVs to the grid would have to pay an additional annual fixed cost to do so. As stated in 4.2.3, this will cost the average small customer an additional $371 p.a., which would significantly reduce the return on investment for a customer to establish a second connection point.

Although the Rules[37] require tariffs to be cost reflective, they provide significant leeway for a network to allocate and recover costs from daily fixed charges; in fact there is no specific Rules that govern prices at the tariff component level. It is also unclear whether current annual fixed charges are cost reflective, and if they are, whether two connections would incur twice as many costs to the network.

In theory, fixed costs should be used to recover fixed costs not related to higher network utilisation. These typically include account setup and administration costs, billing costs, and other fixed and/or customer related costs that do not vary by the amount of energy or peak demand consumed.

Energeia's review of establishing a second connection identified that networks will include additional data processing costs associated with billing for the additional NMI. No other additional fixed or customer related costs were identified. Based on the expected impact of the additional annual costs involved, Energeia recommends further work into this space to determine cost reflectivity, and whether second connections, like secondary tariffs, should be more cost reflective than they currently are.

[37] National Electricity Rules Chapter 6, https://www.aemc.gov.au/sites/default/files/2020-09/NER%20-%20v150%20-%20Chapter%206_0.pdf

Appendix A – Glossary

Table 3 – Glossary of Key Terms

Key Term	Definition
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ASP	Accredited Service Provider
CapCon	Capital Contribution
COAG	Council of Australian Government
DER	Distributed Energy Resource
DNSP	Distribution Network Service Provider
ESB	Energy Security Board
FAQ	Frequently-Asked Question
FRMP	Financial Responsible Market Participant
MP	Metering Provider
MTR	Multiple Trading Relationships
NEM	National Electricity Market
NER	National Electricity Rules
NERL	National Electricity Retail Law
NMI	National Metering Identifier
PEV	Plug-in Electric Vehicle
PoC	Power of Choice Rules
PV	Photovoltaic
SGA	Small Generation Aggregator
VPP	Virtual Power Plant

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Appendix C – Supplementary Material

C.1 Stakeholder Engagement Summary

Table 4 – Stakeholder Engagement

Company	Industry	Region	Position	Contact Made	Interview Date
Essential	DNSP	NSW	General Manager of Network Services	25/09/2020	30/09/2020
Endeavour	DNSP	NSW	Snr. Manager Network Connections	25/09/2020	2/10/2020
Intellihub	MP	NEM	GM – Metering Operations	25/09/2020	28/09/2020
AEMO	Regulator	Australia	Market Design and Dvlp. Specialist	1/10/2020	6/10/2020
Powershop	Retailer	VIC, NSW, QLD, SA	Chief Commercial Officer	25/09/2020	2/10/2020
Energy Australia	Retailer	VIC, NSW, QLD, SA	Strategy and Solutions Design Lead	29/09/2020	9/10/2020

Source: Energeia

C.2 Key Party Relationships

While customers cannot choose their network, they are able to choose their retailer. Their choice of retailer will have a strong bearing on the return on investment associated with their second connection point as:

- it determines which MP installs their meter, which could affect their fixed costs paid to retailers depending on the MP contract terms negotiated
- their knowledge of grid service offerings such as VPPs and demand response can often be from the retailer they sign up with

Table 5 presents the relationships that various popular retailers have with MPs and grid service enablers. A key finding is that all Big-3 retailers offer some form of grid service options to customers with DER, depending on the customer's location.

Customers also choose electricians, but as independent contractors, they typically do not partner with any of the other parties involved.

Table 5 – Retailer Relationships

Retailers	MPs	Grid Services
AGL	Plus ES	SolarEdge
Origin	Acumen/intelliHUB	LG
EnergyAustralia	Vector	?*
Powershop	Metropolis/Vector	Reposit
Ergon Energy	Metering Dynamics	
Aurora Energy	Metering Dynamics	
Red Energy	Vector	

Source: Energeia; Note: * EA offers demand response and VPP, but does not disclose partnerships

Energeia posits that if small customers were able to engage directly with MPs like large customers, MPs might be more innovative with their offerings which could unlock more potential for small customers, for example, a customer could pay to install an advanced, cutting-edge smart meter that enables them to participate in a wider range of grid services.

C.3 Network and Retail Cost Summary

Table 6 – Key Network and Retail Small Customer Cost Summary

	Energex	Ergon	Tas	SAPN	Evoenergy	Ausgrid	End	Essential	Ausnet	CitiPower	Jemena	Powercor	United
Upfront Costs													
Network Fee													
Overhead - Single Phase	?	?	$566	$506	$841	$88	$77	$107	$387	$515	$631	$501	$500
Underground - Single Phase	?	?	$430	$341	$1,371	$88	$77	$107	$201	$515	$631	$501	$500
Overhead - Multi Phase	?	?	$809	$506	$841	$88	$77	$107	$462	$619	$817	$629	$500
Underground - Multi Phase	?	?	$549	$341	$1,371	$88	$77	$107	$336	$619	$817	$629	$500
De/Re-Energisation Fees	$350	$350	$432	$100	$176	$155	$85	$301	$14	$22	$21	$22	$22
Annualised Costs (p.a.)													
Tariff Fixed Costs - Primary Network	$182	?	$208	$170	$101	$189	$167	$305	$118	$95	$59	$140	$61
Tariff Fixed Costs - Primary Retail	$215	?	$144	$161	$410	$120	$152	$247	$298	$318	$322	$367	$276
Tariff Fixed Costs – Secondary Network	$0	$0	$6	N/A	$0	$45	$13	$33	$0	$0	$0	$0	$46
Labour Costs (per hour)													
Design + Planning + Commissioning	?	?	$137	$169	$153	$222	$222	$202	$128	$135	$206	$135	$199
Field Worker	?	?	$116	$145	$193	$171	$171	$155	$112	$76	$114	$76	$199
Cap Con - Shared Network Cost Rates ($/kVA)													
ST	$69	$69	$0	Quoted	Quoted	Quoted	Quoted	Quoted	$52	$34	Quoted	$35	Quoted
HV	$486	$486	$52	Quoted	Quoted	Quoted	Quoted	Quoted	$402	$182	Quoted	$104	Quoted
LV	$926	$926	$262	Quoted	Quoted	Quoted	Quoted	Quoted	$817	$529	Quoted	$375	Quoted

Source: DNSP Connection Policies, DNSP Pricing Policies, Retailer Websites, Note: Tas = TasNetworks, End = Endeavour

ENERGEIA

Energeia's Industry Specialists are empowering the energy sector by providing the latest research and consultancy services focused on electricity



Heritage

Energeia was founded in 2009 to pursue a gap foreseen in the professional services market for specialist information, skills and expertise that would be required for the industry's transformation over the coming years.

Since then the market has responded strongly to our unique philosophy and value proposition, geared towards those at the forefront and cutting edge of the energy sector.

Energeia has been working on landmark projects focused on emerging opportunities and solving complex issues transforming the industry to manage the overall impact.

Energeia Pty Ltd

Suite 2, Level 9
171 Clarence Street
Sydney NSW 2000

+61 (0)2 8097 0070
energeia@energeia.com.au
energeia.com.au

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