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Draft 2026 Forecasting Assumptions Update

Submission to AEMO, 2 February 2026

The Centre for Applied Energy Economics and Policy Research (CAEEPR) is a collaborative partnership between Griffith Business School and energy sector participants in Australia's National Electricity Market.

CAEEPR aims to maximise the energy sector's potential to achieve emission reductions and contribute to inclusive, sustainable, and prosperous businesses and communities while building capacity in electricity economics. CAEEPR uses a national electricity market model to develop and analyse different scenarios to assess different policy positions for generator dispatch and transmission efficiency.

CAEEPR's sub aims/objectives that are most relevant to this submission:

- Supporting the transition to more sustainable and less carbon-intensive power generation and transmission system and address the accompanying policy, economic, technical and political challenges within the industry.
- Provide thought leadership and industry engagement strategies that our members can design and deliver best practice energy services with reduced emissions.
- Create and uphold advanced Electricity Market models for analysing wholesale spot and future markets, power system reliability, integration of dispatchable and intermittent resources, and network capacity adequacy.

This submission has been prepared by Andrew Fletcher who is an Industry Adjunct Research Fellow at CAEEPR. The views expressed in this submission are entirely the author's and are not reflective of CAEEPR.

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Introduction

I welcome the opportunity to provide feedback on the Draft 2026 Forecasting Assumptions Update. This submission provides detailed feedback to AEMO, CSIRO and Green Energy Markets, identifying several opportunities to improve accuracy, transparency and policy-alignment of consumer energy resource (CER) projection modelling. The aggregate impact of incorporating policy changes and addressing issues identified in this submission is likely to negatively impact rooftop solar PV and CER BESS uptake projections. Updating these assumptions is critical to ensuring that AEMO's forecasts remain credible and useful for stakeholders

AEMO and consultant's rooftop solar PV and CER BESS projections are outdated and final versions should be updated to reflect recent policy developments such as changes to the Cheaper Home Batteries program and the announcement of the Solar Sharer Offer. Flow on effects from the Solar Share Offer are expected to include increased awareness, offering by retailers and take up by customers of retail tariffs with zero or low middle of the day prices. Retail tariff prices and structure are key drivers of CER paybacks and uptake and transparency of these assumptions should be improved and retail tariffs with zero or low middle of the day price periods included in modelling.

The following key changes to rooftop solar PV and CER BESS uptake projections should be made in final versions:

- Data from AEMO's Distributed Energy Resources Register of DNSPs should be used to inform battery duration assumptions, rather than a harmonised generic assumption of 2.5hrs.
- The battery cycling assumptions, including the 90% for Step Change for a 20kWh-25kWh CER BESS, is highly aggressive and unrealistic for the average household load of 18kWh. This assumption should be informed by modelling based on actual household load traces.
- Modelling assumptions should incorporate regional variation in rooftop solar PV self-consumption and battery cycling due to differences in load and its correlation with rooftop solar PV generation.
- The impact of network connection export limits for Queensland, where there isn't a dynamic connection mandate, should be incorporated.
- Paybacks should be disclosed based on different assumed retail tariff structures, including for standalone rooftop solar PV, standalone CER BESS and hybrid systems.

Changes are recommended to improve the accuracy of electric vehicle load projections by better incorporating losses and seasonality in charging loads:

- Variation in charger efficiency (losses) by type should be incorporated and whether phantom battery drain is included should be clearer.
- Seasonality in travel should be better integrated, while the impact of temperature on electric vehicle efficiency due to battery performance and air conditioning should be modelled.

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1. Draft 2026 Forecasting Assumption Update Report

1.1 2026 EESO Step Change scenario

Matters for consultation

- Do stakeholders support the proposed approach to continue to apply battery uptake trends projected for the 2025 IASR, adjusted to acknowledge sales outcomes to date from the CHBP and WA Residential Battery Scheme in the 2026 ESOOs?

Recommendation: AEMO's proposed approach of applying battery uptake trends projected for the 2025 IASR adjusted for recent sales outcomes is not supported. Up to date projections should be produced for final projections and reports.

