AusNet
Battery Uptake and Impact Forecasting Report

Prepared by Energeia for

AusNet

21 August 2025

Executive Summary

AusNet is required under the National Electricity Rules (NER) to develop a realistic expectation of demand to underpin its capital and operational expenditure plans.[1,2] Additionally, in Distribution Annual Planning Reports (DAPRs), maximum demand forecasts must be provided, having regard to the estimated total output of known distribution-connected units.[3]

Flexible behind-the-meter devices, including rooftop PV and solar-batteries, and loads, including water heating and EV charging, are increasingly able to reshape load across networks. Greater participation of consumer resources in the distribution network may thereby also contribute to reducing drivers of capital investment, including peak demand and voltage excursions.

To inform their own spatial demand forecasts, AusNet engaged Energeia to develop reasonable forecasts of spatial battery uptake, configuration, operation and flexibility by scenario, asset and probability assumption to 2040.

Scope and Approach

To deliver AusNet's scope of work to achieve its regulatory objectives, Energeia developed the following project delivery scope and approach:

1. **Data Collection and Processing** – Energeia collected and processed the data from the public domain, as well as from AusNet through a request-for-information (RFI), to populate our solar-battery forecasting tool. This included the scenario assumptions, summarised below.
2. **Analysis, Modelling and Forecasting** – Energeia analysed the input data and developed key inputs into the tool, including adoption propensity, a representative customer sample and simplex inputs like technology costs, which were used to generate the forecasts.
3. **Documentation, Data pack and Validation** – Energeia validated the processed inputs and forecast results with AusNet. Energeia then developed a draft report and finalised it with input from AusNet. A data pack was also provided to AusNet.

The scenarios modelled, our methodology, inputs and assumptions, and our resulting forecast are summarised below.

Detailed information regarding the key inputs and assumptions used in this report is in Appendix D.

Scenarios

Table ES1 details the key drivers assumed in Energeia's battery forecasts, split by Australian Energy Market Operator (AEMO) scenario. They have been designed to align with AEMO's base case, Step Change scenario, and the lower intensity Progressive Change scenario.

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[1] National Electricity Rules Version 232, cl. 6.5.6(c)(1)(iii), https://energy-rules.aemc.gov.au/ner/current/6.5.6

[2] National Electricity Rules Version 232, cl. 6.5.7(c)(1)(iii), https://energy-rules.aemc.gov.au/ner/667/636257#6.5.7

[3] National Electricity Rules Version 232, cl. 6.13.1(d)(1)(vi), https://energy-rules.aemc.gov.au/ner/667/635921#5.13.1

Table ES1 – Scenario Summary Table

Energeia Model Driver Mapping		Scenarios: Progressive Change	Scenarios: Step Change
Demand Drivers	Market Growth	Per Customer Counts	
		Per Customer Counts	
Cost Drivers	Technology Costs	AEMO Progressive Change	AEMO Step Change
	National Electricity Market (NEM) Prices	Energeia	
	Network Revenues	Electricity Distribution Price Review (EDPR)	
	Rebates and Incentives	Cheaper Home Batteries, Solar-battery Loans (Vic)	
Device Drivers	Solar PV Adoption	AEMO Progressive Change	AEMO Step Change
	Electric Vehicle (EV) Adoption	AEMO Progressive Change	AEMO Step Change
	Vehicle to Everything (V2x) Adoption	AEMO Progressive Change	AEMO Step Change
Tariff Drivers	Tariff Re-assignment	Energeia	
	Default Tariffs	Using AusNet Provided Tariffs	
	Amber / Wholesale Adoption	Energeia	
Virtual Power Plants (VPPs)	VPP Participation	AEMO Progressive Change	AEMO Step Change

Source: Energeia, AusNet. Note: Purple indicates shared inputs between the scenarios, blue represents Progressive Change inputs, and green represents Step Change inputs.

Battery Uptake

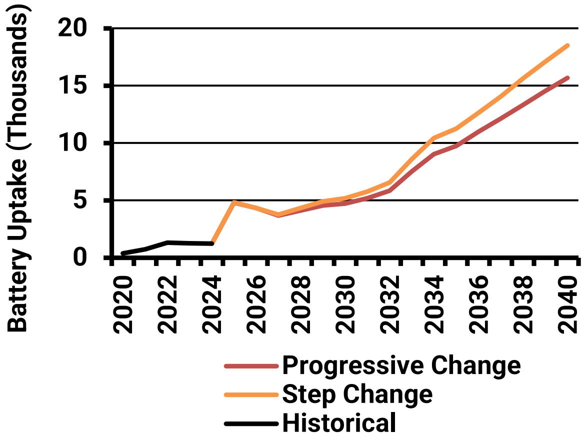
Energeia's solar-battery uptake forecasting tool calculates annual battery uptake by customer segment. The full methodology is detailed in Section 4 of the report. The set of key customer segments was agreed with AusNet, who also supplied forecast changes in segment populations.

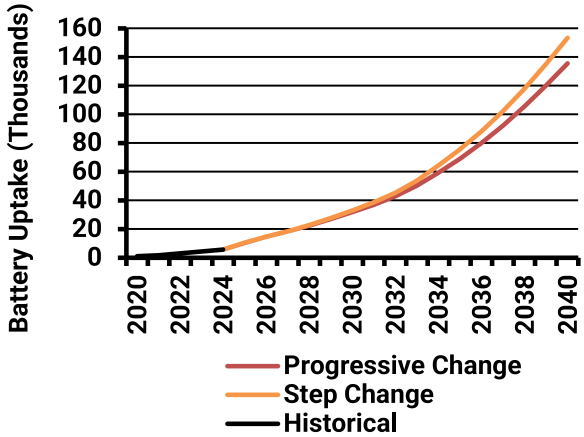
Figure ES1 shows the historical and forecast annual and cumulative sales of batteries to 2040 by scenario. The forecast initially reflects the impact of the Federal Government's Cheaper Home Battery Program[4], which drops off as the rebate decreases in value. In the later years, the large rise in installations is due to increasing retail electricity prices and decreasing battery prices. The difference between the two scenarios is driven by both lower battery prices and higher rates of PV and electric vehicle uptake in the Step Change scenario.

Across the Progressive Change and Step Change scenarios, cumulative uptake reaches 32 and 33 thousand batteries by 2030 and 136 and 153 thousand batteries by 2040. The shape of adoption is clearly heading into the accelerated portion of a typical technology S-curve from around 2032.

[4] Australian Government, Department of Climate Change, Energy, the Environment and Water (2025), Cheaper Home Batteries Program, https://www.dcceew.gov.au/energy/programs/cheaper-home-batteries

Figure ES1 – Annual Battery Installations (Left) and Cumulative Battery Installations (Right) by Scenario



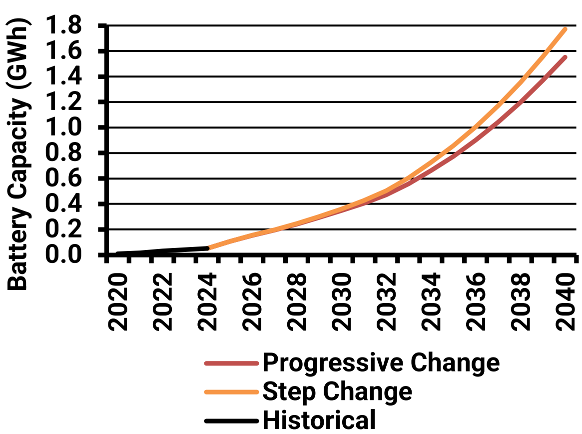


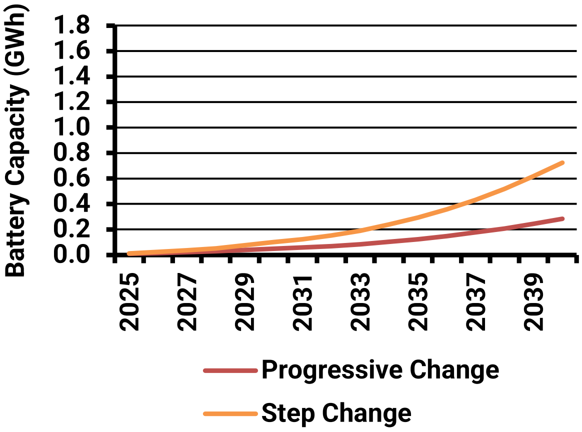
Source: Energeia Modelling

Figure ES2 shows the historical[5] and forecast cumulative energy capacity of batteries and the forecast[6] cumulative flexible energy capacity in AusNet's network until 2040 by scenario.

Battery capacity across Progressive Change and Step Change scenarios reaches approximately 0.35 and 0.36 GWh by 2030 and 1.55 and 1.77 GWh by 2040, respectively. Again, the variation between scenarios is driven by both lower battery prices and higher rates of PV and EV uptake in the Step Change scenario. Flexible battery capacity reaches 0.05 and 0.10 GWh by 2030 and 0.28 and 0.72 GWh by 2040, respectively. The larger variation between the scenarios in flexible capacity comes from the difference in the percentage of VPP participation forecast between scenarios.

Figure ES2 – Cumulative Battery Capacity (Left) and Flexible Battery Capacity (Right) by Scenario





Source: Energeia Modelling

Our forecast of battery capacity is based on battery assumptions detailed in Appendix D.

Battery Impact

Energeia estimated the impact of battery adoption where not on a flexibility system, i.e. not managed by a HEMS or a VPP. This was achieved by modelling typical battery control algorithms under different tariff structures. For a flat tariff with solar PV, the model aimed to maximise self-

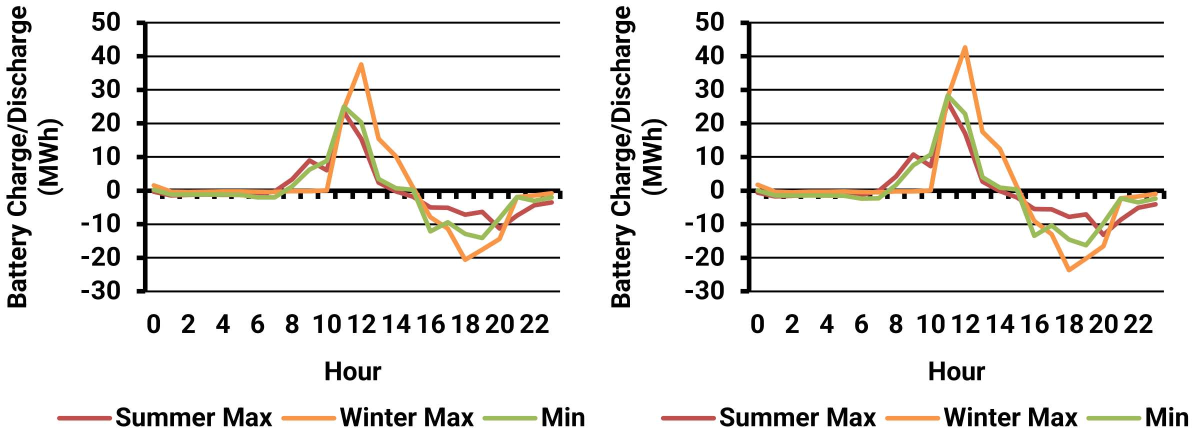
[5] Only battery systems under 1,000 kWh were considered in the historical data

[6] Historical data not available for flexible battery capacity

consumption. For Time-of-Use (ToU) or wholesale tariffs, the focus was on shifting consumption from high-cost peak periods to low-cost off-peak periods.

Figure ES3 below shows the total system hourly battery load profile (LP) on key cost-driving days in 2037 (the last year of AusNet's demand forecast data) by scenario for non-managed batteries. The forecasts show high levels of charging during the middle of the day, utilising excess solar and low pricing and discharging during the evening at times of high demand and high prices.

Figure ES3 – Total Hourly Battery Load on Network Summer Max, Winter Max and Min Demand Days for Progressive Change (Left) and Step Change (Right) Scenarios



Source: Energeia Modelling

While the batteries appear to be using power in the middle of the day, which on average is likely to soak up excess solar PV, and discharging in the evening, the lack of orchestration of these devices means that they are less likely to efficiently and effectively target the key cost drivers of peak demand or voltage excursions.

Detailed reporting of battery operation by customer segment is discussed in Section 5 of the report.

Limitations

In our opinion, our solar-battery uptake and impact forecasts are reasonable, as they are unbiased and based on the best available information at the time the project was completed.

While this study is grounded in AusNet's customer population, historical customer purchasing behaviour, market-sourced current technology prices and best available forecast prices, including AusNet's own revenue trajectory and AEMC's wholesale market price forecasts[7], it is naturally limited by available resources, including time.

The most significant limitations are the number of customer segments modelled, the number of customer samples used, and the use of solar PV adoption behaviour as a proxy for solar-battery adoption behaviour. The last point was carefully considered and used because the adoption of solar batteries in AusNet's territory has not been solely on economic grounds, a key factor moving forward.

When more data is available post 1 July, and it will need to be around 12 months, as July and August are likely to reflect the dynamics of a major change in policy, and there is a strong annual cycle to buying solar PV, which peaks in the summer, we'd recommend considering revalidating the forecast.

[7] AEMC (2024), Residential Electricity Price Trends 2024, https://www.aemc.gov.au/sites/default/files/2024-11/Price%20Trends%202024%20Final%20Report.pdf

Table of Contents

Table of Figures

Table of Tables

Disclaimer

While all due care has been taken in the preparation of this report, in reaching its conclusions Energeia has relied upon information and guidance from AusNet and other publicly available information. To the extent these reliances have been made, Energeia does not guarantee nor warrant the accuracy of this report. Furthermore, neither Energeia nor its Directors or employees will accept liability for any losses related to this report arising from these reliances. While this report may be made available to the public, no third party should use or rely on the report for any purpose.

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Glossary

Key Term	Definition
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
CER	Consumer Energy Resource
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EDPR	Electricity Distribution Price Review
EV	Electric Vehicle
FCAS	Frequency Control Ancillary Service
IBT	Inclining Block Tariff
LP	Load Profile
LRMC	Lon Run Marginal Cost
MD	Maximum Demand
NEM	National Electricity Market
POE	Probability of Exceedance
PV	Photovoltaic
ROI	Return on Investment
RRP	Regional Reference Price
ToU	Time of Use
TSS	Tariff Structure Statement
V2x	Vehicle to Everything
VPP	Virtual Power Plant
VWA	Volume-Weighted Average
ZS	Zone Substation

1. Background

1.1 The Need for Accurate Solar-Battery Forecasts

AusNet, as a Distribution Network Service Provider (DNSP) for Victoria (VIC), is regulated by the Australian Energy Regulator (AER) under the National Electricity Rules (NER).

AusNet is required under the NER to base its forecast capital expenditure (Capex) and operational expenditure (Opex) in its building block proposals on the levels required to "meet or manage demand for standard control services over that period".[8,9]

The AER must accept these forecasts if they are satisfied that they reflect "a realistic expectation of the demand forecast and cost inputs required to achieve the capital/operating expenditure objectives." [10,11]

The NER also requires AusNet to connect solar PV and to manage curtailment efficiently (along with other distributed resources, including batteries).[12]

Finally, AusNet is required by the NER to prepare their maximum demand forecasts for the forward planning period in their Distribution Annual Planning Reviews (DAPRs) to have regard to "estimated total output of known distribution connected units." [13]

To help inform its demand forecasts, AusNet required a forecast of consumer battery devices, including uptake in total stock and the estimated load impacts.

1.2 Potential Effects of Consumer Energy Resources

Flexible behind-the-meter devices, including rooftop PV and solar-batteries, and loads, including water heating and electric vehicle (EV) charging, are increasingly able to reshape load across networks. Greater participation of consumer resources in the distribution network may thereby also contribute to reducing drivers of capital investment, including peak demand and voltage excursions.

Figure 1 (left) illustrates a peak day load for a consumer with significant building and transport electrification, rooftop PV and a solar battery. This consumer's net load is shown as a dotted line and is relatively high cost to serve due to the impact of this load on peak demand as well as on voltage levels.

Figure 1 (right) illustrates the potential peak day load for the same consumer being orchestrated either via a virtual power plant (VPP) or a home energy management system (HEMS). This

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[8] National Electricity Rules Version 232, cl. 6.5.6(a)(1), https://energy-rules.aemc.gov.au/ner/current/6.5.6

[9] National Electricity Rules Version 232, cl. 6.5.7(a)(1), https://energy-rules.aemc.gov.au/ner/667/636257#6.5.7

[10] National Electricity Rules Version 232, cl. 6.5.6(c)(1)(iii), https://energy-rules.aemc.gov.au/ner/667/636256#6.5.6

[11] National Electricity Rules Version 232, cl. 6.5.7(c)(1)(iii), https://energy-rules.aemc.gov.au/ner/667/636257#6.5.7

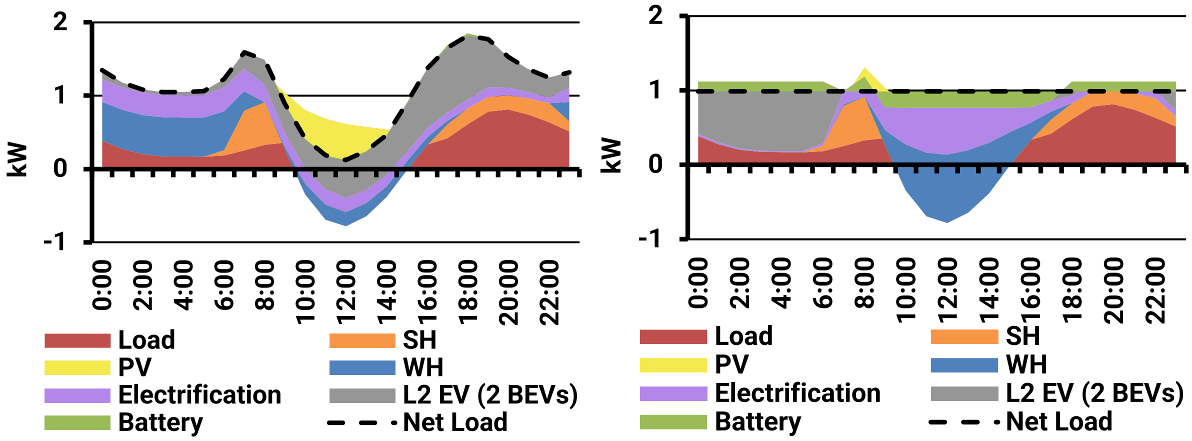
[12] As per the National Electricity Amendment (Access, Pricing and Incentive Arrangements for Distributed Energy Resources) Rule 2021, https://www.aemc.gov.au/sites/default/files/documents/national_electricity_amendment_access_pricing_and_incentive_arrangements_for_distributed_energy_resources_rule_2021_no._9.pdf

[13] National Electricity Rules Version 232, cl. 6.13.1(d)(1)(vi), https://energy-rules.aemc.gov.au/ner/667/635921#5.13.1

consumer's net load is again shown as a dotted line, and is relatively low cost to serve for the DNSP on the peak day.[14]

The key question for DNSPs and regulators is what level of devices will be adopted, what level of orchestration services will be adopted, and where they will be able to reduce DNSP costs, and how much conflict will there be with other potential use cases, e.g. wholesale energy and frequency control ancillary services (FCAS).

Figure 1 – Illustrative Impacts of Customer Decisions on Load Before and After Optimisation



Source: Energeia Modelling, Note: PV – Photovoltaics, SH – Space Heating, WH – Water Heating, L2 EV – Level 2 Electric Vehicle Charging, BEV – Battery Electric Vehicle

The impact of solar batteries on the distribution networks over time will depend on a range of factors, including device adoption, tariffs and associated resource management systems, including HEMS and VPPs, as well as the interplay with each other, e.g., EV and/or charging to soak up excess solar PV.

There are also a range of sub-factors that will drive each factor, including the end consumer cost of the devices, net of rebates, tariff structures and levels, and incentives to participate in VPPs and/or HEMS, as well as building electrification, which increases consumption and thereby consumer bills.

Therefore, developing a reasonably accurate estimate of solar-battery impacts on asset overloads and voltage excursions requires forecasting battery adoption, configuration, operation and flexibility at the asset level under different planning scenarios and probability assumptions, e.g., Probability of Exceedance of 50% (PoE 50).

[14] Energeia notes that the profile changes depending on the highest best use, i.e. RRP, FCAS, peak demand, etc.

2. Scope and Approach

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

2.1 Scope

For the reasons set out in the background section, AusNet requires a reasonable forecast of behind-the-meter battery uptake by customer segment, and the associated impacts on assets in terms of maximum and minimum[15] demand. These results were to inform AusNet's future network infrastructure and investment decisions.

Energeia was engaged by AusNet to develop an independent forecast of battery uptake in AusNet's jurisdiction, as well as aggregated battery load profiles at the zone substation (ZS) level.

2.2 Approach

The process of modelling AusNet's battery uptake involved the three steps outlined below:

1. **Data Collection and Processing** – Energeia collected and processed the data from the public domain, as well as from AusNet through a request-for-information (RFI), to populate our solar-battery forecasting tool. This included the scenario assumptions, summarised below.
2. **Analysis, Modelling and Forecasting** – Energeia analysed the input data and developed key inputs into the tool, including adoption propensity, a representative customer sample and simplex inputs like technology costs, which were used to generate the forecasts.
3. **Documentation, Data pack and Validation** – Energeia validated the processed inputs and forecast results with AusNet. Energeia then developed a draft report and finalised it with input from AusNet. A data pack was also provided to AusNet.

The following section summarises the process involved in each workstream.

2.2.1 Data Collection and Processing

This workstream involved gathering data on historical consumer energy resource (CER) uptake, the existing customer and CER counts and load profiles, and all the assets within AusNet's distribution zone. This involved the following steps:

- **Collect Data from AusNet** – Energeia issued an RFI to AusNet. In response, AusNet provided data on historical uptake of PV and batteries, customer and CER load profiles, asset data, tariff data by type and customer segment, revenue forecasts, and scenario assumptions by driver and scenario.
- **Gap-fill Remaining Data** – Energeia collected the remaining data inputs, via desktop research, required to determine battery uptake by segment.

2.2.2 Analysis, Modelling and Forecasting

This workstream focused on validating the inputs and updating the tool to produce battery uptake forecasts and load profiles. The steps are outlined below:

- **Customer Adoption and Load Profile Model by Segment and Scenario** – Energeia updated the battery uptake tool to forecast the customer adoption of batteries and battery load profiles for different customer segments.

[15] Voltage excursions are driven by a range of factors, but minimum demand is a typical driver of them.

- **Asset Load Profile Model by Scenario** – Based on the battery uptake tool outputs, Energeia used the battery asset tool to forecast load profiles at the zone substation level for each year and scenario.
- **Weather Normalise Asset Load Profiles** – In order to observe the effects of weather, Energeia weather normalised the customer load profiles to account for the impacts of P90, P50, and P10 temperatures[16] on demand.

2.2.3 Documentation, Data Pack and Validation

The final workstream includes all engagement and documentation Energeia undertook with AusNet:

- **Validate Key Inputs and Assumptions with AusNet Team** – Energeia validated the processing of inputs with the AusNet project team. This workshop also included a presentation of the draft results.
- **Draft Findings Workshop** – Energeia presented revised analysis of the ongoing project and refined reporting based on feedback from the Inputs and Assumptions Workshop.
- **Develop Report** – Energeia documented the methodology, inputs and assumptions, and key results in this final report.
- **Provide Data Pack** – Energeia provided AusNet with a data pack of all the modelled battery load profiles by zone substation.

The above scope was applied to develop forecasts of AusNet's battery uptake and impact. The scenarios used in the forecasting can be seen in the section below.

[16] Px is shorthand for probability of exceedance (or POE) and indicates a value that will only be exceeded x% of the time, e.g. P10 temperature means that only 10% of observed temperature readings exceeded this value. More information on the weather normalisation methodology is included in Appendix C

3. Scenarios and Segments

The following section outlines the scenarios used for AusNet's battery uptake forecast and associated network impact.

Energeia has split out the key battery uptake model drivers into five broad categories:

- Demand Drivers
- Cost Drivers
- Device Drivers
- Tariff Drivers
- VPP

Table 1 details the key drivers used in Energeia's battery forecast, split by AEMO scenario.

Table 1 – Scenario Summary Table

Energeia Model Driver Mapping		Scenarios	
		Progressive Change	Step Change
Demand Drivers	Market Growth	Per Customer Counts	
		Per Customer Counts	
Cost Drivers	Technology Costs	AEMO Progressive Change	AEMO Step Change
	National Electricity Market (NEM) Prices	Energeia	
	Network Revenues	Electricity Distribution Price Review (EDPR)	
	Rebates and Incentives	Cheaper Home Batteries, Solar-battery Loans (Vic)	
Device Drivers	Solar PV Adoption	AEMO Progressive Change	AEMO Step Change
	EV Adoption	AEMO Progressive Change	AEMO Step Change
	Vehicle to Everything (V2x) Adoption	AEMO Progressive Change	AEMO Step Change
Tariff Drivers	Tariff Re-assignment	Energeia	
	Default Tariffs	Using AusNet Provided Tariffs	
	Amber / Wholesale Adoption	Energeia	
VPPs	VPP Participation	AEMO Progressive Change	AEMO Step Change

Source: Energeia, AusNet, Note: Purple indicates shared inputs between the scenarios, blue represents Progressive Change inputs, and green represents Step Change inputs

The main drivers that differ by AEMO's scenarios are battery price forecasts, forecasts of customer and CER counts, and the assumed percentage of flexible battery capacity.

For each AEMO scenario, Energeia modelled annual battery uptake for each customer class to 2040, split by segment, as summarised in Table 2 with each segment representing a combination of customer, tariff, and CER type.

Table 2 – Segment Summary Table

Customer Type	Tariff Type	CER Type
Residential - House	Inclining Block Tariff (IBT)	No EV or PV
Small Business	ToU kWh	EV
Medium Business	ToU Maximum Demand (MD)	PV
Large Business	Wholesale Tariff	EV + PV

Source: Energeia

The tariff types below determine the battery algorithm used to model customers' battery cycling behaviour, and include:

- **IBT** – represents customers on an inclining block tariff with quarterly consumption blocks, each charged at a different rate. Customers on this tariff will charge their battery from solar and discharge as needed to meet household consumption until the battery is depleted
- **ToU kWh** – represents customers on a time-of-use energy tariff with rates that vary by time of day, day type, and month. Customers on this tariff will charge their battery from solar, with additional off-peak grid charging if needed, and discharge during peak periods to minimise consumption and peak charges
- **Wholesale** – represents customers on a wholesale tariff who are charged at the wholesale half-hourly spot price. Customers on this tariff will charge their battery during the lowest price periods (combined network plus wholesale) until it is full and discharge during the highest price periods (combined network plus wholesale) until it is depleted.

CER segments include:

- **No CER** – represents customers with no CER
- **EV** – represents customers with an EV. An average EV load profile provided by AusNet is added to the customer's agent load profile by customer class
- **PV** – represents customers with a solar PV system. Customers with PV can charge their batteries with excess solar during the middle of the day. A reference 1 kWh normalised PV profile provided by AusNet is scaled by the average PV system size for each customer class and added to the agent's load profile
- **EV + PV** – represents customers with a solar PV system and an EV.

Each combination of customer, tariff, and CER type is modelled as a separate segment with distinct customer battery behaviour.

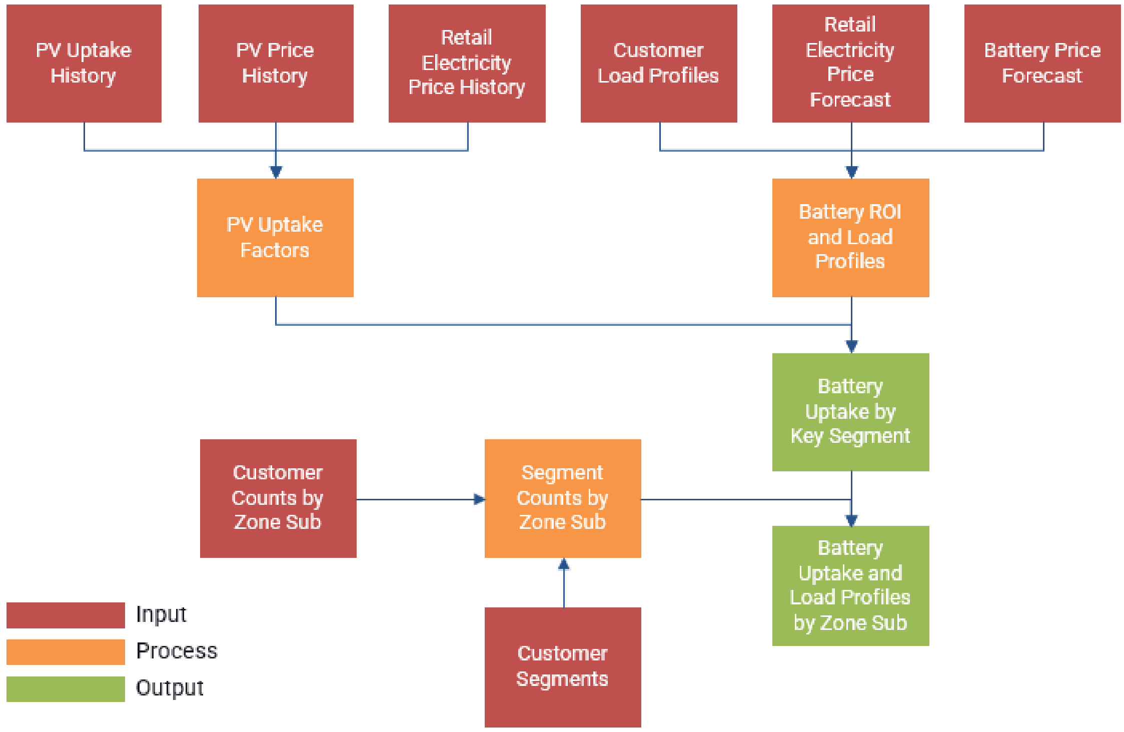
All segments are then modelled using five different representative load profiles for both the Step Change and Progressive Change scenarios across three different weather years: P90, P50, and P10.

4. Methodology

This section provides an overview of the analytical methodology used by Energeia in our modelling of future battery adoption and its impact by customer class, as depicted diagrammatically in Figure 2.

Additional details on our inputs and assumptions are detailed in Appendix D.

Figure 2 – Battery Uptake Methodology Flow Diagram



Source: Energeia

Each of the inputs, methods and outputs is summarised as follows:

- **PV Uptake History** – The historical monthly installation of PV for AusNet customers by customer type over the last 10 years, used to calculate the PV uptake factors
- **PV Price History** – The historical average price of PV in Australia by month for residential and commercial PV over the last 10 years, used to calculate the PV uptake factors
- **Retail Electricity Price History** – The price of retail electricity for AusNet customers (including feed-in tariffs) by customer type for the last 10 years, used to calculate the PV uptake factors
- **Customer Load Profiles** – Half-hourly consumption for a selection of AusNet customers[17] (without any CER) in 2024, which has been weather normalised[18], and are used to calculate energy consumption and financial impacts before and after battery installation
- **Retail Electricity Price Forecast** – A forecast of the percentage increase in retail electricity price by customer type, used to calculate future annual electricity bill costs
- **Battery Price Forecast** – A forecast of battery price by scenario, used to calculate annual battery capital costs

[17] See Appendix A for further detail on the selection of agents from the customers provided by AusNet

[18] See Appendix C for weather normalisation methodology

- **Customer Counts by Zone Substation** – Counts by customer type and CER type, used to forecast counts of customers in each segment and scale battery load profiles by zone substation
- **Customer Segments** – A combination of different customer types, tariff types and CER types outlined earlier in Table 2
- **PV Uptake Factors** – A calculated relationship between PV return on investment (ROI) and PV annual uptake[19], used to forecast battery uptake using annual battery ROI
- **Battery ROI and Load Profiles –** Resulting battery load profile and ROI from the calculation of retail bills from each specific segment combination
- **Segment Counts by Zone Substation** – Customer counts by segment and zone substation, used to allocate battery load profiles to zone substations
- **Battery Uptake by Key Segment** – Calculated battery uptake by segment using annual ROI and the uptake propensity curves for each customer class
- **Battery Uptake and Load Profiles by Zone Substation** – Calculated battery load profiles at each zone substation.

[19] See Appendix B for the calculation method and outcomes of the PV uptake factors

5. Results

This section provides detailed reporting of Energeia's modelling results for battery uptake, battery capacity, battery power, flexible battery power, average day battery load profiles and system maximum and minimum demand day battery load profiles, broken down by segment for residential (house) customers under AEMO's main "Step Change" scenario. It also presents comparative reporting of these modelling outcomes between the Step Change and Progressive Change scenarios. All modelling results shown in this report are for the P50 weather year.

5.1 Step Change Scenario

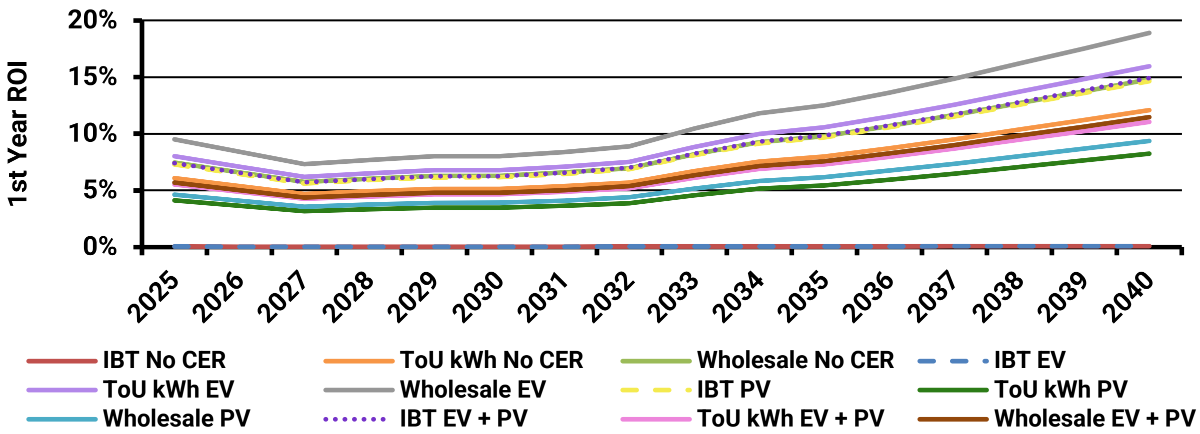
The key modelling outcomes from Energeia's forecasting results for residential (house) customers under the Step Change scenario for the P50 weather year are detailed in the following sections.

5.1.1 Annual Battery Return on Investment

66% of Australian energy customers state that saving money on their electricity bill is an extremely important reason to buy a solar battery.[20] Energeia puts consumer behaviour at the centre of our forecasting methodology, and we use ROI as the most accurate metric for this type of investment. The historical relationship between ROI and market uptake is regressed and then applied using forecast ROIs and market sizes over time by segment.

Energeia calculated the ROI of a battery for each segment by customer class by dividing the annual energy savings by the total upfront cost. The annual energy savings were calculated as the difference in energy costs before and after battery installation. For upfront cost, Energeia used the cost of a selectively sized battery for each customer class[21]. The resulting ROI is shown in Figure 3, split by segment, and largely reflects the shape of the electricity price forecast[22], which is the strongest driver of ROI.

Figure 3 – Annual Residential (House) Return on Investment by Segment – Step Change Scenario



Source: Energeia Modelling, Note: Segments without PV on the Left and Segments with PV on the Right

Customers on wholesale and ToU tariffs without PV consistently see higher returns than with PV, as battery systems have less opportunity to offer bill savings to customers who have already invested in

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[20] Ausgrid (2017), Household Solar Power and Battery Survey, https://www.ausgrid.com.au/-/media/Documents/Demand-Mgmt/DMIA-research/Household-Solar-Power-and-Battery-Survey_-Report.pdf

[21] See Appendix D for the battery sizing and battery price forecast

[22] See Appendix D for the forecast electricity price forecast input

reducing their bills by installing PV. This effect is even more pronounced for wholesale customers, as low (and sometimes negative) prices during the middle of the day further reduce the value of storing excess solar. Interestingly, customers on an IBT tariff paired with solar also see a high ROI, primarily due to this segment having the highest starting bill costs for most agents.

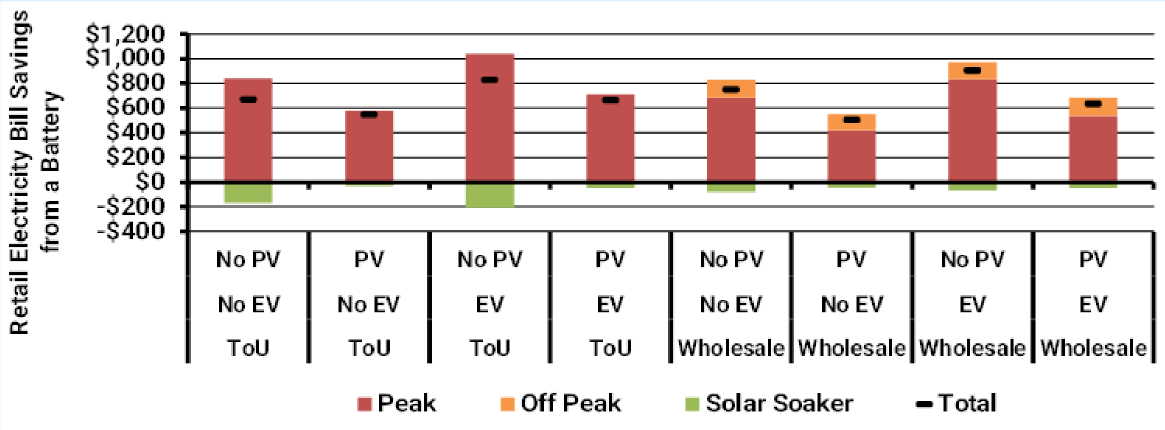
Annual Savings by Segment – A Residential Customer Case Study

Customers with Solar PV are often early adopters of solar-batteries, to increase solar self-consumption, or to counter falling feed-in-tariffs, rising tariffs or to improve reliability. Our modelling has found that adding a solar battery to a customer with existing solar PV delivers a lower ROI than customers without PV. This is due to a number of reasons, including:

- Average consumption net of solar PV is relatively low, and includes a reduction of customer demand during peak hours, reducing the benefits available to a solar battery;
- The rebate, and new tariff options, are delivering solar-battery ROIs that are higher than solar PV ROIs in some cases, which are falling due to changes in tariffs and FiTs;
- Customers that adopted solar PV early have higher propensities to adopt; adding adoption vintage to the segmentation could be explored in a future study; and
- Finally, modelling solar PV adoption was out of scope for this study; a combined solar PV + solar battery could have a higher ROI and could also be explored in future studies.

The figure below shows the charging costs and discharging savings for an example customer, with an underlying consumption of approximately 6 MWh per year, without PV and with PV. The key trends to note include the relationship of load to savings, with customers with higher loads seeing the greatest savings from a solar battery.

Figure 4 – Solar Battery Savings Breakdown for a Single Customer by Tariff, EV and Solar PV



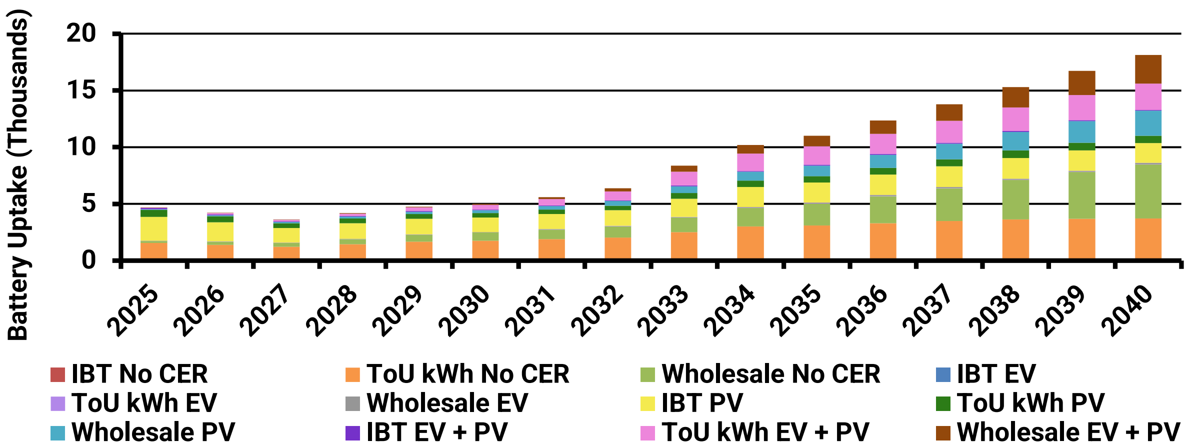
Source: Energeia Modelling, Note: Peak is from 4-9pm, solar soaker is from 11am-4pm and off peak is all other times

The opportunity cost of lost FiT revenues is not shown in the above examples but would result in slightly lower total savings for a customer with PV.

5.1.2 Annual Battery Uptake

Energeia used the first-year ROI values and the uptake factors to calculate annual battery uptake by segment, as reported in Figure 5.

Figure 5 – Annual Residential (House) Battery Uptake by Segment – Step Change Scenario



Source: Energeia Modelling

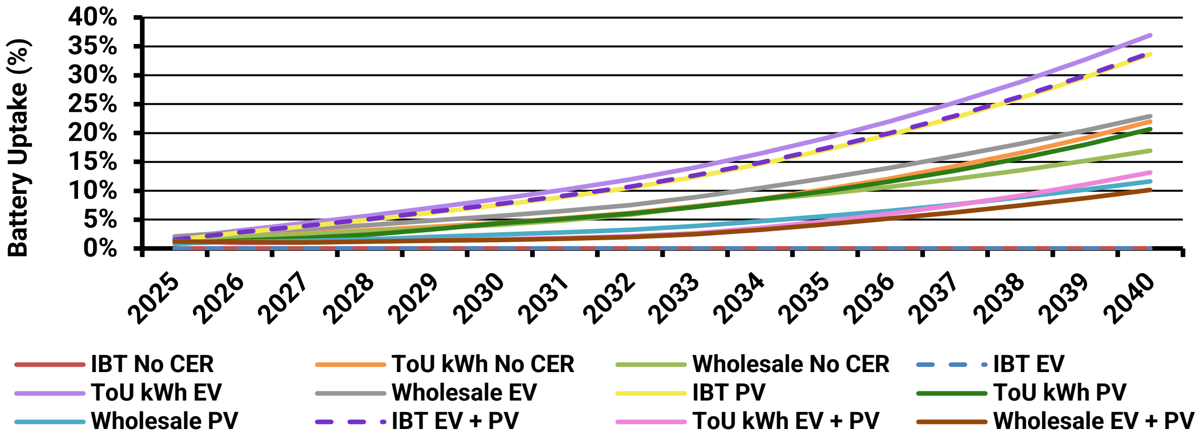
The forecast of annual battery uptake follows the same shape as the forecast of battery ROI, which is largely driven by retail electricity price and upfront battery price.

5.1.3 Cumulative Battery Uptake

Energeia used the first-year ROI values and the uptake factors to calculate cumulative battery uptake by segment.

Energeia developed a view of battery uptake by segment, shown in Figure 6 as a percentage of all customers, to illustrate the relative uptake across different segments.

Figure 6 – Residential (House) Battery Uptake % by Segment – Step Change Scenario

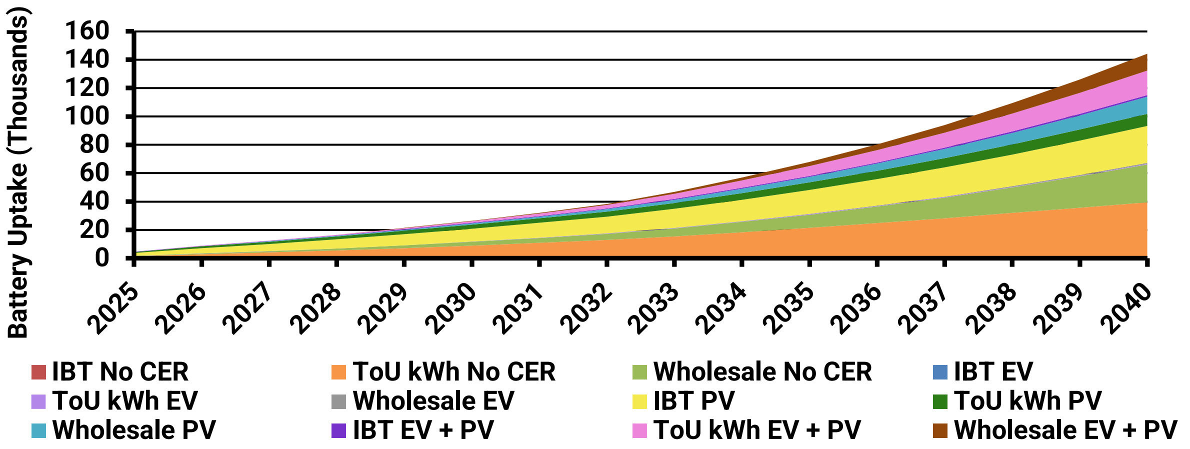


Source: Energeia Modelling

Most segments see limited growth until 2030, with battery uptake among customers on the IBT tariff rising sharply after 2033 to reach nearly 34% by 2040. This segment sees fast growth due to a high ROI and a decreasing customer base, as the tariff is assumed to be phased out over time.

The cumulative battery uptake for AusNet's residential customers by segment is reported in Figure 7.

Figure 7 – Cumulative Residential (House) Battery Uptake by Segment – Step Change Scenario



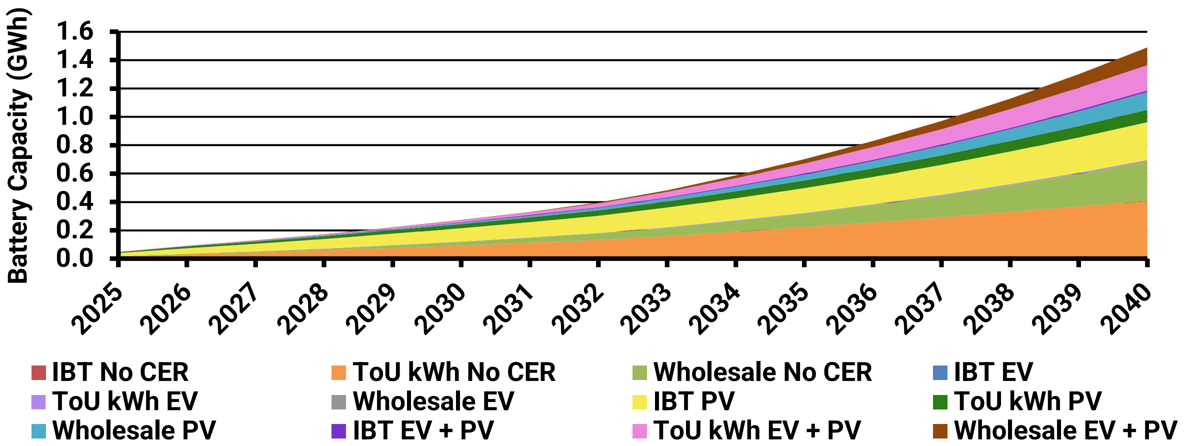
Source: Energeia Modelling

Forecast battery uptake grows moderately to 2030, then accelerates after 2033 due to growth in retail electricity prices, which increases energy savings for battery owners and sees 26,000 residential battery installations by 2030 (4% of Residential – House customers) and 144,000 by 2040 (18% of Residential – House customers).

5.1.4 Cumulative Battery Capacity

To calculate battery capacity by segment, Energeia multiplied battery uptake by the selected battery sizes[23], shown cumulatively in Figure 8. Forecast battery capacity follows a similar trajectory to battery uptake, reaching 0.27 GWh by 2030 and 1.49 GWh by 2040.

Figure 8 – Cumulative Residential (House) Battery Capacity by Segment – Step Change Scenario



Source: Energeia Modelling

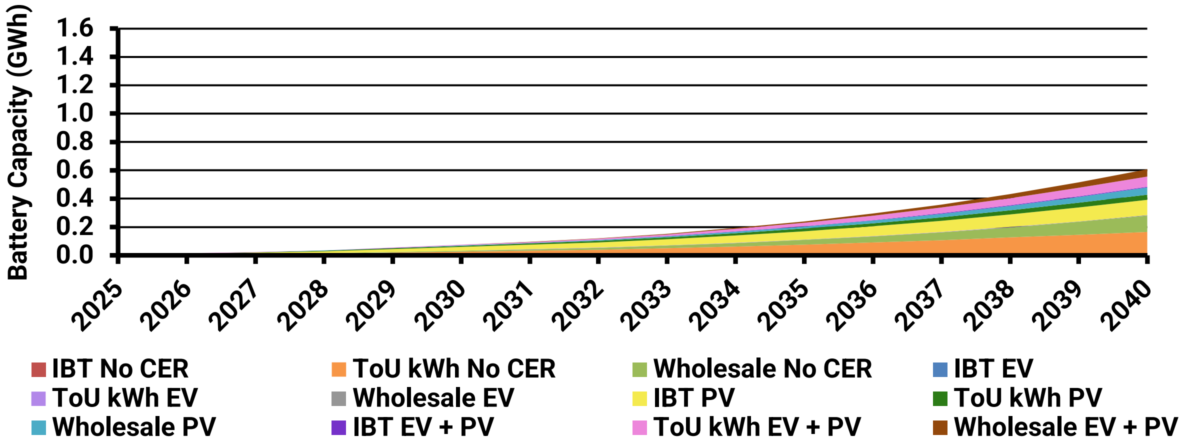
5.1.5 Cumulative Flexible Battery Capacity

Flexible battery capacity is a key reporting outcome, indicating the share of aggregated battery capacity (i.e., batteries that are enrolled in a VPP) that can be used to support grid services. Energeia calculated flexible battery capacity by multiplying the cumulative battery capacity by AEMO's ratio of

[23] See Appendix D for the battery sizing

aggregated battery capacity to total battery capacity[24]. The resulting uptake is shown in Figure 9, and sees cumulative flexible battery capacity reaching 0.08 GWh by 2030 and 0.60 GWh by 2040. Note, that these results do not include customers on wholesale tariffs, which will be price responsive, and thus can be considered by some as competitors of VPPs.

Figure 9 – Cumulative Res (House) Flexible Battery Capacity by Segment – Step Change Scenario



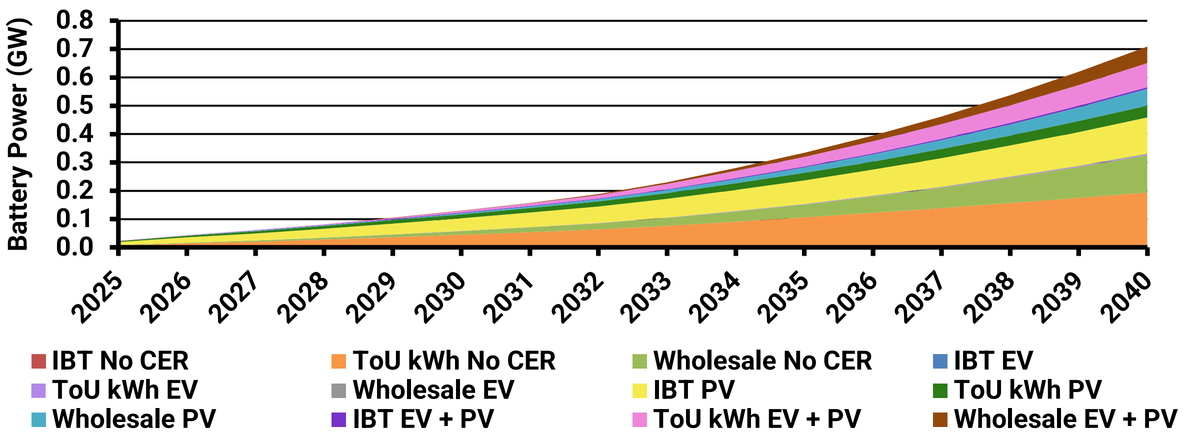
Source: Energeia Modelling

5.1.6 Cumulative Battery Power

Energeia calculated battery power by dividing the battery capacity of each customer class by its corresponding battery duration[25].

Figure 10 shows the resulting cumulative battery power by scenario for residential (house) customers, reaching 0.13 GW by 2030 and 0.71 GW by 2040, with battery power for each segment following a similar growth trend consistent with battery uptake.

Figure 10 – Cumulative Residential (House) Battery Power by Segment – Step Change Scenario



Source: Energeia Modelling

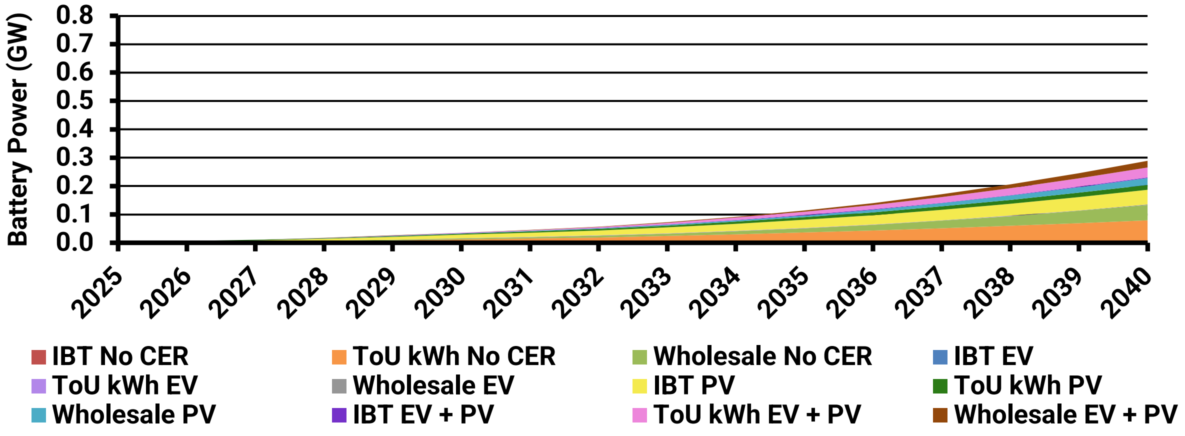
[24] AEMO (2025), Draft Inputs and Assumptions, https://aemo.com.au/consultations/current-and-closed-consultations/2025-iasr

[25] Battery assumptions are 2.1 hours for residential and 1.3 hours for small, medium and large businesses

5.1.7 Cumulative Flexible Battery Power

The cumulative flexible battery power is shown in Figure 11, and sees flexible battery power reaching 0.04 GW by 2030 and 0.29 GW by 2040.

Figure 11 – Cumulative Res (House) Flexible Battery Power by Segment – Step Change Scenario

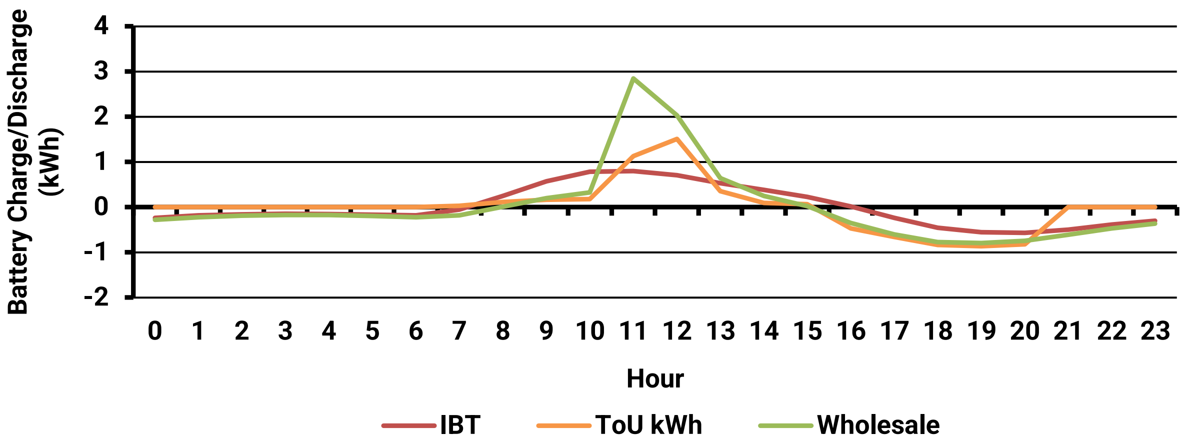


Source: Energeia Modelling, AEMO Draft Inputs and Assumptions

5.1.8 Average Day Battery Load Profiles in 2037

To demonstrate the charging and discharging patterns of the battery for residential customers on different tariffs, Energeia calculated the volume-weighted average (VWA) battery profile on an average day in 2037 (the last year of forecast demand provided by AusNet). Figure 12 shows the volume-weighted average battery customer's battery profile by tariff type.

Figure 12 – VWA Residential (House) Customer Average Day Battery LPs in 2037



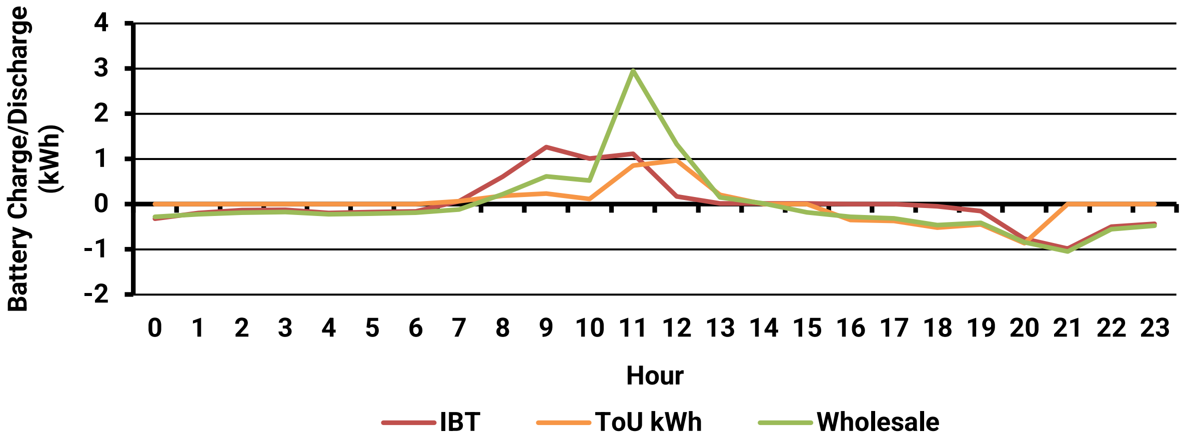
Source: Energeia Modelling, Note: Positive = Charge, Negative = Discharge

It can be seen by the average battery profiles that batteries reasonably consistently charge during the day when rooftop solar generation is at its highest and prices are at their lowest, and discharge during the evening, when both consumption and prices are at their highest.

5.1.9 Maximum Day Battery Load Profiles in 2037

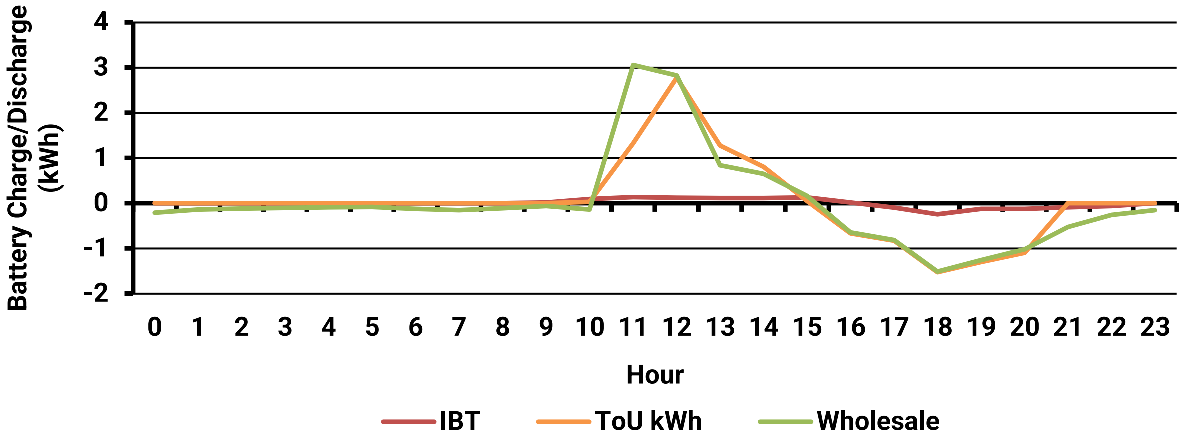
To demonstrate the impact of battery uptake on AusNet's asset load profiles, Energeia calculated the volume-weighted average residential customer battery load profiles on network maximum demand days. Figure 13 and Figure 14 show the volume-weighted average residential customer battery load profiles on the network, summer maximum demand and winter maximum demand days in 2037 (last year of forecast demand provided by AusNet).

Figure 13 – VWA Residential (House) Customer Summer Max Demand Day Battery LPs in 2037



Source: Energeia Modelling, Note: Positive = Charge, Negative = Discharge

Figure 14 – VWA Residential (House) Customer Winter Max Demand Day Battery LPs in 2037



Source: Energeia Modelling, Note: Positive = Charge, Negative = Discharge

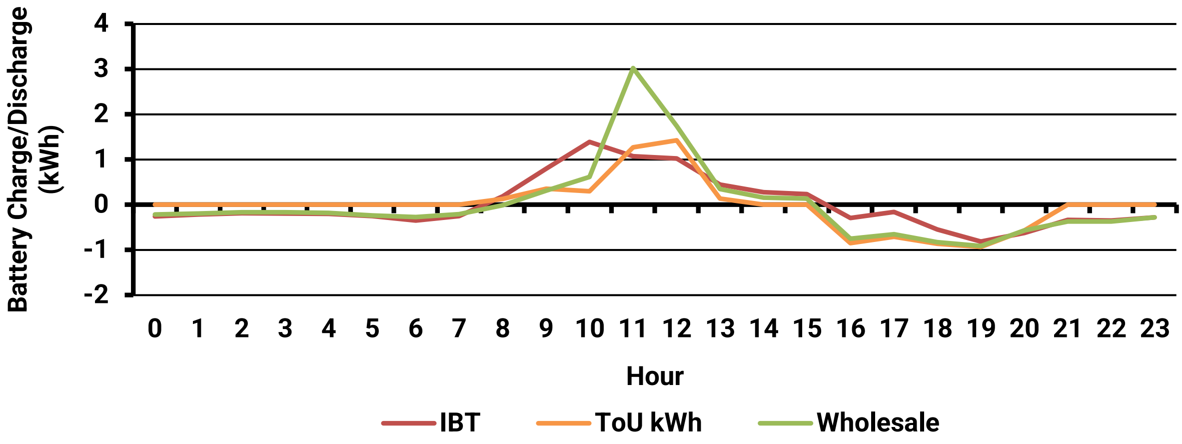
The battery profiles on the summer maximum demand day are fairly well aligned, charging when there is lots of solar and discharging when there is higher consumption and higher prices in the evening.

In contrast, on the winter maximum demand day, both ToU kWh and Wholesale algorithms prioritise charging during the overlapping low-cost period in the middle of the day—when wholesale prices are off-peak and the network's solar soaker tariff applies—allowing batteries to fully charge, before then discharging in the evening when demand is highest. The battery charge and discharge are comparatively very small for the IBT algorithm because there is very little excess solar to charge the battery.

5.1.10 *Minimum Day Battery Load Profiles in 2037*

Energeia also calculated the volume-weighted average residential customer battery load profiles on the network minimum demand day, as seen in Figure 15.

Figure 15 – VWA Residential (House) Customer Min Demand Day Battery LPs in 2037



Source: Energeia Modelling, Note: Positive = Charge, Negative = Discharge

The battery profiles on the minimum demand day are well aligned, charging in the middle of the day when there is lots of solar and discharging when there is higher consumption and higher prices in the evening.

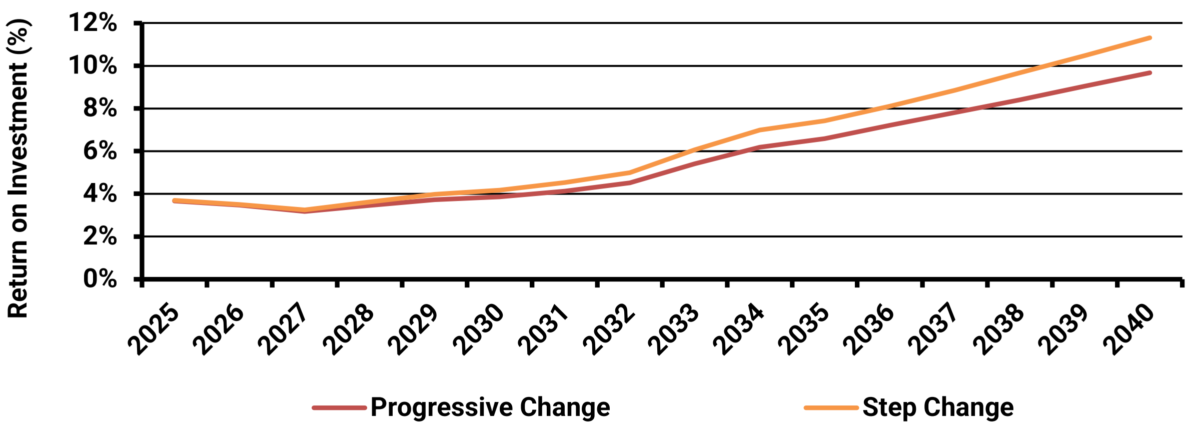
5.2 Outlook by Scenario

The key comparative reporting of Energeia's modelling outcomes between the Step Change and Progressive Change scenarios is outlined in the following sections. Historical data points have also been included where possible to provide a sense check and illustrate the increased uptake in the early forecast years that is driven by the federal government rebate program. All modelling outcomes are shown for the P50 weather year for all customer types (i.e., residential, small business, medium business and large business).

5.2.1 *Annual Battery Return on Investment*

Energeia's forecast of battery ROI is shown in Figure 16 by scenario, hitting 9.7% ROI in 2040 under Progressive Change and 11.3% ROI in 2040 under Step Change, primarily due to the differing battery price forecasts, with prices falling more rapidly under Step Change and delivering higher returns.

Figure 16 – Annual Return on Investment by Scenario

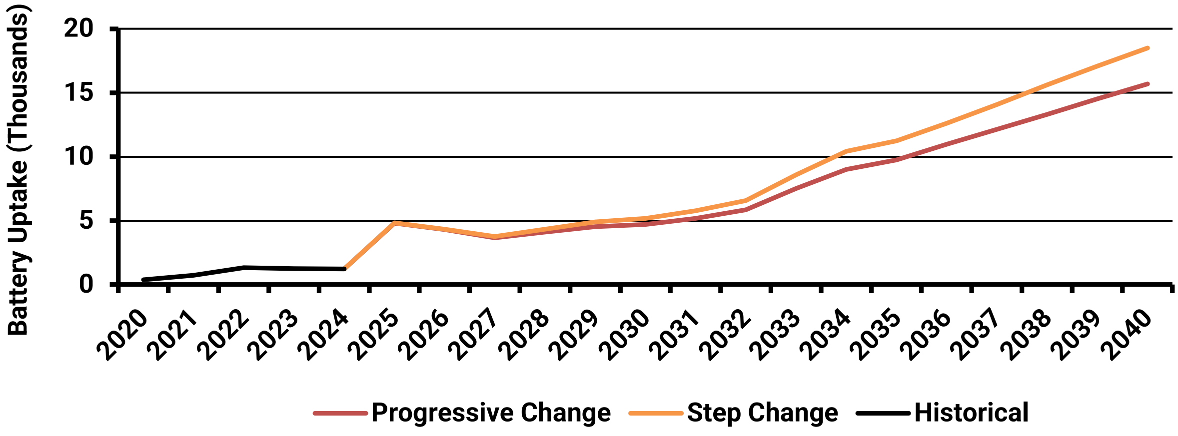


Source: Energeia Modelling

5.2.2 *Annual Battery Installations*

Energeia's forecast of battery uptake is shown in Figure 17 by scenario, hitting 15,700 batteries installed per year under Progressive Change and 18,500 batteries installed per year under Step Change by 2040.

Figure 17 – Annual Battery Installations by Scenario



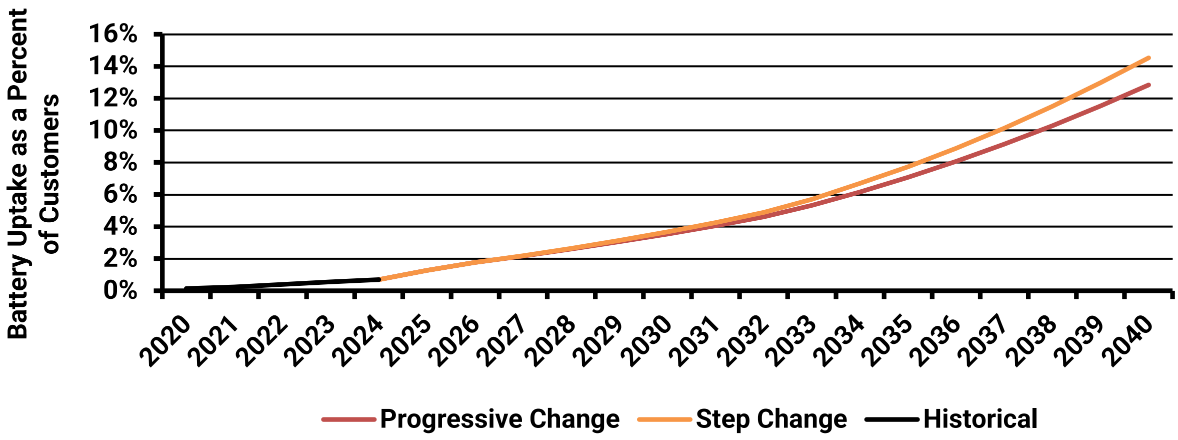
Source: Energeia Modelling

Both scenarios see similar rates of uptake early in the forecasting period, with a pronounced jump in 2025 as the federal battery rebate kicks in, before beginning to diverge post-2033 due to lower battery capex under the Step Change scenario.

5.2.3 *Cumulative Battery Uptake*

Energeia's forecast of battery uptake as a percentage of customers is seen in Figure 18. Battery uptake reaches 12.8% under Progressive Change and 14.5% under Step Change by 2040, reflecting differences in ROI due to battery price forecasts.

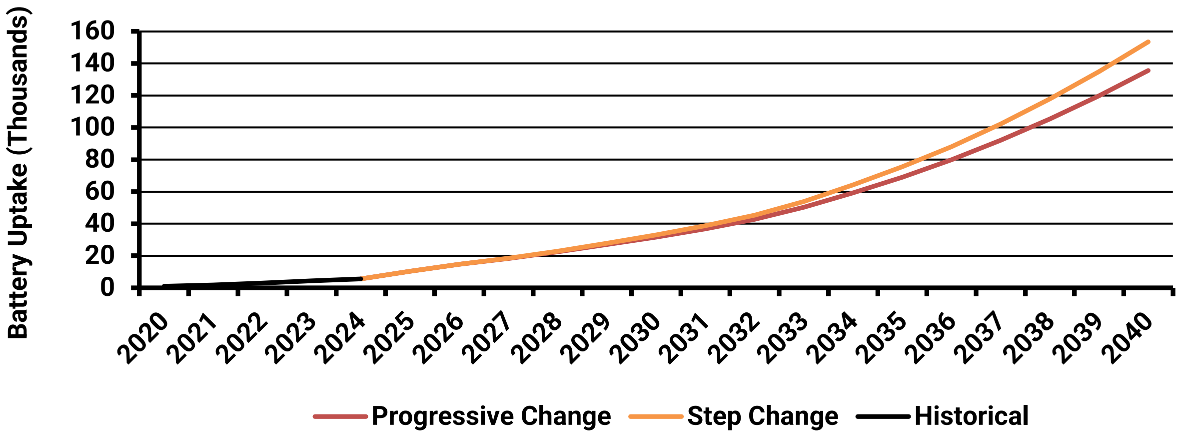
Figure 18 – Battery Uptake % by Scenario



Source: Energeia Modelling

The total cumulative battery uptake is shown in Figure 19 by scenario, hitting 136,000 batteries under Progressive Change and 153,000 batteries under Step Change by 2040.

Figure 19 – Cumulative Battery Uptake by Scenario

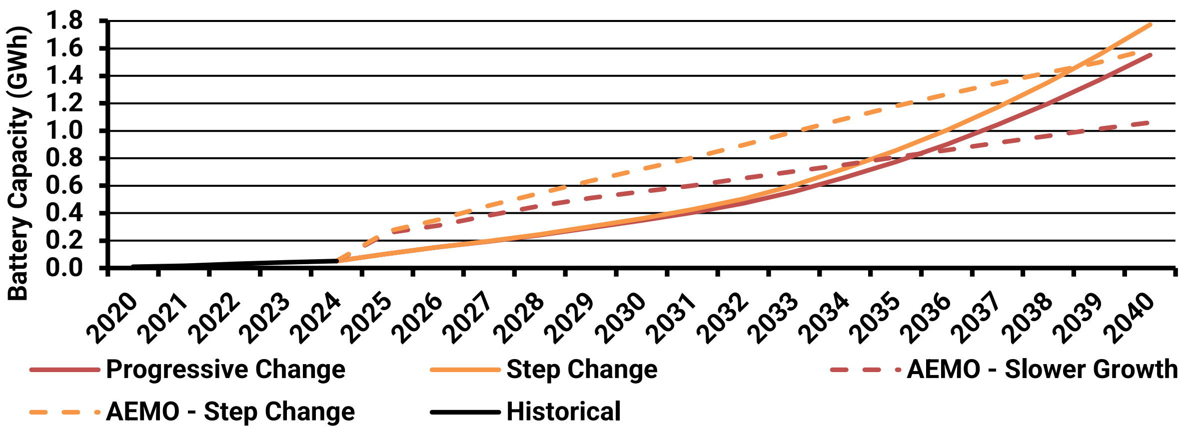


Source: Energeia Modelling

5.2.4 Cumulative Battery Capacity

Energeia's forecast of battery capacity follows the same trend as battery uptake and is shown in Figure 20 by scenario, reaching 1.55 GWh under Progressive Change and 1.77 GWh under Step Change. This forecast is also compared against AEMO forecasts of battery capacity[26].

Figure 20 – Cumulative Battery Capacity by Scenario



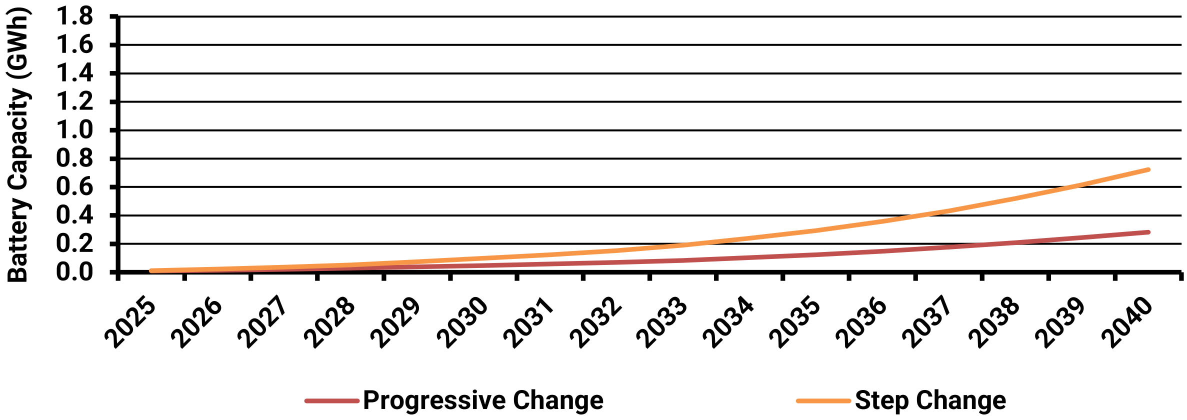
Source: Energeia Modelling, AEMO (2025), Note: Only Battery Systems Under 1000kWh were Considered in the Historical Data

5.2.5 Cumulative Flexible Battery Capacity

Energeia's forecast of flexible battery capacity is reported in Figure 21 by scenario, reaching 0.28 GWh under Progressive Change and 0.72 GWh under Step Change.

[26]AEMO (2025), Draft Inputs and Assumptions, https://aemo.com.au/consultations/current-and-closed-consultations/2025-iasr, Note: The AEMO forecasts are adjusted on a pro-rata basis by forecasted PV capacity for AusNet (provided by AusNet) vs forecasted PV capacity for Victoria, because AEMO do not provide battery forecasts at the DNSP level

Figure 21 – Cumulative Flexible Battery Capacity by Scenario



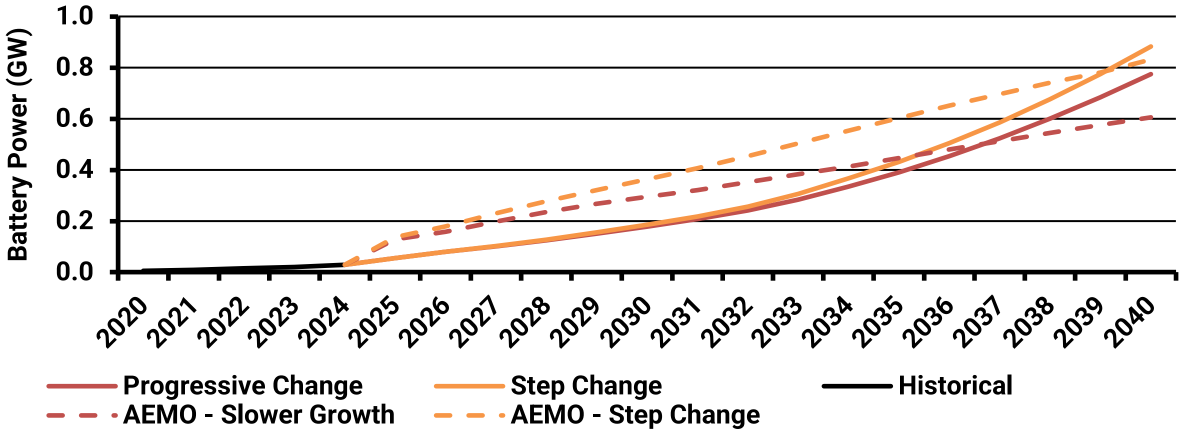
Source: Energeia Modelling

Flexible battery capacity sees the greatest variation in uptake due to differing assumptions around the share of batteries participating in VPPs over time, with the Step Change scenario forecasting 41% of battery capacity will be flexible by 2040, and the Progressive Change scenario forecasting an 18% share.

5.2.6 Cumulative Battery Power

Energeia's forecast of battery power follows the same trend as battery capacity and is shown in Figure 22 by scenario, climbing to 0.78 GW under Progressive Change and 0.88 GW under Step Change. This forecast is also compared against AEMO forecasts of battery power[27].

Figure 22 – Cumulative Battery Power by Scenario



Source: Energeia Modelling, Note: Only Battery Systems Under 1000kW were Considered in the Historical Data

5.2.7 Cumulative Flexible Battery Power

Energeia's forecast of flexible battery power is reported in Figure 23 by scenario, reaching 0.14 GW under Progressive Change and 0.36 GW under Step Change.

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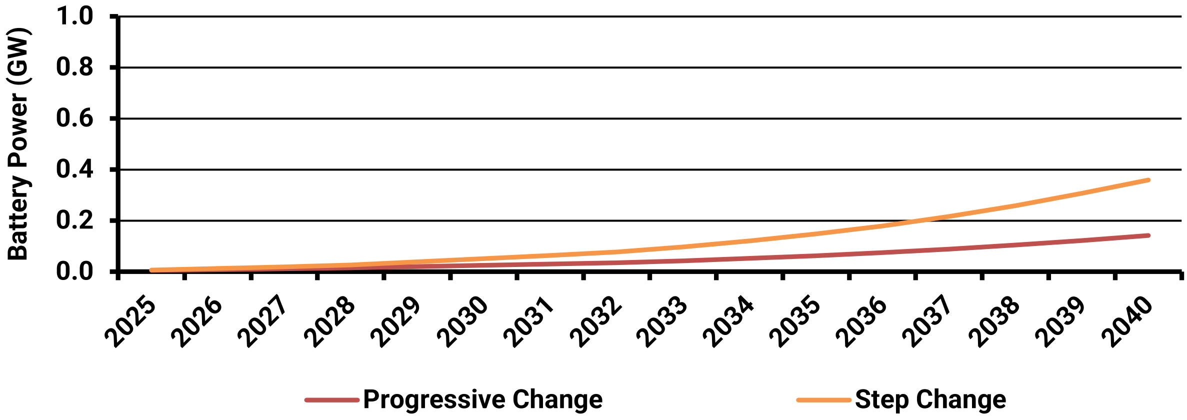
[27] AEMO (2025), Draft Inputs and Assumptions, https://aemo.com.au/consultations/current-and-closed-consultations/2025-iasr, Note: The AEMO forecasts are adjusted on a pro-rata basis by forecasted PV capacity for AusNet (provided by AusNet) vs forecasted PV capacity for Victoria, because AEMO do not provide battery forecasts at the DNSP level

Figure 23 – Cumulative Flexible Battery Power by Scenario

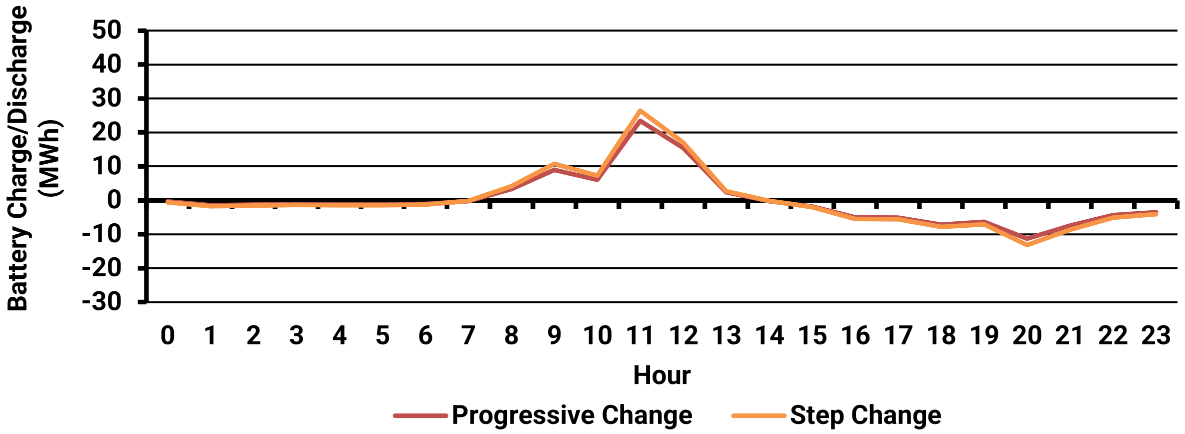


Source: Energeia Modelling, AEMO Draft Inputs and Assumptions

5.2.8 Maximum Day Battery Load Profiles in 2037

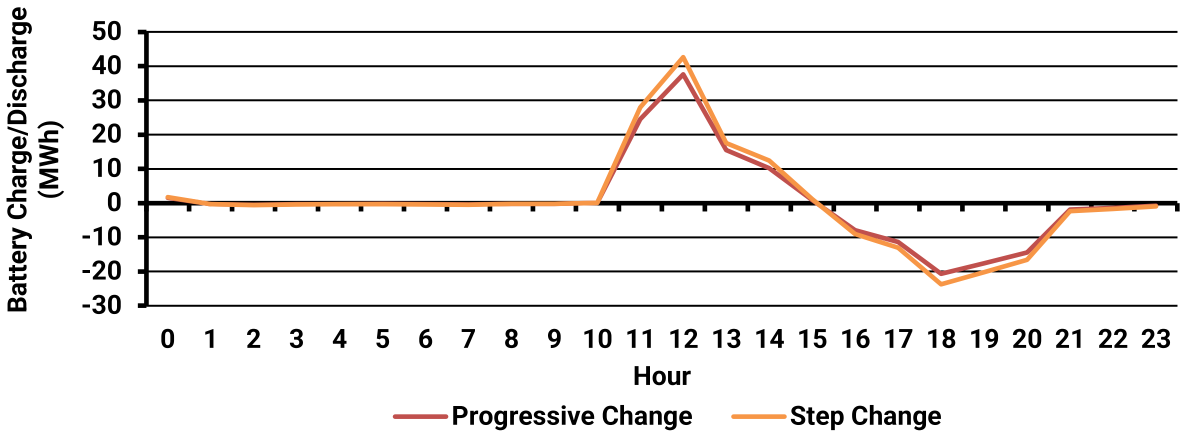
Energeia's forecasted network maximum demand day battery load profiles are shown in Figure 24 and Figure 25 by scenario.

Figure 24 – All Customer Summer Max Demand Day Battery LPs in 2037 by Scenario



Source: Energeia Modelling, Note: Positive = Charge, Negative = Discharge

Figure 25 – All Customer Winter Max Demand Day Battery LPs in 2037 by Scenario



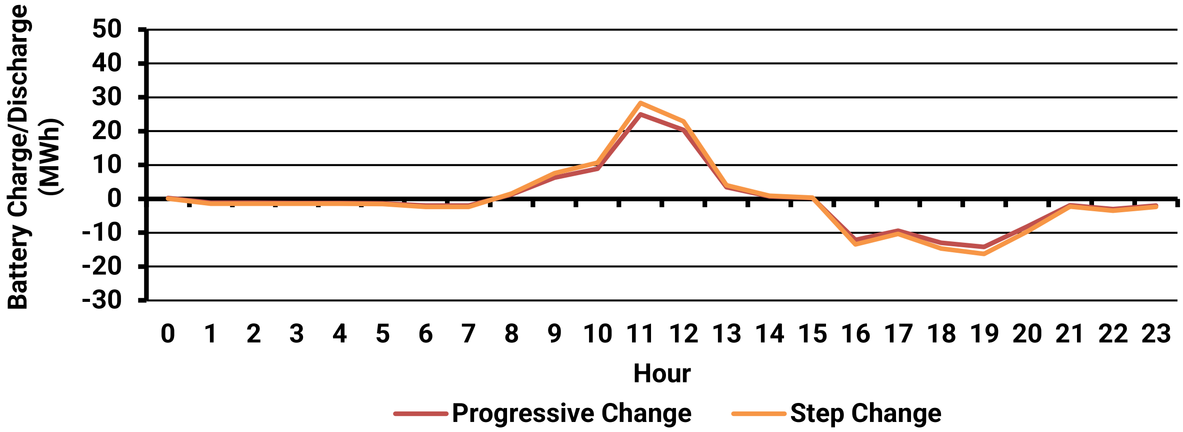
Source: Energeia Modelling, Note: Positive = Charge, Negative = Discharge

There is very little observed variation across scenarios, with both reflecting similar shapes. The Step Change scenario has greater magnitudes as a result of greater battery uptake. Noting that these battery profiles are the sum of all battery profiles (including VPP batteries) and are not orchestrated in any way.

5.2.9 *Minimum Day Battery Load Profiles in 2037*

Energeia's forecasted network minimum demand day battery load profiles are shown in Figure 26 by scenario.

Figure 26 – All Customer Min Demand Day Battery LPs in 2037 by Scenario



Source: Energeia Modelling, Note: Positive = Charge, Negative = Discharge

There is very little observed variation across scenarios, with both reflecting similar shapes, charging during the middle of the day when solar is peaking and discharging during the evening at times of higher consumption and price.

5.3 Limitations

Due to time constraints, scope and nature of the data, this modelling has a number of limitations. These limitations and how they affected the analysis are listed and explained below:

- **Using the relationship between PV uptake and ROI to calculate battery uptake** – Although batteries and solar PV systems serve the same purpose, to reduce electricity bills, it is an approximation to say that they will have the uptake of these two technologies will have the same relationship to ROI. This approximation was made due to solar PV being a much more mature technology in Australia and battery installations having far fewer data points to use.
- **Using five agents to represent an entire customer type** – Using five agents to represent residential customers is not a very statistically accurate approximation. However, due to the number of segments, scenarios and weather years being tested, increasing the number of agents by one increases the number of iterations by hundreds. Due to the time constraints of this analysis, it was decided that it would be preferable to use a low number of agents.
- **Estimation of wholesale tariff uptake** – Wholesale tariffs (e.g. Amber Electric) are a relatively new concept, and the uptake so far in Australia is still fairly low. The uptake of this type of tariff, based on trended historical data, is an approximation. The uptake of this tariff will become more accurate to predict as more data comes out.
- **Modelling battery ROIs based on a fixed year of wholesale prices** – For customers on wholesale tariffs, the amount that can potentially be saved over time by using a battery will change with changing market dynamics. For example, if storage in Victoria were to increase dramatically, it may flatten wholesale prices, thus lowering the amount that a battery can save on bill costs. Modelling wholesale prices was not in the scope of this analysis.
- **A single battery was tested for each customer type** – For each customer type, only one battery size was used in calculating ROI. This method does not account for the variability in customer choice when selecting a battery. Different sizes of batteries will have different bill savings and upfront costs, therefore different ROI outcomes. This was done due to both a lack of data on the distribution of battery sizes for different customer types and to save on iterations.
- **A single EV load profile was used** – Different people have different driving habits, and therefore, different EV drivers have different charging habits. EV charging profiles impact on battery ROI, and the variability of these different EV charging habits, was not captured to save on the number of required iterations.
- **Modelling does not consider the impacts of electrification** – Victoria still has many gas customers, and with changing policies on gas connections, there is likely to be a significant increase in electric space heating, water heating and cooking. The load profiles used were 2024 load profiles; however, it is unknown the type of gas devices their customers might have. Therefore, the impacts of future electrification on load profiles were not considered part of the scope.

5.4 Future Improvements

With more battery installation data and more time to carry out the analysis, the following future improvements can be made to the analysis:

- **Calculating the historical relationship between battery ROI and uptake** – As more battery data is captured, with more granularity on customer types and the impact of the federal battery rebate has come through in the data, the impact on ROI and uptake can be calculated. With this data, PV will not have to be used as a proxy to measure this relationship. As a result, the analysis would become more accurate.
- **Modelling more customers to account for added load profile variability** – The more agents that are selected, the more accurate the ROI modelling becomes. Having more modelling time will allow the battery uptake model to be transferred from Excel to Python, and therefore, be able to do far more iterations and increase modelling accuracy.

- **Using the relationship between battery uptake and wholesale tariff uptake** – As there is more data available on both battery uptake and wholesale tariff uptake, the relationship between batteries and wholesale tariffs can be measured and applied on a year-by-year basis, therefore improving the accuracy of wholesale tariff uptake.
- **Modelling different options of batteries and EVs** – With more time to carry out the analysis and transferring the model from Excel to Python will allow more iterations and therefore enable variability in battery sizes and EV charging profiles to be considered in the segment combinations.

Appendix A – Customer Sample

This appendix covers the purpose, method, and outcome of the customer sample design.

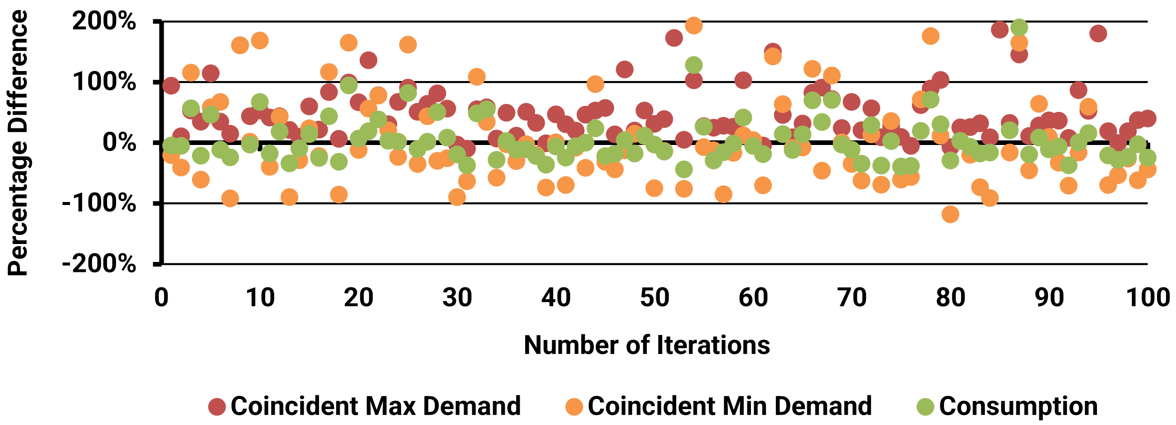
A.1. Purpose

Customer sampling was used to enable efficient and scalable modelling of customer load profiles across AusNet's network. Modelling every individual customer was not feasible due to the scale of the dataset, so a smaller set of representative profiles was selected instead. Five agents were randomly chosen for each customer class to reflect the typical diversity in load shapes and annual consumption observed across the population. When scaled to the network level, this approach ensures that the sampled profiles provide a reliable approximation of overall customer behaviour.

A.2. Method

Energeia developed a simulation method that randomly selected five customer load profiles (agents) per customer class from AusNet's dataset, repeating this process 100 times to test different combinations, reducing the risk of bias, and improving the representativeness of the final sample. For each iteration, the aggregated agent load profile was compared against the network-level characteristics using three key metrics: coincident maximum demand, coincident minimum demand, and total consumption. The resulting distribution of each metric across all 100 iterations is shown in Figure A1.

Figure A1 – Comparison of Aggregated Agents vs Network Data



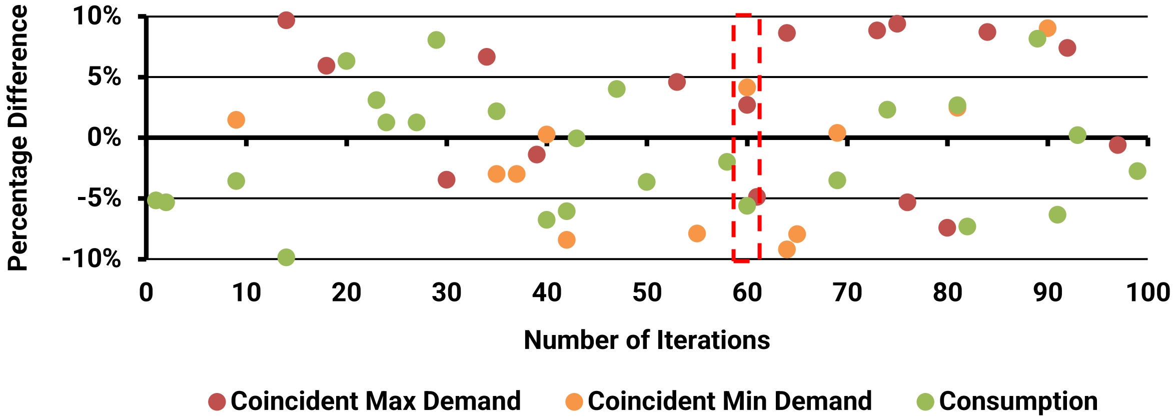
Source: Energeia Modelling, AusNet Data, Note: Negative Means that Aggregated Agent Outcomes are Lower than the Network Totals

The observed variation across all three metrics likely reflects the high level of variation when scaling up a small sample of 25 customers to represent the full network. The diversity that these agents introduce to the modelling aims to represent the different behaviours of actual customers on the network.

A.3. Outcome

The iteration with the lowest variance across all three variables was selected to serve as the final sample, ensuring a strong representation of the broader customer population. This selected iteration is highlighted in red in the focused comparison shown in Figure A2, where the figure shows the level of variance in iterations, capped at 10% above and below the target variables.

Figure A2 – Focused Comparison of Selected Agent vs Network Data

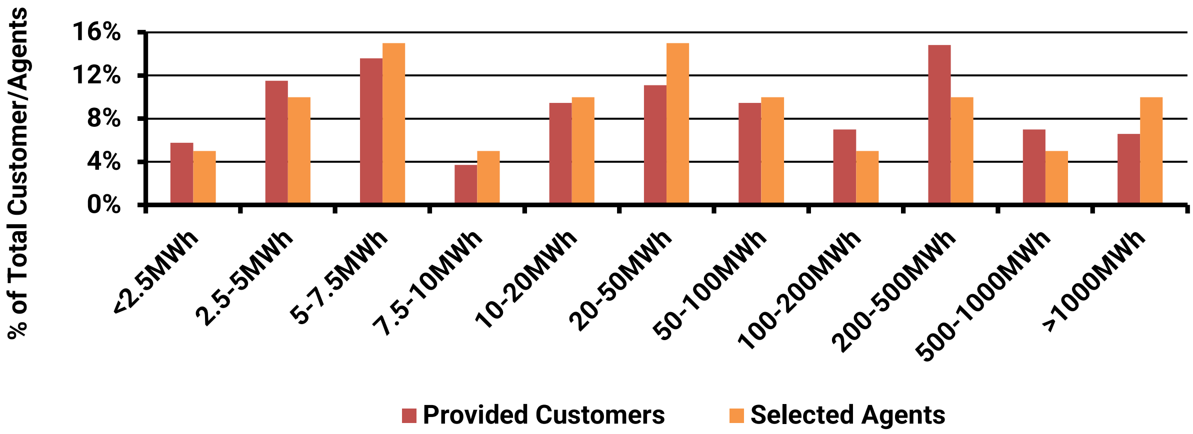


Source: Energeia Modelling, AusNet Data, Note: Negative Means Aggregated Agent Outcomes are Lower than the Network Totals, Red Dashed Outline Represents the Selected Iteration with the Lowest Variance Across all Three Variables

Energeia quality-assured the selected sample by scaling up the load profiles of the five randomly selected agents from each customer class using 2024 AusNet customer counts. Solar photovoltaic (PV) and electric vehicle (EV) profiles were also scaled up to the network level and added to each agent's load profile.

Figure A3 shows that the distribution of selected agents across annual consumption bands aligns well with the broader AusNet customer base, indicating that the sample provides a reasonable representation of energy consumption behaviour in the population.

Figure A3 – AusNet Annual Consumption for Provided Load Profiles vs Selected Agents



Source: AusNet, Energeia Analysis

Appendix B – Uptake Propensity

This appendix covers the purpose, method, and outcome of the uptake propensity outcomes for each customer class.

B.1. Purpose

Customer adoption of batteries is influenced by a range of factors, including tariff structure, household consumer energy resource (CER) mix (e.g. solar photovoltaics (PV) and electric vehicles (EV)), and upfront battery cost. Historically, battery uptake in the National Electricity Market (NEM) has been dominated by early adopters, who typically are less price-sensitive than mass market adopters. This is due to the fact that early adopters are driven by a wide range of other factors, including tech enthusiasm and sustainability, in the case of green energy. To not over-represent the behaviours of early adopters in the regression factors developed for this analysis, Energeia derived uptake coefficients based on the observed relationship between historical solar PV annual installs and the first-year return on investment (ROI) of buying solar PV. Solar PV was used as a proxy as it is a comparable technology with a similar lifetime and repayment revenue stream for customers, indicating a similar decision-making strategy for investing consumers.

The calculated relationship between PV first-year return on investment and PV sales was applied to battery economics to determine battery uptake. The resulting uptake propensity curves provide a consistent, data-driven basis for forecasting future adoption.

B.2. Method

Energeia's battery uptake propensity coefficients were developed from an analysis of historical PV adoption rates and historical PV return on investment by customer class.

Energeia used a technology uptake function to project battery technology adoption over time based on:

1. Technology ROI in year t:

$$Battery\ ROI_t\ (\%) = \frac{Battery\ 1st\ Year\ Savings_t\ (\$)}{Battery\ Capex_t(\$)}$$

2. Technology uptake in year t:

$$Battery\ Uptake_t = \big(a * Battery\ ROI_t(\%)\big) + b$$

Where:

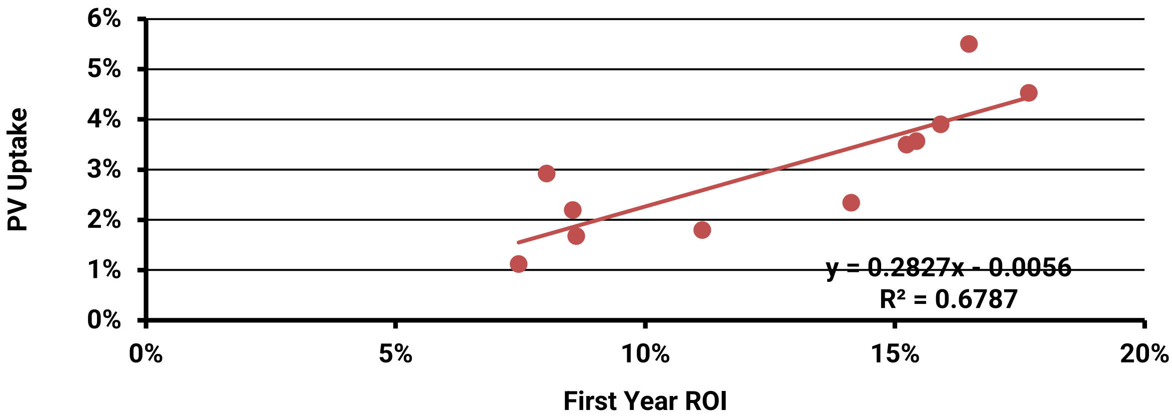
- $Battery\ ROI_t\ (\%)$ = Battery ROI
- $Battery\ Capex_t\ (\$)$ = Battery capital expenditure, calculated as the total installed upfront cost of a battery minus any applicable battery incentive
- $Battery\ 1st\ Year\ ROI_t\ (\$)$ = Battery 1st year savings, calculated as the difference in the cost of an annual electricity bill before and after installing a battery
- $Battery\ Uptake_t$ = Battery uptake within a segment in year t
- a = Slope coefficient representing the sensitivity of uptake to ROI
- b = Intercept term that captures base-level uptake independent of ROI.

Battery uptake is driven by both the assumed functional relationship with ROI and how ROI evolves over time.

B.3. Outcome

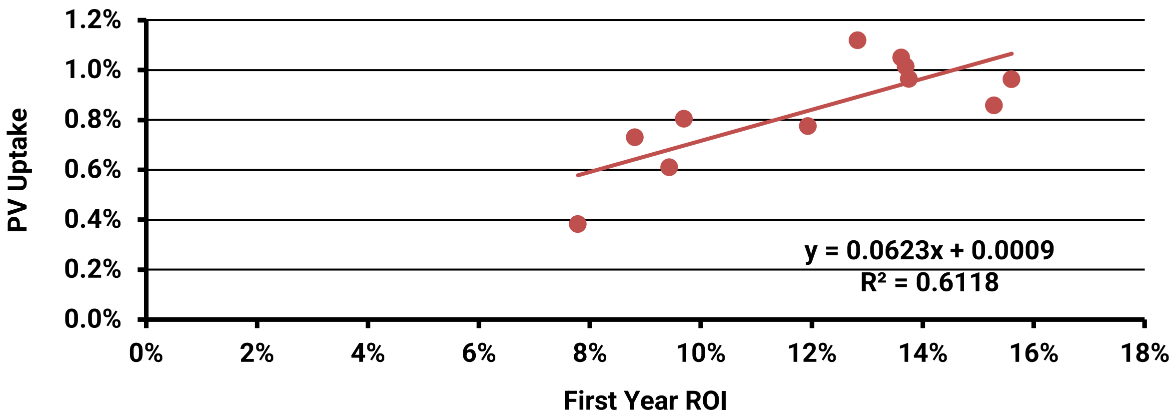
The resulting uptake propensity curves showing the 10-year historical relationship between PV uptake and PV ROI are shown in Figure B1 and Figure B2 for residential and small business customers.

Figure B1 – Residential (House) Uptake Factors



Source: Energeia Modelling

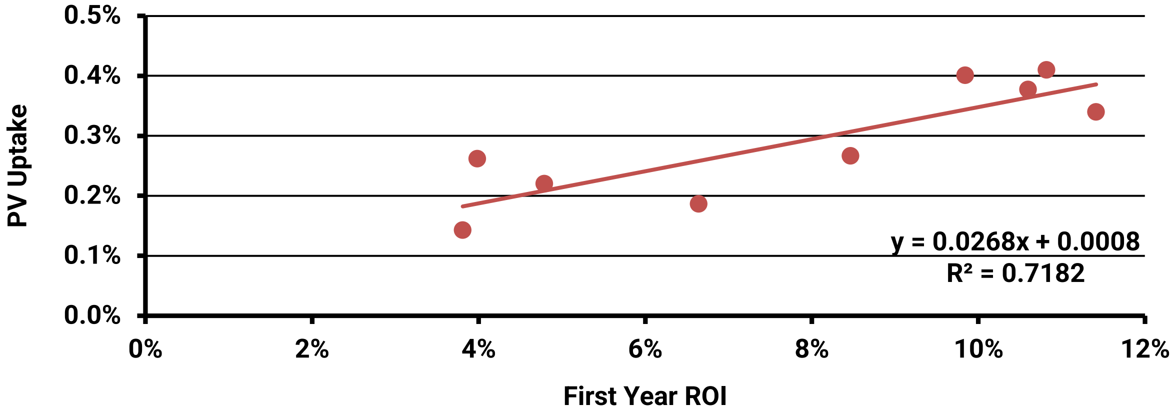
Figure B2 – Small Business Uptake Factors



Source: Energeia Modelling

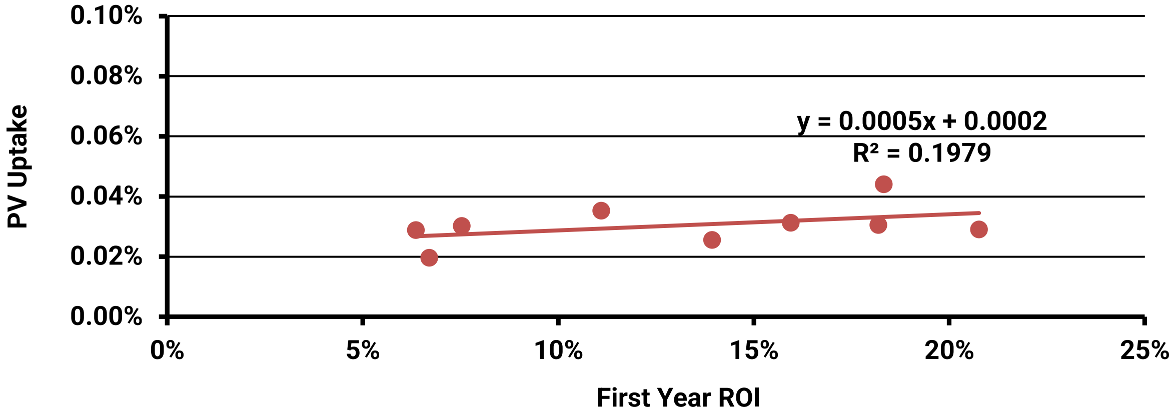
The uptake factors for medium and large business customers, shown in Figure B3 and Figure B4. Correlation between PV uptake and ROI remains weaker for large business customers, likely reflecting their lower sensitivity to financial drivers or higher upfront cost barriers.

Figure B3 – Medium Business Uptake Factors



Source: Energeia Modelling

Figure B4 – Large Business Uptake Factors



Source: Energeia Modelling

Appendix C – Weather Normalisation

This appendix covers the purpose, method, and outcome of the weather normalisation of customer load profiles.

C.1. Purpose

Temperature is a well-known driver of electricity demand, as the primary factor inducing space heating loads. Load profiles were weather normalised to account for the impacts of extreme temperatures. The weather normalisation aims to adjust the historical data to control for the impact of temperature on demand, such that an entire year of demand exhibits the adjusted likelihood of an extreme weather day. Energeia normalised historical half-hourly load data from AusNet, generating three levels of probability of exceedance (POE, or P): P10, P50, and P90. These POEs were calculated by taking the 90th, 50th and 10th percentile temperatures across the observed history.

C.2. Method

Energeia used the half-hourly interval weather data and demand supplied by AusNet for its network for all historical years considered in the forecast inputs (i.e. 2015-2024). The key weather variable used was:

- **Temperature**: The average temperature measured at zone substations across the AusNet network (in degrees C).

The temperature weather variable was used in regressions with all demand days, by each hour of the day, separated into summer, winter, and autumn/spring seasons. The regression and normalisation process are detailed in the steps below:

1. **Determine weather-dependent load** –AusNet's hourly network demand (i.e. the sum of zone substation demand) was regressed against average zone substation temperature for each hour of the day. Dummy variables were also included in the forecast for year-on-year effects, to account for such evolving factors as solar photovoltaic (PV) uptake, and day type effects, to account for the impact that holidays and weekends have on the load shapes of consumers compared to weekdays.

2. **Select regression coefficients** – For each half-hourly interval, the regression coefficients were found as a percentage of the total load. These coefficients represented the % of load increase/decrease corresponding to a 1°C increase/decrease in temperature. The coefficients were only considered at hours where resulting regressions were statistically significant (i.e., minimising p-value (<0.05) whilst maximising R^2). If a regression was found to be statistically significant, the hourly interval was treated as uncorrelated to temperature and was left unchanged from the weather normalisation process. Note that regressions were separated by season as the relationship of demand with temperature changes over the year (i.e. higher temperatures increase demand in summer through additional heating load, and lower temperatures increase demand in winter through additional cooling load).

3. **Apply regression coefficients –** Normalising demand for weather variation occurred by scaling weather-dependent demand using the regression coefficients at each corresponding interval, multiplied by the difference in observed temperature and the calculated POE temperatures. These POEs were estimated by taking the 90th, 50th and 10th percentile temperatures across the observed history, for the specific hour of the day. The final normalised demand was found as the sum of the weather-insensitive load and the weather-normalised, weather-sensitive load by each POE.

The following definition of P10, P50 and P90 temperature were used:

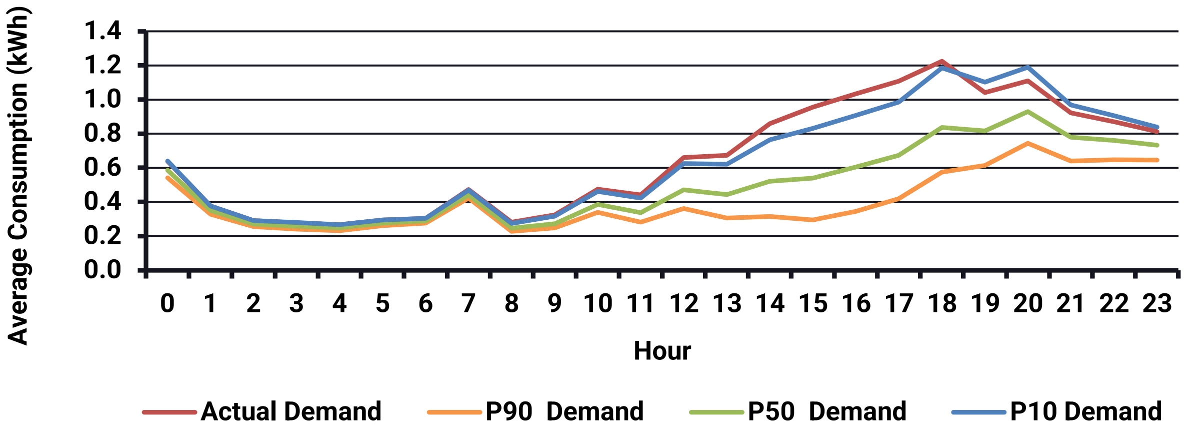
- **P10**: The 90th percentile average temperature observed historically at each hour across AusNet's zone substations, such that only 10% of readings exceeded this value
- **P50**: The 50th percentile average temperature observed historically at each hour across AusNet's zone substations, such that 50% of readings exceeded this value

- **P90**: The 10th percentile average temperature observed historically at each hour across AusNet's zone substations, such that 90% of readings exceeded this value

C.3. Outcome

The outcome of this process was a unique weather coefficient for summer, winter, and autumn/spring demand by hour. These coefficients were then applied to average agent load profiles across each customer class, with the final weather-normalised profiles selected for P10, P50, and P90 temperature based on the percentile of historical observations. The resulting weather-normalised peak day load profiles for residential customers are shown in Figure C1 and Figure C2 by season and POE. These profiles are the average of the five selected agent's load profiles for each customer type.

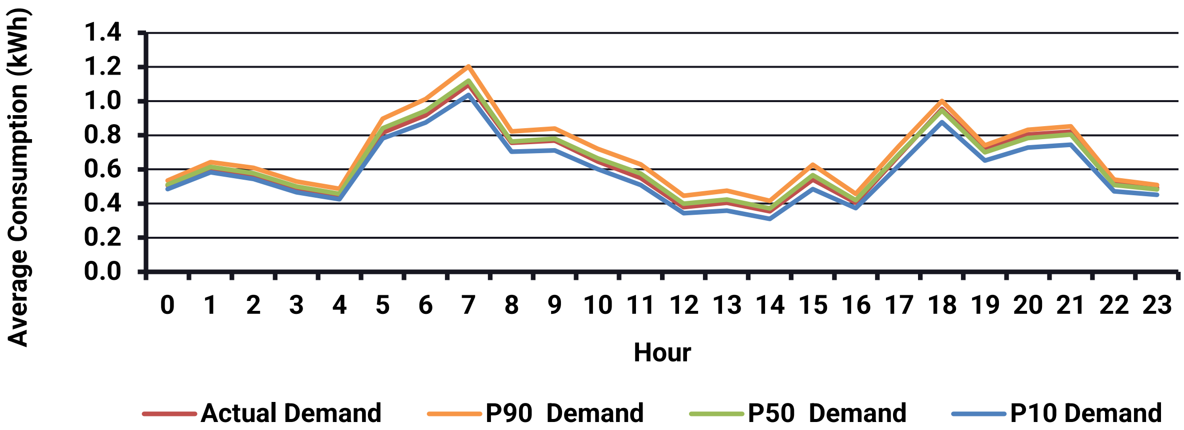
Figure C1 – Residential (House) Summer Peak Day Load Profile by POE in 2024



Source: Energeia Modelling, AusNet Historical Zone Substation and Weather Data

The residential weather normalised load profiles illustrate the increased impact that temperatures have on load during the middle of the day through to late afternoon in summer (i.e., cooling loads). P10 is the 90th percentile (warmest) historical temperature, meaning it results in the highest cooling load during these hours. Actual demand is also the highest on the summer peak day, suggesting that the network peak day in 2024 was hotter than the P10 temperature at that hour.

Figure C2 – Residential (House) Winter Peak Day Load Profile by POE in 2024

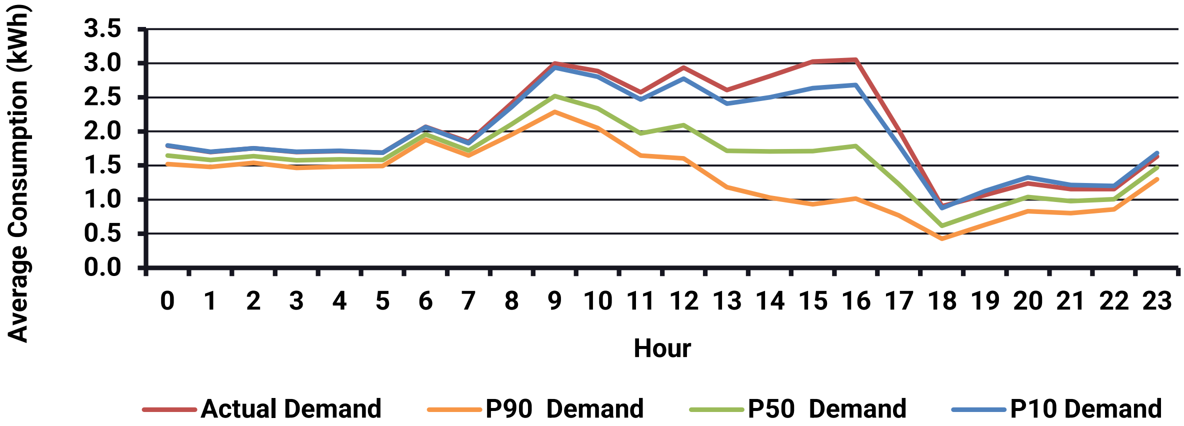


Source: Energeia Modelling, AusNet Historical Zone Substation and Weather Data

During winter, temperatures have a less pronounced impact on load throughout the day, likely due to many customers relying on gas for heating rather than electricity. However, this could change over time due to the electrification of space heating. Furthermore, P50 is consistently shown to follow actual load quite closely, as it represents median weather conditions that typically align with average annual demand.

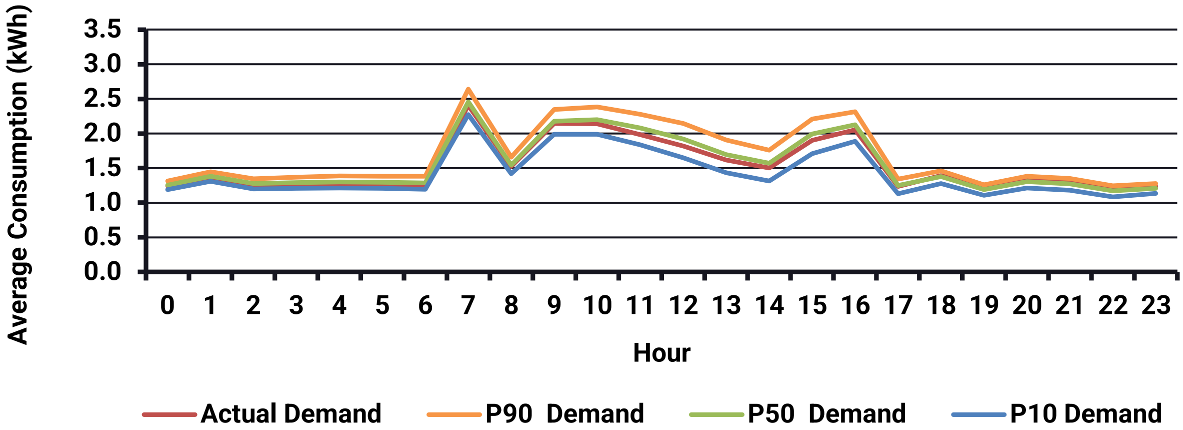
Small business weather normalised load profiles, shown in Figure C3 and Figure C4 by season and POE, showed consistently high load throughout the day, peaking in the morning before dropping sharply in the evening, reflecting the typical fixed operating hours of these businesses.

Figure C3 – Small Business Summer Peak Day Load Profile by POE in 2024



Source: Energeia Modelling, AusNet Historical Zone Substation and Weather Data

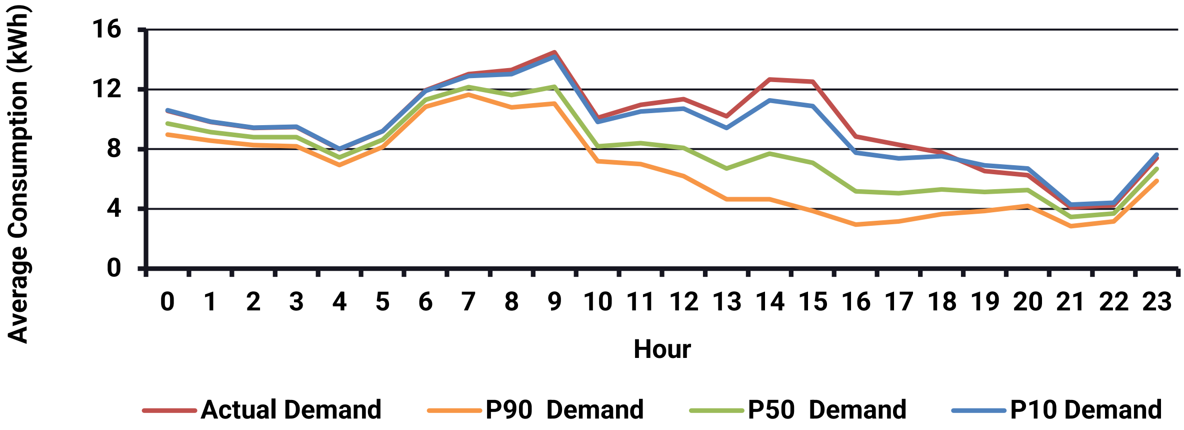
Figure C4 – Small Business Winter Peak Day Load Profile by POE in 2024



Source: Energeia Modelling, AusNet Historical Zone Substation and Weather Data

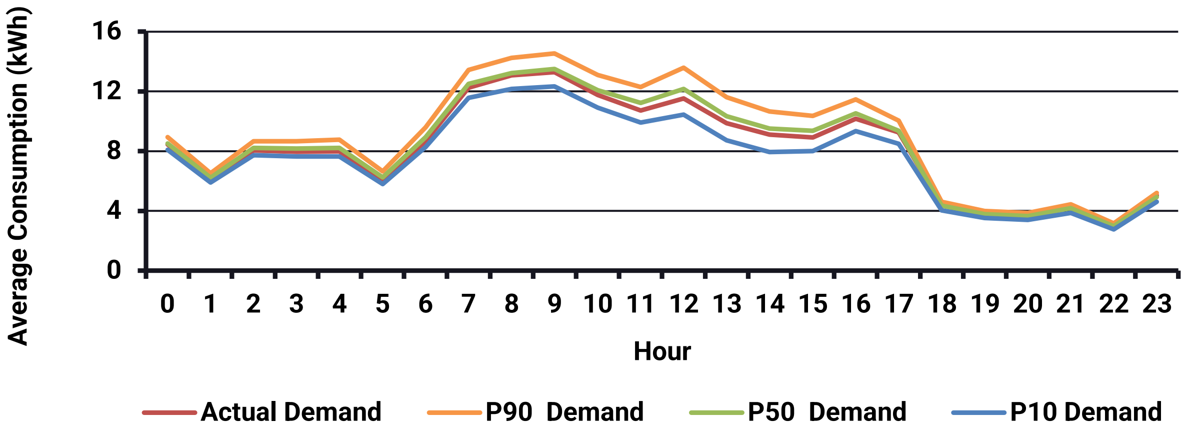
Medium business weather normalised load profiles, shown in Figure C5 and Figure C6 by season and POE, showed similar characteristics as small business customers, with a distinct morning peak and minimum in the evening.

Figure C5 – Medium Business Summer Peak Day Load Profile by POE in 2024



Source: Energeia Modelling, AusNet Historical Zone Substation and Weather Data

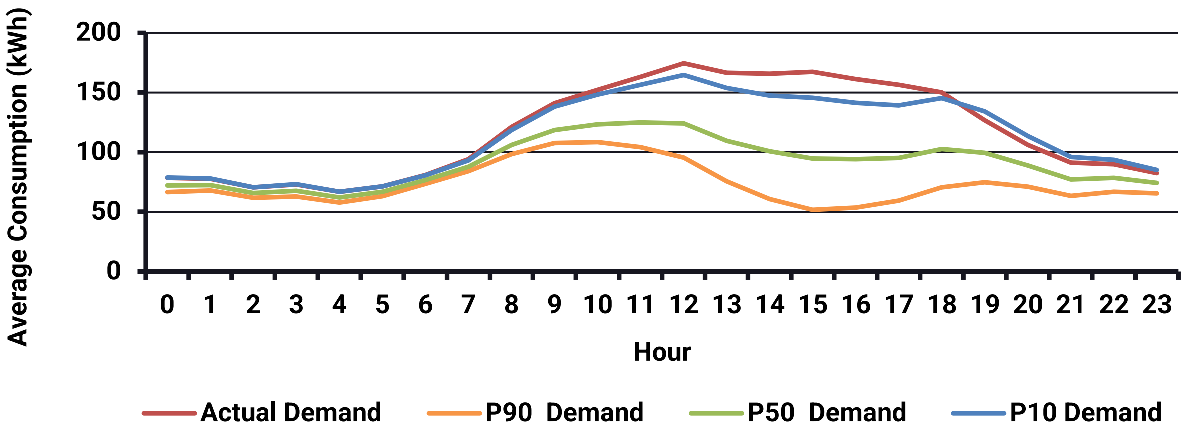
Figure C6 – Medium Business Winter Peak Day Load Profile by POE in 2024



Source: Energeia Modelling, AusNet Historical Zone Substation and Weather Data

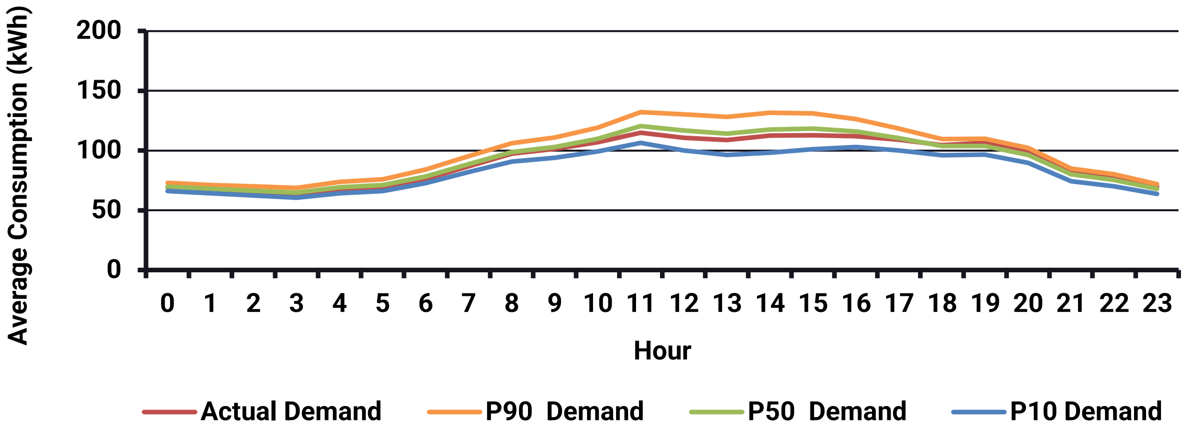
Large business weather normalised load profiles, shown in Figure C7 and Figure C8 by season and POE, tended to have higher loads during business hours and early evening hours (approximately 9 am-9 pm). As temperatures tended to be higher during these hours, the resulting P10 load was much higher than others during summer.

Figure C7 – Large Business Summer Peak Day Load Profile by POE in 2024



Source: Energeia Modelling, AusNet Historical Zone Substation and Weather Data

Figure C8 – Large Business Winter Peak Day Load Profile by POE in 2024



Source: Energeia Modelling, AusNet Historical Zone Substation and Weather Data

Appendix D – Inputs and Assumptions

The following section outlines the inputs and assumptions used to forecast battery uptake.

D.1. Request For Information

The following section summarises all the inputs that were requested by Energeia for this analysis, and the status of the request for information (RFI) response provided by AusNet. Table D1 shows the RFI and the status of each requested input.

Table D1 – RFI and Response Status

Category	Sub-Category	Data Received
Customer Data	Load Profiles by Customer Segment	✓
	Customer and Consumer Energy Resources (CER) Counts by Customer Segment, Asset and Year	✓
CER Data	Load Profiles by Customer Segment and CER Type	✓
Asset Data	Asset Hierarchy	✓
	Load Profiles for Each Asset	✓
Tariff Data	Tariff Names by Type and Customer Segment	✓
Revenue Data	Forecast Revenue, Ideally by Customer Class	✓
Scenario Data	Scenario Assumptions by Driver and Scenario	✓

Source: AusNet, Energeia

The inputs above were used to support the following key calculations and outputs in the modelling:

- Scenarios, customer counts and CER uptake were used to calculate the number of customers in each of the key modelling segments
- Load profiles and tariff data were used to calculate the bill savings of a customer before vs after buying a battery
- Asset data was used for load profile weather normalisation and for battery load profile output graphics

Further information required to complete the study was supplemented from publicly available online resources and is detailed in the following relevant sections.

D.2. CER

The following summarised inputs for solar photovoltaics (PV) and batteries, including:

- Historical uptake
- Historical sizing
- Historical pricing
- Price forecast.

The following inputs for PV and electric vehicles (EVs) are included:

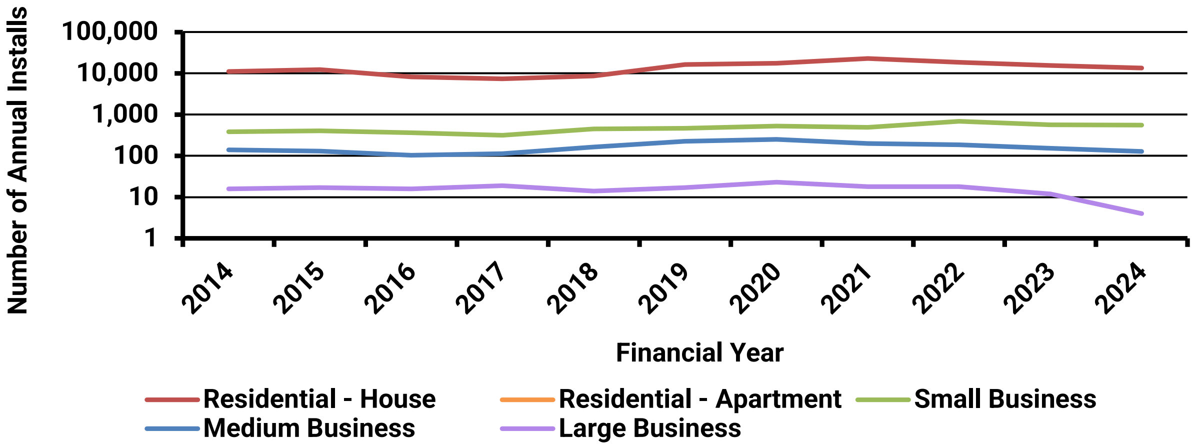
- Energy consumption profiles
- Forecast uptake.

This section also includes virtual power plant (VPP) uptake assumptions.

D.2.1 Historical PV Uptake

Historical PV uptake data was provided by AusNet, as shown in Figure D1. The data shows the historical installs by customer segment, plotted logarithmically. Residential installs overwhelmingly dominate total solar installs.

Figure D1 – Annual Installs by Segment



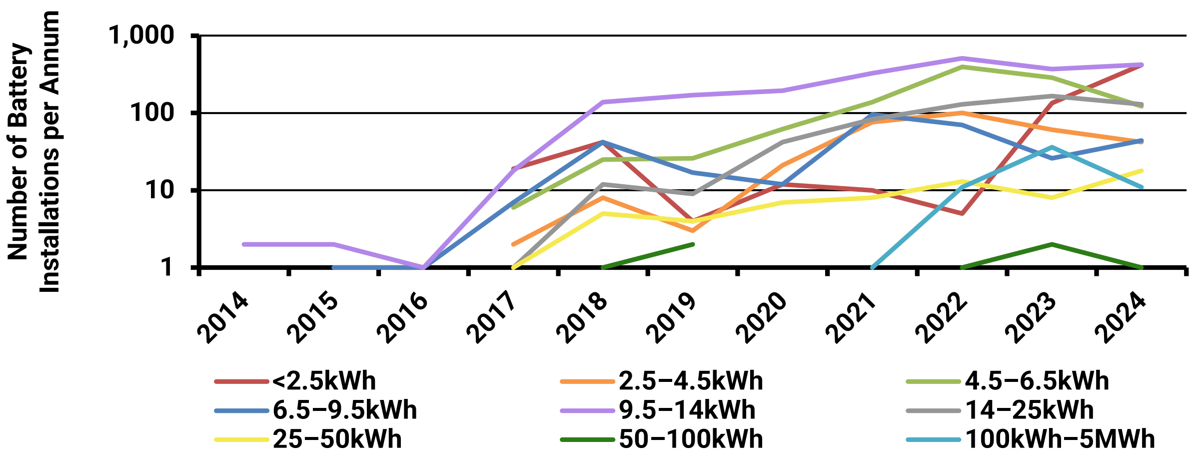
Source: AusNet (2025)

Historical PV data was used as an input for developing regression coefficients for each customer segment.

D.2.2 Historical Battery Uptake

Historical battery uptake data was provided by AusNet, with the provided data illustrating the battery install date, inverter and battery rated power, and battery storage capacity. Data was given from September 2007 to April 2025. Figure D2 below displays the annualised historical PV uptake using a logarithmic scale.

Figure D2 – Historical Battery Uptake by Battery Size



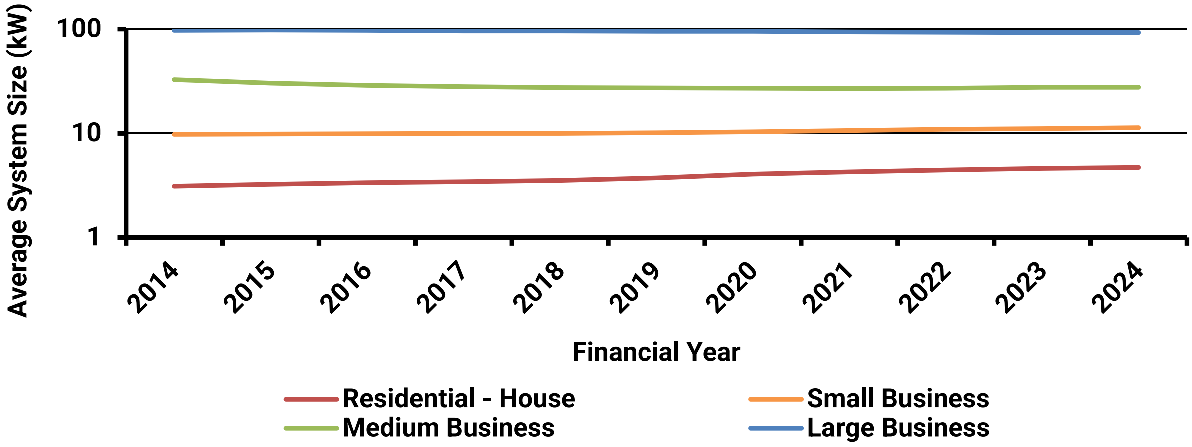
Source: AusNet (2025), APVI (2025)

The trend above displays a marked increase in annual PV installs for all sizes in the decade between 2014 and 2024, illustrating the historical behaviour of battery uptake.

D.2.3 PV Sizing

Historical average PV sizes were provided by AusNet and are broken out into customer type. Figure D3 shows the historical average PV sizes over time. The figure uses a logarithmic scale.

Figure D3 – Historical AusNet Solar PV Average Size by Customer Type



Source: AusNet (2025)

AusNet also provided PV sizes to use for the calculation of PV profiles. These PV sizes were split out into current PV (for customers that have installed PV before 2025) and new PV (for customers that install PV from 2025 onwards). These sizes can be seen in Table D2 below.

Table D2 – PV Sizes by Customer Type and PV Type

Customer Type	PV Type	PV size (kW)
Residential	Current	5
Residential	New	7
Small Business	Current	12
Small Business	New	18
Medium Business	Current	26
Medium Business	New	32
Large Business	Current	100
Large Business	New	120

Source: AusNet (2025)

These PV sizes are used in the calculation of PV generation profiles, which go into calculating bill savings and, therefore, battery ROI and uptake.

D.2.4 Battery Sizing

For battery capacity and rated power, Energeia used AusNet's historical solar PV and battery install data. The average residential solar PV and battery sizes (residential batteries assumed to be between 5 and 20kWh) over the last 3 years were calculated. This ratio of PV to battery size was used to scale up the size of the batteries of other customer types. For battery rated power, Energeia assumed residential and small business batteries were 2-hour batteries, and medium and large commercial batteries were 4-hour batteries.

Energeia compared the above calculations and assumptions to what was in the public domain. Tables D3 and D4 below compare the battery capacity and battery rated hours by customer type across different sources.

Table D3 – Comparison of Battery Capacity by Customer Type and Source (kWh)

Source	Residential		Small Business		Medium Business		Large Business	
	2025	2040	2025	2040	2025	2040	2025	2040
Energeia Calculations	10		25		62		212	
CSIRO, Small-Scale Solar and Battery Projections	11	14	20				516	
GEM, Projections for DER	10	15	10	15			500	

Source: Energeia, AusNet (2025), CSIRO (2024), Green Energy Markets (2024)

Table D4 – Comparison of Rated Battery Hours by Customer Type and Source (Hours)

Source	Residential	Small Business	Medium Business	Large Business
Energeia Assumptions	2	2	4	4
CSIRO, Small-scale Solar and Battery Projections	2.1	1.3	1.3	1.3
GEM, Projections for DER	2.5	2.5	2.5	2.5

Source: Energeia, CSIRO (2024), Green Energy Markets (2024)

Based on the comparison charts above, Energeia's battery capacity calculations were reasonable for all customer types with the exception of large businesses. As a result, Energeia updated the large business capacity to 500kWh. The residential battery capacity in both the Commonwealth Scientific Industrial Research Organisation (CSIRO) and GEM reports showed that battery capacity increases with PV size. Because Energeia is using two different sizes for residential systems currently installed (5kW) and residential systems installed during the forecast period (7kW), it was decided to have two different battery sizes, one for currently installed PV and one for newly installed PV.

For the battery rated hours, the decision was made to align with the CSIRO report.

Based on these decisions, the battery sizes used in the uptake calculations can be seen in Table D5 below.

Table D5 – Battery Size Inputs (Rounded to Nearest Whole Number)

Customer Type	PV Type	Battery Capacity (kWh)	Battery Hours	Battery Power (kW)
Residential	Current PV	10	2.1	5
Residential	New PV	14	2.1	7
Small Business	All	25	1.3	19
Medium Business	All	62	1.3	48
Large Business	All	500	1.3	385

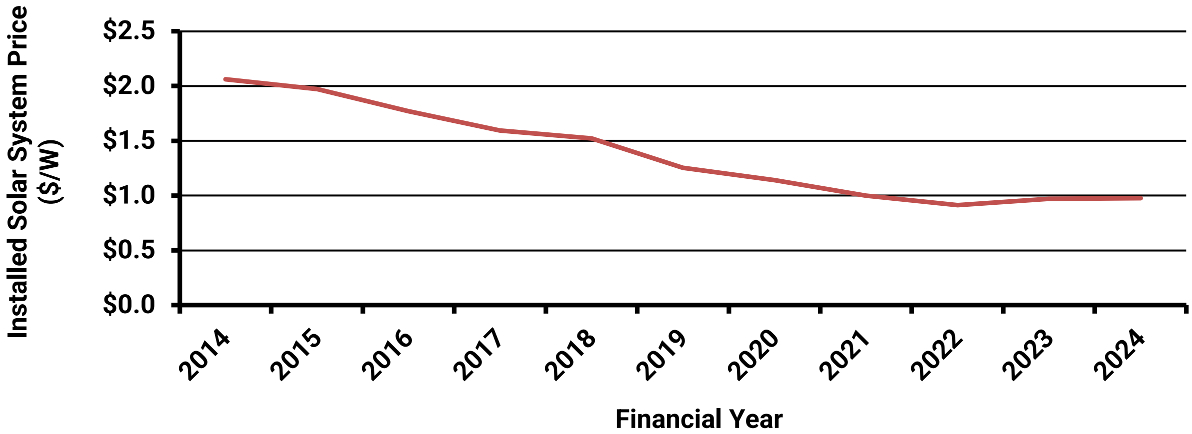
Source: Energeia, AusNet (2025), CSIRO (2024), Green Energy Markets (2024)

These sizes are used in the calculation of electricity bill savings from a battery, which go into the calculation of ROI and battery uptake.

D.2.5 PV Price History

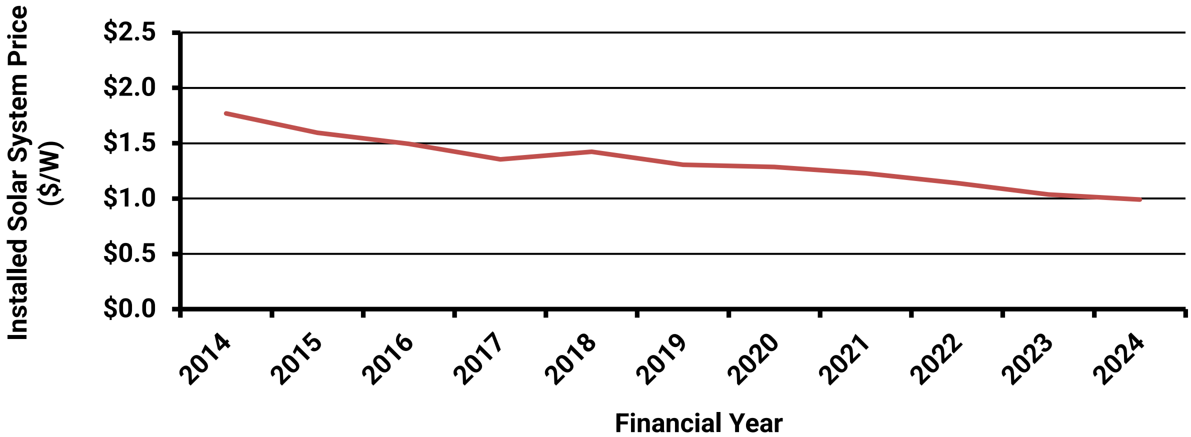
Residential and commercial PV price history was gathered in the public domain from Solar Choice's Solar Panel Price Index. Figure D4 and Figure D5 below show the average cost of solar PV over time in dollars per watt.

Figure D4 – Residential Installed Solar System Price History



Source: Solar Choice (2025)

Figure D5 – Commercial Installed Solar System Price History



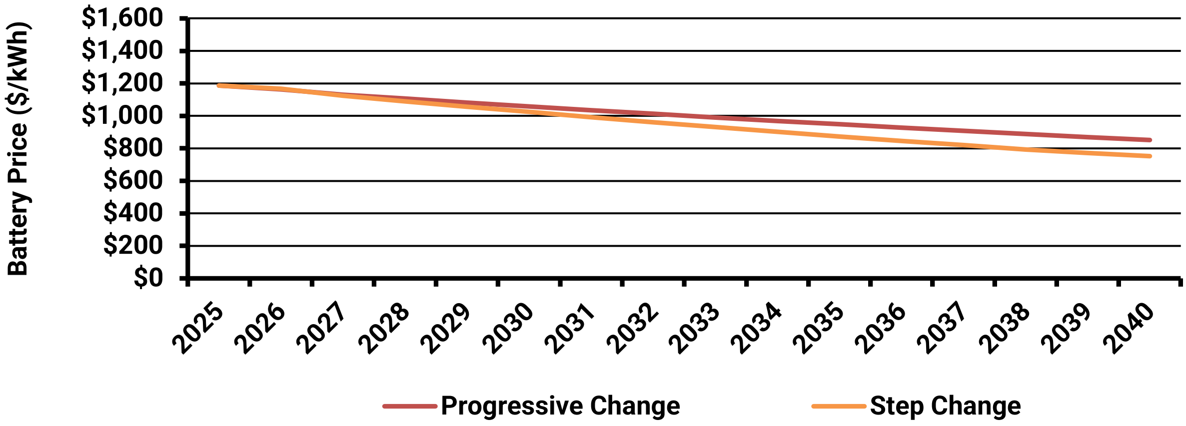
Source: Solar Choice (2025)

PV price history is used in the calculation of the uptake factors of the different customer segments. The numbers above include the impact of incentives.

D.2.6 Battery Price Forecast

The 2025 installed battery price was gathered from the Solar Choice Battery Price Index, using the latest datapoint (May 2025). Beyond 2025, the latest CSIRO Small-Scale Solar PV and Battery Projections report was used to scale the prices over time. Figure D6 shows the installed battery price before incentives.

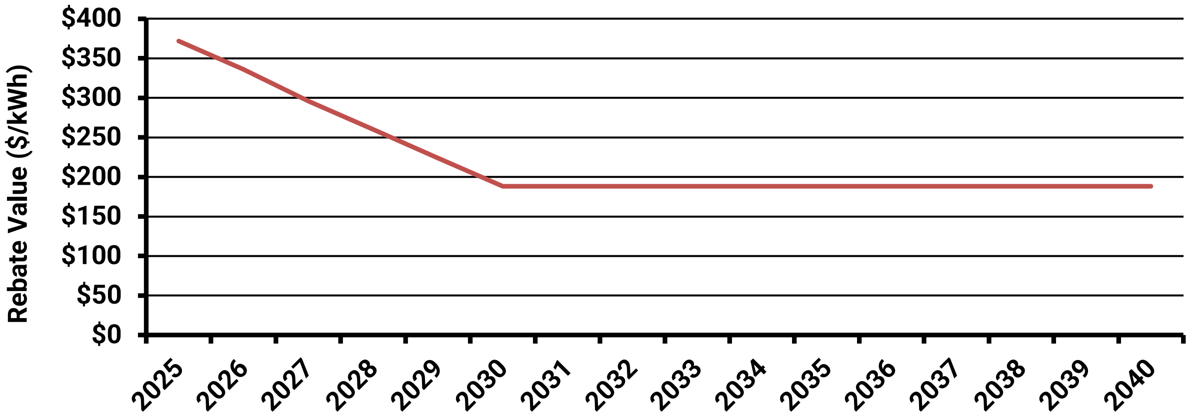
Figure D6 – Battery Price Forecast by Scenario



Source: Solar Choice (2025), CSIRO (2024)

The battery incentive forecast shown in Figure D7 was taken from the Australian Government and is only including the federal Cheaper Homes Battery Program. The Cheaper Home Battery Program is funded through the purchasing of Small-Scale Technology Certificates (STC's), with the number of STC's available per project reducing per year until 2030, resulting in a reduced incentive over time. This program ends at the end of 2030; however, AusNet has advised that it is realistic to assume that the program would be extended beyond 2030. The incentive is assumed to hold its value from 2030 onwards.

Figure D7 – Battery Incentive Forecast



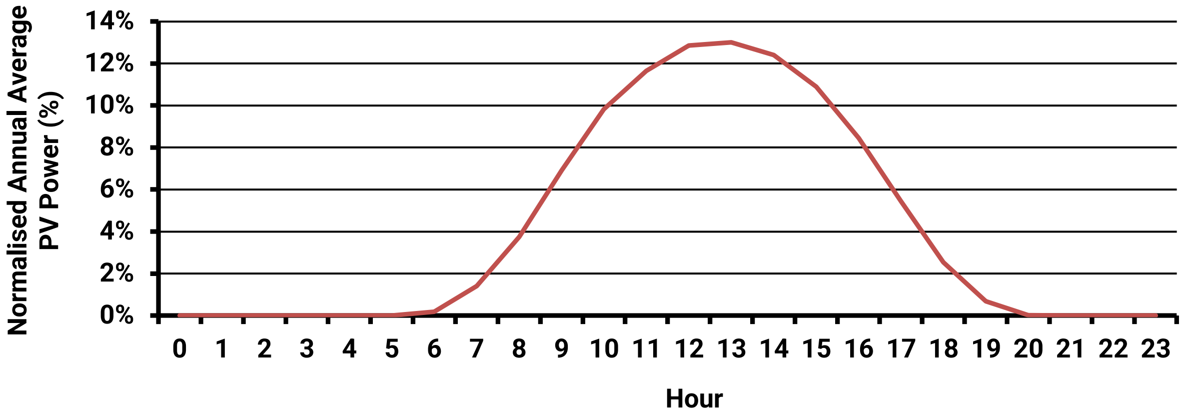
Source: Australian Government (2025)

Both the battery price and battery incentive forecast are used to calculate battery capex and, therefore, battery ROI over time.

D.2.7 PV Generation Profile

PV generation profiles were provided by AusNet in a half-hourly format for 2024. The load profiles were then normalised to develop the shape shown in Figure D8 below.

Figure D8 – Average Day Normalised PV Generation Profile



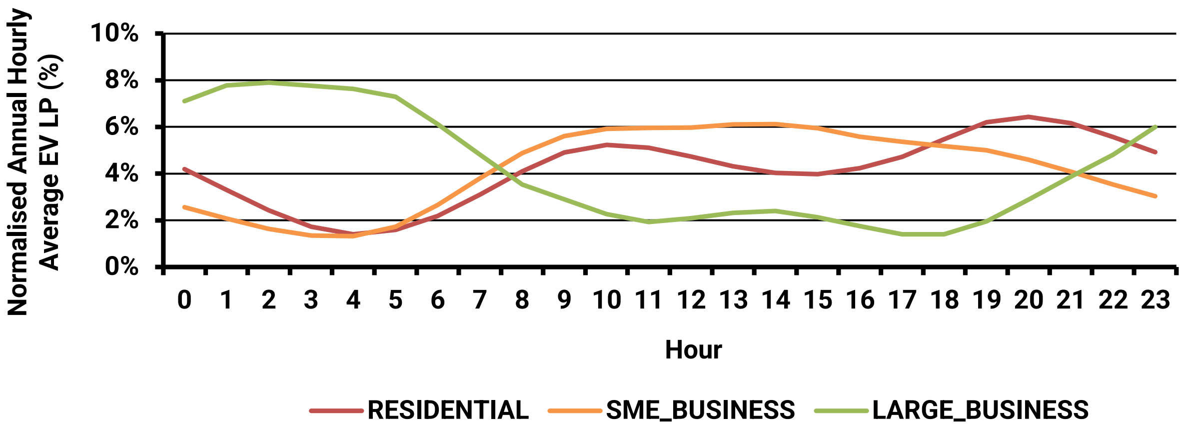
Source: AusNet (2025)

The PV profile is used in the calculation of battery ROI for customers with PV. Based on AusNet's advice, an 85% efficiency factor is also applied when calculating a customer's PV generation profile.

D.2.8 EV Load Profile

EV profiles were provided by AusNet in a half-hourly format for all of 2024. The load profiles were then normalised to develop the shape shown in Figure D9 below.

Figure D9 – Average Day Normalised EV Load Profile by Segment



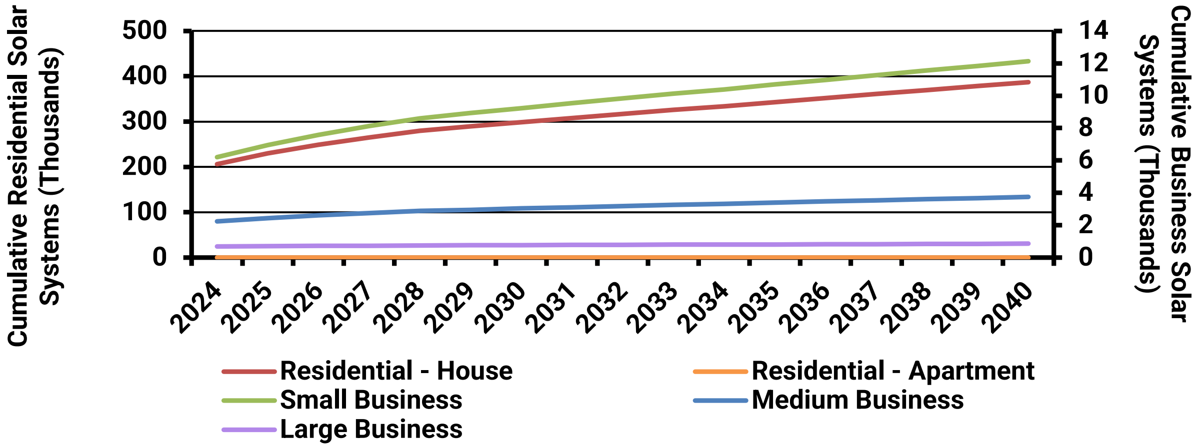
Source: AusNet (2025)

EV profiles are used in the calculation of battery bill savings and, therefore, ROI for customers who have EVs.

D.2.9 PV Uptake Forecast

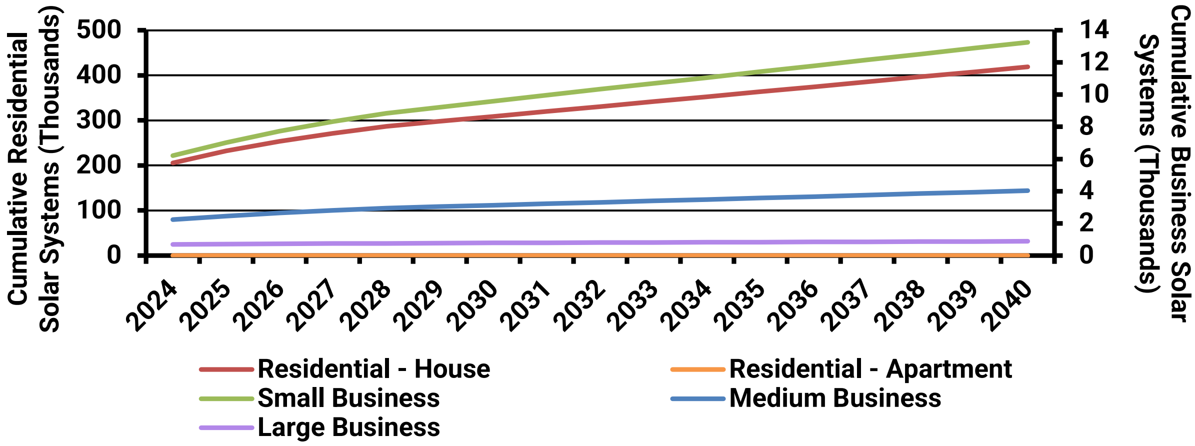
Forecasts of PV uptake were provided by AusNet and contained outlooks of PV uptake by scenario until 2034, after which the forecasts were trended out to 2040. Figure D10 and Figure D11 below show the uptake of PV by customer type for each scenario.

Figure D10 – PV Uptake Forecast by Segment – Progressive Change Scenario



Source: AusNet (2025)

Figure D11 – PV Uptake Forecast by Segment – Step Change Scenario



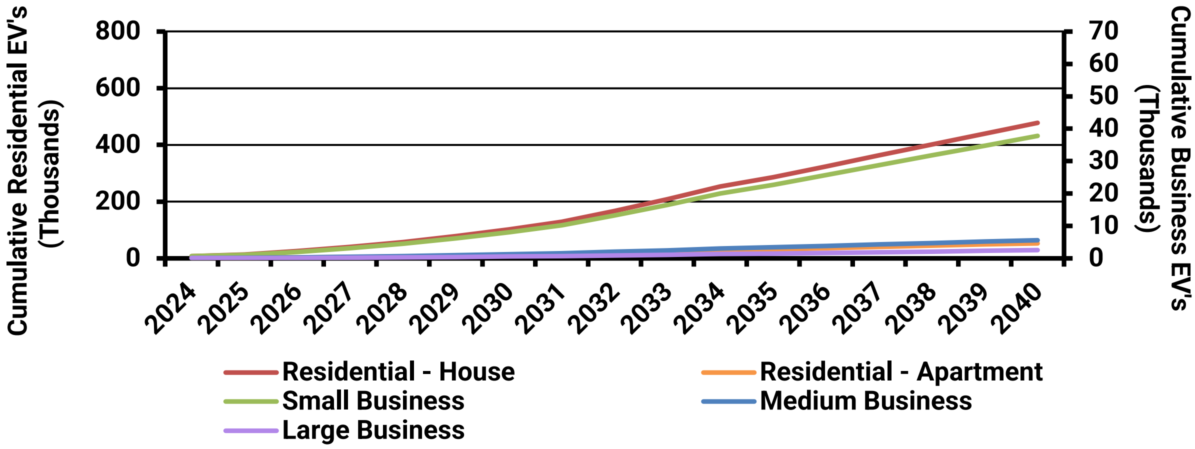
Source: AusNet (2025)

These PV forecasts are used to determine the number of customers in each segment over time.

D.2.10 EV Uptake Forecast

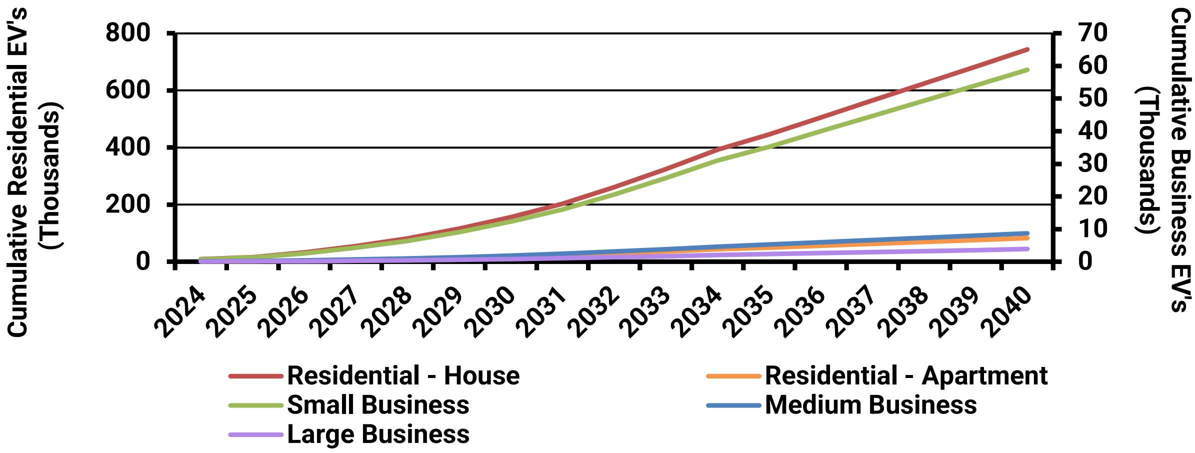
Forecasts of EV uptake were provided by AusNet and contained outlooks of EV uptake by scenario until 2034, after which the forecasts were trended out to 2040. Figure D12 and Figure D13 below show the uptake of EVs by customer type for each scenario.

Figure D12 – EV Uptake Forecast – Progressive Change



Source: AusNet (2025)

Figure D13 – EV Uptake Forecast – Step Change



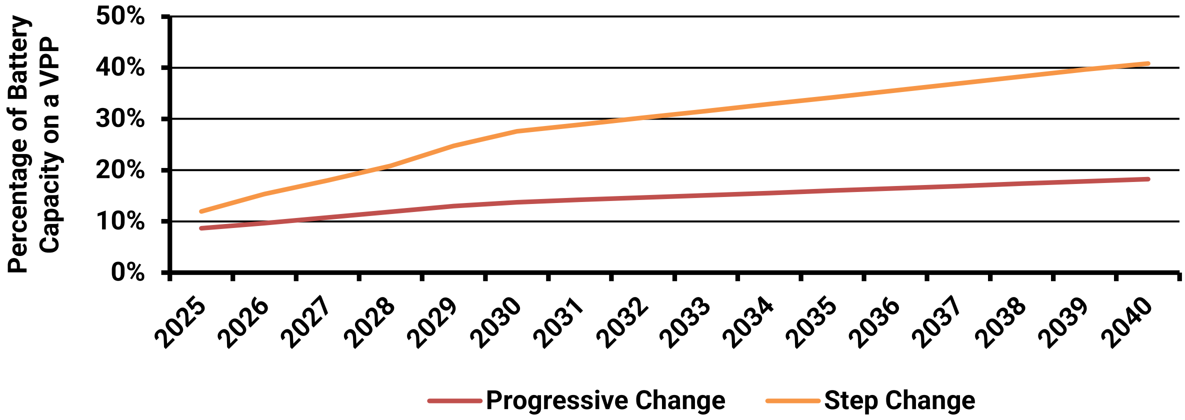
Source: AusNet (2025)

These EV forecasts are used to determine the number of customers in each segment over time.

D.2.11 VPP Enrolment

The VPP enrolment is calculated by dividing the aggregated embedded energy storage capacity by the embedded energy storage capacity in Victorica from the AEMO Integrated System Plan (ISP) 2025 draft inputs and assumptions. This percentage of VPP enrolment by capacity can be seen in Figure D14.

Figure D14 – Percentage VPP Enrolment by Capacity



Source: AEMO (2025)

These inputs are used to scale the total forecast battery capacity in order to calculate AusNet's flexible battery capacity.

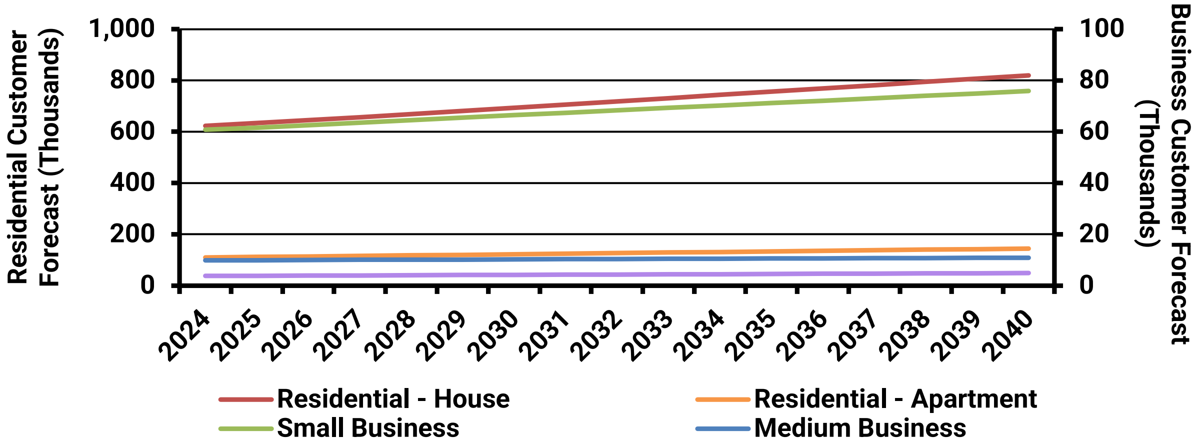
D.3. Customers

This section provides an overview of the input load profiles and customer counts used to model battery ROI.

D.3.1 Forecast Customer Counts

Customer count forecasts by customer class, shown in Figure D15, were provided by AusNet. These customer counts are the same across both scenarios.

Figure D15 – Forecast Customer Counts by Customer Class



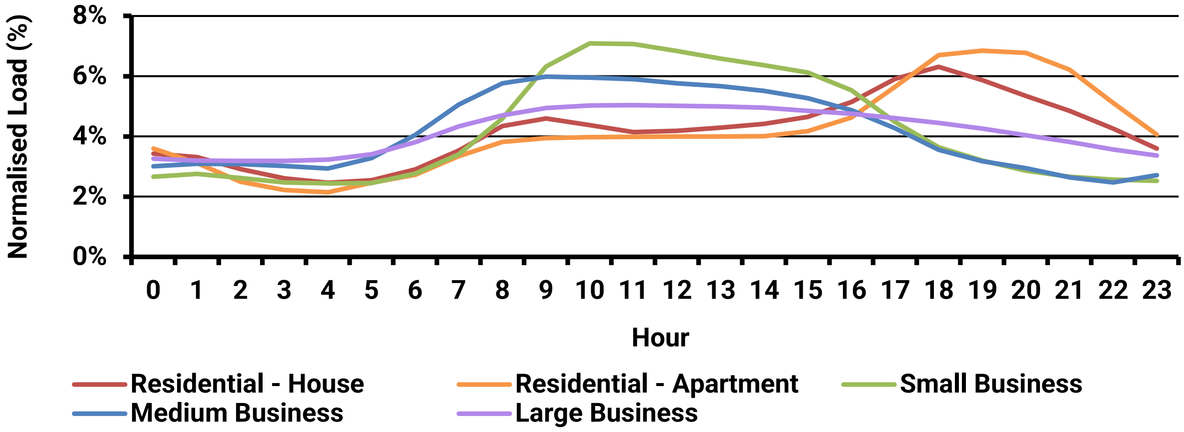
Source: AusNet Client Data

Note that customer counts are not split out by standalone homes and apartments, so a split of 85/15 has been assumed for residential houses vs residential apartments based on the data provided.

D.3.2 Customer Profiles

Customer half-hour load profiles were provided by AusNet and grouped by customer type, then averaged, as shown in Figure D16.

Figure D16 – Average Customer Half-Hourly Load Profiles by Customer Class



Source: AusNet Client Data

Out of these load profiles, five were selected from each customer type (except residential – apartment, whose uptake of batteries was considered negligible) and used to model battery ROI.

D.4. Tariffs and Pricing

This section provides an overview of the pricing inputs and applicable tariff structures used to model the battery uptake of each customer class.

D.4.1 Tariff Types and Customer Assignments

Battery uptake by customer class was modelled by assigning a split of customers within each class to one of three tariff types: inclining block, time-of-use energy, or time-of-use maximum demand. The proportion of customers on each tariff within each class was based on actual customer counts from AusNet's tariff data for 2025, summarised in Table D6.

Table D6 – Tariff Customer Splits by Customer Class and Tariff Type

Segment	Tariff Type	Starting Split
Residential	IBT	65%
	ToU kWh	35%
	ToU MD	0%
Small Business	IBT	40%
	ToU kWh	60%
	ToU MD	0%
Medium Business	IBT	0%
	ToU kWh	0%
	ToU MD	100%
Large Business	IBT	0%
	ToU kWh	100%
	ToU MD	0%

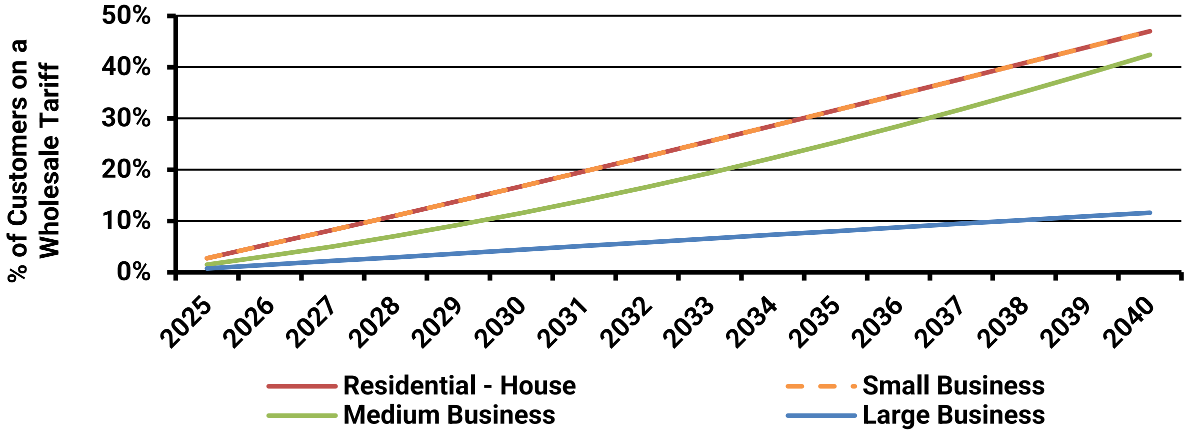
Source: AusNet Client Data

Based on the data provided by AusNet, most residential and small business customers were either on an IBT or ToU energy tariff, while medium business customers were on a demand tariff. Noting that all large business customers were assigned to an energy ToU tariff which also included a capacity charge (based on transformer rating) and demand tariff (based on 5 critical peak demand days per year).

D.4.2 Wholesale Tariff Uptake

Wholesale tariffs are accessible to each customer class through Amber Electric and allow individual customers to purchase and sell energy at the wholesale spot price. The forecast uptake of customers on the Amber electric tariff, shown in Figure D17, was trended based on two different inflection points in the historical data as a proxy for future growth, due to limited historical data on the tariff's uptake.

Figure D17 – Estimated Forecast Amber Electric Tariff Uptake by Customer Class



Source: AusNet Client Data

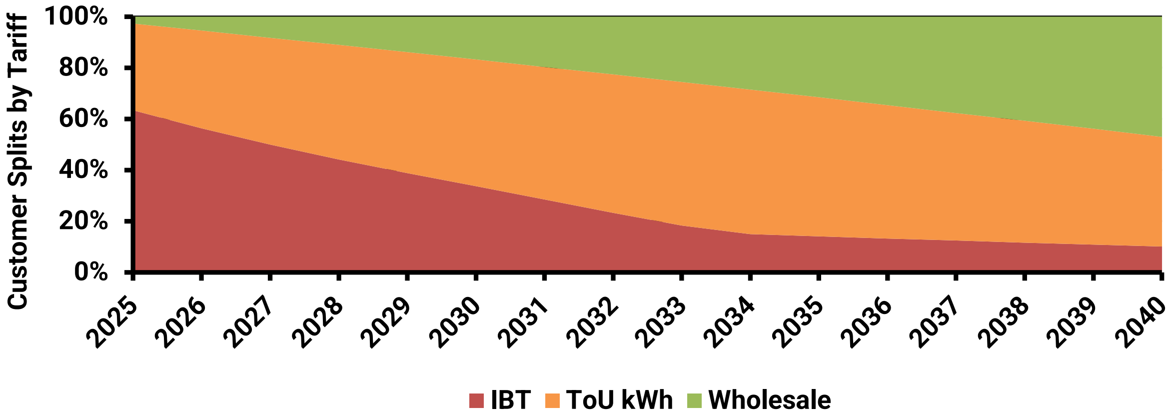
Medium and large business customers are trended from the first inflection point, which marks a sharp increase in Amber tariff uptake, reflecting a more proactive or price-responsive adoption pattern often seen in larger businesses. In contrast, residential and small business customers are trended from the second, more moderate inflection point, to reflect a slower, more cautious uptake consistent with typical consumer behaviour. After seeing the results of the residential uptake, it was decided by AusNet that the uptake was unrealistically high, so it was assumed that residential uptake is aligned to small business uptake.

D.4.3 Annual Residential Splits by Tariff Type

The split of customers by tariff is important in the calculation of battery uptake, as ROI varies widely by tariff.

Energeia calculated the number of customers by tariff using AusNet's provided splits for 2025, as well as AusNet's tariff transition strategy in their most recent tariff structure statement (TSS), which stated that new connections, EV customers, and new solar customers will be assigned to a ToU tariff by default. As well as the switching between IBT and ToU tariffs, there is also a calculated rate of wholesale tariff uptake that influences the splits of tariffs used. Figure D18 shows the split of tariff types for residential customers (living in a house) over time.

Figure D18 – Split of Residential (House) Tariffs Over Time



Source: Energeia, AusNet (2025)

These tariff splits are used to calculate the number of customers on which to apply the battery ROIs and, therefore, calculate the annual battery uptake.

D.4.4 Wholesale Tariff Peak Periods

Wholesale tariff peak periods, illustrated as a heat map in Table D7 and Table D8 by day type, show the average tariff rate by month and hour. Energeia used a cutoff of 20c/kWh to allocate peak periods, with any negative price periods being assigned to super off-peak.

Table D7 – Wholesale Tariff ($/kWh) Heat Map – Weekday

Month	January 1	February 2	March 3	April 4	May 5	June 6	July 7	August 8	September 9	October 10	November 11	December 12
0	$0.09	$0.09	$0.06	$0.10	$0.08	$0.13	$0.12	$0.08	$0.03	$0.05	$0.11	$0.10
1	$0.08	$0.08	$0.06	$0.09	$0.07	$0.12	$0.10	$0.07	$0.03	$0.04	$0.09	$0.09
2	$0.07	$0.07	$0.05	$0.09	$0.07	$0.11	$0.09	$0.05	$0.02	$0.04	$0.09	$0.08
3	$0.07	$0.07	$0.06	$0.09	$0.07	$0.11	$0.09	$0.04	$0.02	$0.04	$0.09	$0.09
4	$0.08	$0.08	$0.06	$0.08	$0.07	$0.11	$0.10	$0.05	$0.01	$0.04	$0.10	$0.09
5	$0.10	$0.12	$0.09	$0.10	$0.08	$0.13	$0.12	$0.07	$0.02	$0.07	$0.11	$0.10
6	$0.07	$0.13	$0.13	$0.14	$0.11	$0.19	$0.17	$0.13	$0.06	$0.06	$0.09	$0.05
7	$0.03	$0.06	$0.08	$0.10	$0.16	$0.25	$0.23	$0.43	$0.04	$0.02	$0.07	$0.03
8	$0.01	$0.04	$0.05	$0.06	$0.11	$0.22	$0.21	$0.73	$0.01	-$0.01	$0.03	$0.01
9	-$0.01	$0.01	$0.03	$0.03	$0.07	$0.20	$0.19	$0.21	-$0.01	-$0.03	$0.01	-$0.01
10	-$0.02	$0.02	$0.01	$0.01	$0.05	$0.16	$0.15	$0.02	-$0.02	-$0.04	$0.00	-$0.01
11	-$0.02	$0.02	$0.01	$0.01	$0.04	$0.13	$0.12	$0.00	-$0.02	-$0.05	-$0.02	-$0.01
12	-$0.02	$0.01	$0.01	$0.01	$0.03	$0.14	$0.11	$0.00	-$0.03	-$0.06	$0.00	-$0.01
13	-$0.03	$0.02	$0.02	$0.00	$0.04	$0.14	$0.11	$0.00	-$0.02	-$0.06	$0.01	-$0.01
14	-$0.01	$0.04	$0.03	$0.02	$0.04	$0.15	$0.11	$0.02	-$0.01	-$0.05	$0.01	$0.00
15	$0.02	$0.06	$0.05	$0.04	$0.07	$0.17	$0.12	$0.03	-$0.01	-$0.03	$0.01	$0.02
16	$0.03	$0.07	$0.07	$0.09	$0.12	$0.24	$0.19	$0.10	$0.02	$0.00	$0.05	$0.04
17	$0.04	$0.10	$0.11	$0.15	$0.16	$0.31	$0.30	$0.71	$0.08	$0.07	$0.10	$0.06
18	$0.08	$0.16	$0.14	$0.16	$0.15	$0.26	$0.49	$0.52	$0.12	$0.12	$0.13	$0.12
19	$0.10	$0.30	$0.13	$0.13	$0.14	$0.22	$0.20	$0.25	$0.10	$0.11	$0.13	$0.14
20	$0.09	$0.13	$0.11	$0.13	$0.12	$0.20	$0.18	$0.12	$0.08	$0.08	$0.13	$0.12
21	$0.09	$0.12	$0.10	$0.12	$0.12	$0.18	$0.16	$0.11	$0.07	$0.07	$0.12	$0.12
22	$0.08	$0.11	$0.08	$0.11	$0.11	$0.16	$0.13	$0.08	$0.06	$0.06	$0.11	$0.11
23	$0.09	$0.11	$0.09	$0.11	$0.10	$0.15	$0.13	$0.08	$0.05	$0.06	$0.12	$0.12

Source: AusNet Data, Note: Red dashed line indicates peak periods, while blue represents super off-peak

Table D8 – Wholesale Tariff ($/kWh) Heat Map – Weekend

Month	January 1	February 2	March 3	April 4	May 5	June 6	July 7	August 8	September 9	October 10	November 11	December 12
0	$0.09	$0.07	$0.10	$0.07	$0.07	$0.14	$0.09	$0.11	$0.01	$0.05	$0.09	$0.12
1	$0.09	$0.06	$0.09	$0.06	$0.06	$0.12	$0.07	$0.10	$0.00	$0.04	$0.08	$0.11
2	$0.08	$0.04	$0.09	$0.05	$0.05	$0.11	$0.07	$0.09	$0.00	$0.03	$0.07	$0.09
3	$0.07	$0.03	$0.09	$0.04	$0.05	$0.11	$0.06	$0.09	$0.00	$0.02	$0.06	$0.09
4	$0.08	$0.03	$0.08	$0.05	$0.05	$0.11	$0.06	$0.10	-$0.01	$0.02	$0.06	$0.09
5	$0.07	$0.06	$0.08	$0.06	$0.06	$0.12	$0.06	$0.10	$0.00	$0.03	$0.06	$0.07
6	$0.02	$0.03	$0.09	$0.06	$0.07	$0.14	$0.10	$0.12	$0.01	$0.01	$0.04	$0.00
7	-$0.01	-$0.02	$0.04	$0.04	$0.07	$0.15	$0.13	$0.13	-$0.02	-$0.03	$0.03	-$0.03
8	-$0.02	-$0.03	$0.01	$0.02	$0.04	$0.14	$0.14	$0.12	-$0.03	-$0.04	$0.03	-$0.04
9	-$0.02	-$0.03	$0.00	$0.00	$0.02	$0.12	$0.13	$0.09	-$0.04	-$0.06	$0.00	-$0.04
10	-$0.02	-$0.04	-$0.01	-$0.01	$0.00	$0.11	$0.09	$0.06	-$0.05	-$0.07	-$0.02	-$0.04
11	-$0.01	-$0.03	-$0.01	-$0.01	$0.00	$0.09	$0.06	$0.02	-$0.05	-$0.07	-$0.01	-$0.05
12	$0.01	-$0.03	-$0.01	-$0.01	$0.00	$0.08	$0.03	$0.01	-$0.05	-$0.09	-$0.02	-$0.07
13	$0.01	-$0.03	-$0.01	-$0.01	$0.00	$0.09	$0.03	$0.02	-$0.06	-$0.10	-$0.01	-$0.08
14	$0.04	-$0.02	$0.01	-$0.01	$0.00	$0.11	$0.04	$0.03	-$0.05	-$0.07	-$0.02	-$0.04
15	$0.06	$0.01	$0.03	$0.02	$0.02	$0.13	$0.07	$0.06	-$0.05	-$0.04	$0.00	-$0.02
16	$0.07	$0.04	$0.04	$0.07	$0.06	$0.21	$0.16	$0.11	-$0.02	$0.00	$0.02	$0.00
17	$0.07	$0.08	$0.07	$0.12	$0.10	$0.24	$0.21	$0.16	$0.02	$0.07	$0.07	$0.02
18	$0.12	$0.12	$0.08	$0.14	$0.10	$0.23	$0.21	$0.18	$0.04	$0.10	$0.10	$0.08
19	$0.14	$0.12	$0.07	$0.12	$0.09	$0.19	$0.18	$0.16	$0.04	$0.09	$0.12	$0.12
20	$0.12	$0.09	$0.06	$0.12	$0.08	$0.19	$0.17	$0.15	$0.03	$0.07	$0.11	$0.11
21	$0.11	$0.07	$0.06	$0.11	$0.07	$0.18	$0.15	$0.14	$0.03	$0.07	$0.10	$0.12
22	$0.11	$0.07	$0.06	$0.10	$0.06	$0.16	$0.14	$0.12	$0.01	$0.05	$0.09	$0.11
23	$0.10	$0.07	$0.06	$0.09	$0.06	$0.15	$0.12	$0.12	$0.01	$0.06	$0.08	$0.10

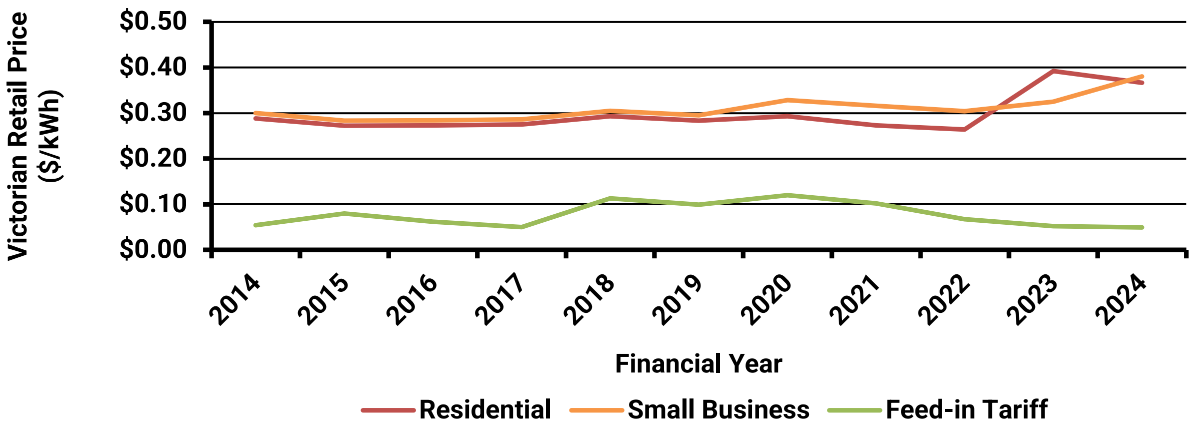
Source: AusNet Data, Note: Red dashed line indicates peak periods, while blue represents super off-peak

These tariff periods (along with the ToU network tariff periods) dictate how a customer's battery is cycled—discharging during peak periods and charging during super off-peak periods—to maximise revenues.

D.4.5 Retail Electricity Price History

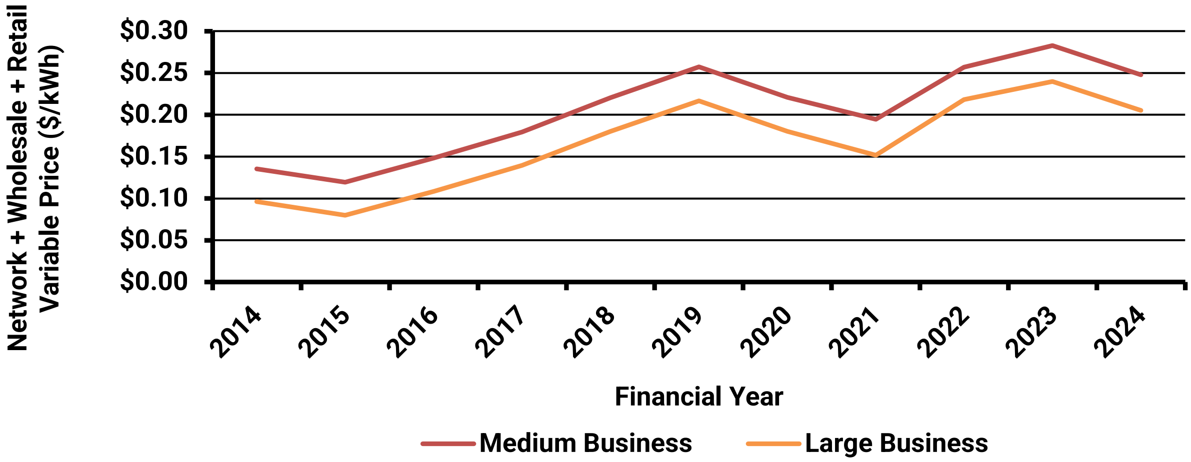
Historical electricity prices, shown in Figure D18 and Figure D19 by customer class, represent AusNet's retail market offers and are used to calculate the PV uptake factors against historical PV uptake in AusNet's network.

Figure D19 – Retail Electricity Price History for Residential and Small Business Customers



Source: AEMC (2014-2025), ECA (2024)

Figure D20 – Retail Electricity Price History for Medium and Large Business Customers



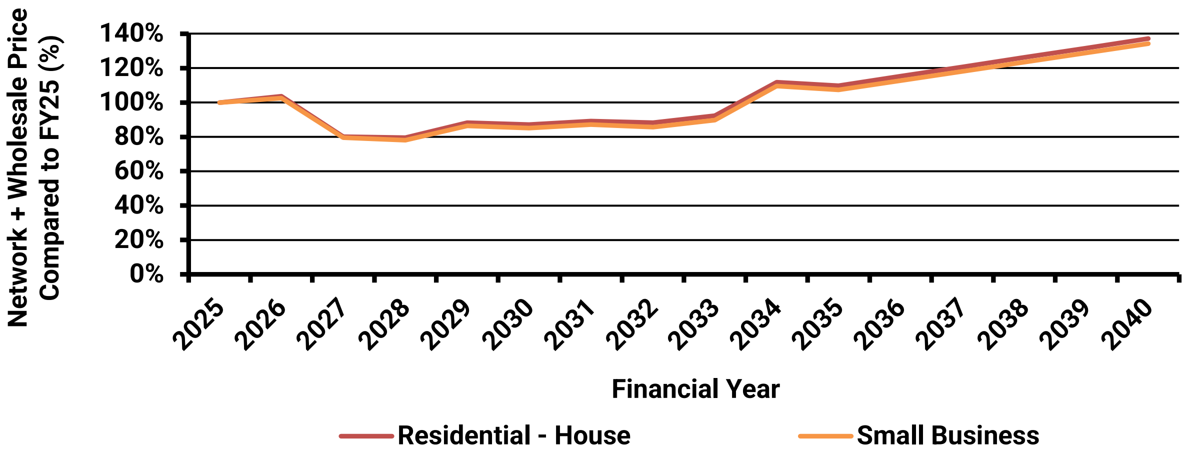
Source: Energeia Research

D.4.6 Retail Electricity Price Forecast

Retail electricity price forecasts, shown in Figure D20 and Figure D21 by customer class, are split into a wholesale and network price components, as some tariffs provide direct exposure to wholesale prices, therefore requiring separate modelling to accurately reflect the structure of these tariffs.

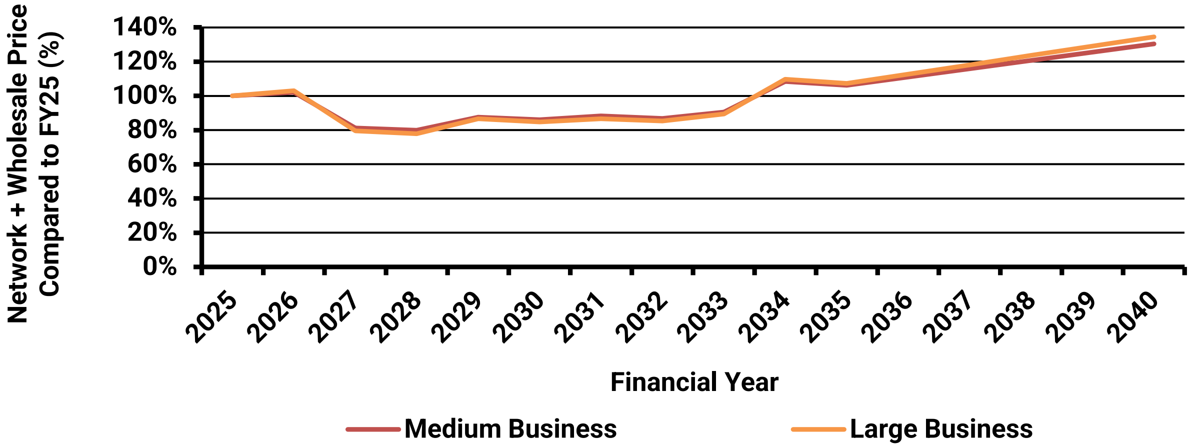
The network component of the price growth is based on the forecast of annual bills to FY30, as outlined in AusNet's most recent EDPR. Network prices are extrapolated beyond FY31 due to the absence of publicly available data. Wholesale price trends are sourced from the Australian Energy Market Commission (AEMC) Residential Electricity Price Trends report and are trended after 2034.

Figure D21 – Residential and Small Business Retail Electricity Price Forecast (Indexed to FY25)



Source: AusNet EDPR (2025), AEMC (2024)

Figure D22 – Medium and Large Business Retail Electricity Price Forecast (Indexed to FY25)



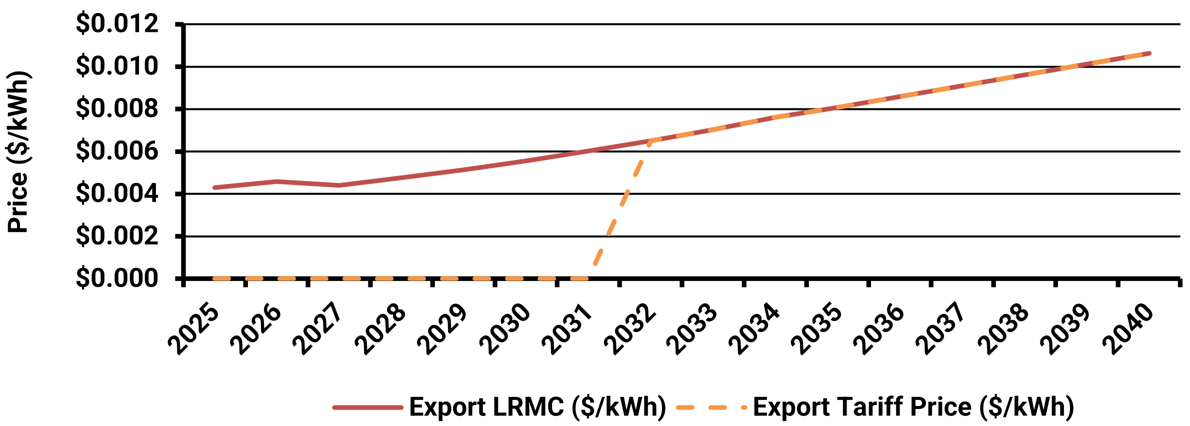
Source: AusNet EDPR (2025), AEMC (2024)

Total retail electricity prices largely follow the same trends as they are both fairly heavily dictated by wholesale prices.

D.4.7 Export Tariff

The forecast export tariff, shown in Figure D22, is assumed to remain flat until the end of the current regulatory cycle in FY31, after which it is set to equal the export long run marginal cost (LRMC), which is modelled to grow in line with AusNet's revenue forecast.

Figure D23 – Export Tariff Price Forecast



Source: AusNet (2025)

The export tariff price is used to model bill savings from a battery and therefore battery ROI and uptake.

Appendix E – About Energeia

Energeia was founded in 2009 and has grown to become one of the largest specialist energy consultancies in Australia. Energeia specialises in providing advisory and technical services in the following areas:

- Energy policy and regulation
- Smart networks and smart metering
- Energy storage
- Electric vehicles and charging infrastructure
- Distributed generation and storage technologies
- Network planning and design
- Demand management and energy efficiency
- Energy product development and pricing
- Wholesale and retail electricity markets

Energeia delivers its services across three lines of business:

- **Proprietary Research** – We provide in-depth reports on Distributed Energy Resources related markets and technologies of strategic interest, including EVs, solar PV and storage, smart grids, microgrids, energy efficiency and home energy management
- **uSim and wSim Utility and Market Simulators** – We have developed industry-leading utility simulation software that models customer behaviour, bills, DER adoption, 17520 load profiles, utility sales, capex, opex, rates and financial performance, on an integrated basis
- **Professional Services** – We offer tailored services in the areas of rate and incentive design, cost of service analysis, DER and load forecasting, system planning, and DER technology-related strategy and plan development.

We are organised into research, consulting and software development functional units, but there is significant cross-over between the working groups due to the significant quantitative analysis that we perform on behalf of our clients, much of which requires custom tooling.

- The software development working group is responsible for the development of our utility simulation tool, uSim
- The consulting and research team are responsible for delivering Energeia's proprietary research reports and professional services

Our purpose is to find better ways to power humanity now and tomorrow.

Energeia History

Energeia was founded Sydney, Australia in 2009 to pursue a gap foreseen in the professional services market for specialist information skills, and expertise that would be required for the energy 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.

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