There isn't a clear rationale as to why out of date modelling would be used. AEMO is encouraged to update final projections and reports to account for the impact of recent changes to the Cheaper Home Batteries Program and the announcement of the Solar Sharer Offer, as well as for regional variation in CER economics and other issues identified in this submission.

1.2 2026 EESO Step Change scenario – higher CER BESS sensitivity

Matters for consultation

- Do stakeholders support the potential inclusion of sensitivity analysis that extends recent sales, reflecting the assumed effect of the subsidy programs, to examine insights regarding potential reliability improvements in the ESOOs? By applying this as a sensitivity on Step Change, the ESOO formal reliability assessments would adopt battery uptake trends observed over a longer history, potentially lowering the reliability contribution from consumer batteries.

Recommendation: The inclusion of sensitivity analysis with higher CER BESS uptake is supported, provided relevant supporting analysis and commentary is also provided.

In reporting the result of this sensitivity AEMO is encouraged to discuss:

- CER BESS kW and kWh assumptions and their source
- What proportion of Solar Shift, TOU and VPP operating profiles are assumed for CER BESS
- Cycling percentage modelling outcomes for each of these CER BESS operating profiles
- Energy storage derating assumption for VPP and any SRMC (variable cost) assumed (2025 EESO PLEXOS model assumes $1,000/MWh, which doesn't appear to be documented)
- Contribution of each CER BESS operating profiles to meeting peak demand, including compared to rated capacity.

It is noted that the author's 2025 Forecast Improvement Plan Consultation Submission identifies a range of potential improvement to the modelling of CER BESS operating profiles, which may reduce their contribution to reliability and meeting peak demand. These improvements relate to both Solar Shift and VPP operating profiles and impacts of implementing these improvements would be magnified in the higher CER BESS uptake sensitivity.

1.3 Rooftop solar PV and CER BESS projections

Matters for consultation

- Are the changes in distributed PV forecasts presented here considered appropriate, both in terms of level and shape of the trajectories?

Recommendation: AEMO is encouraged to update final projections and reports to account for changes to the Cheaper Home Batteries Program and the announcement of the Solar Sharer Offer, as well as for regional variation in CER economics and other issues identified in this submission.

These issues impact the accuracy of consultant and AEMO's projections and in aggregate have the potential to materially reduce the level of future rooftop solar PV and CER BESS installations.

1.3.1 Policy changes

Recommendation: Incorporate impact of Cheaper Home Batteries Program and the Solar Sharer Offer

Figure 1 and Figure 2 show the material reduction in Cheaper Home Battery Program subsides from May 2025 due to recently announced changes, particularly for large batteries. An example of the large impact of these changes is that the author is aware of an installer offering a fixed price contract for a stackable battery, with 42kWh of storage if installed up to and including Aprill 2026 and 28kWh if installed afterwards.

The Solar Share Offer is a generally available electricity offer with a daily $0/kWh window during a specific period of the day, to be made available from 1 July 2026 in areas covered by the Default Market Offer (Department of Climate Change, Energy, the Environment and Water, 2025B). Current uptake of Time of Use tariffs across the NEM may be very low with 99% of Ergon Retail's (regional Queensland) residential customer on standard flat-rate tariffs despite Time of Use tariffs being available for many years, including a 'solar soaker' Time of Use tariff with low middle of the day prices being introduced in 2023 (Energy Queensland, 2025). The Solar Sharer Offer may have flow on impacts of greater offering and awareness and uptake by customers of retail tariffs with low or zero middle of the day price periods. Other recent development supporting an increased uptake of such tariffs include:

- Network tariffs with a low middle of the day price periods (solar soak) becoming more common, including Energex (South East Queensland) making such a tariff available from 1 July 2025 (Energex, 2025).
- Increase in retailers offering tariffs with low or zero middle of the day price periods (some of which required proof of electric vehicle registration) including OVO, GloBird Energy, AGL, Ergon Retail, Powershop and Red Energy (Wattever, 2025).
- Unexpected rapid increase in CER BESS installs driven by Cheaper Home Batteries Program, with it anticipated that BESS owners are more likely to be EV owners, with a reasonable portion financially incentivised to move to tariff structures with low or zero middle of the day price periods.

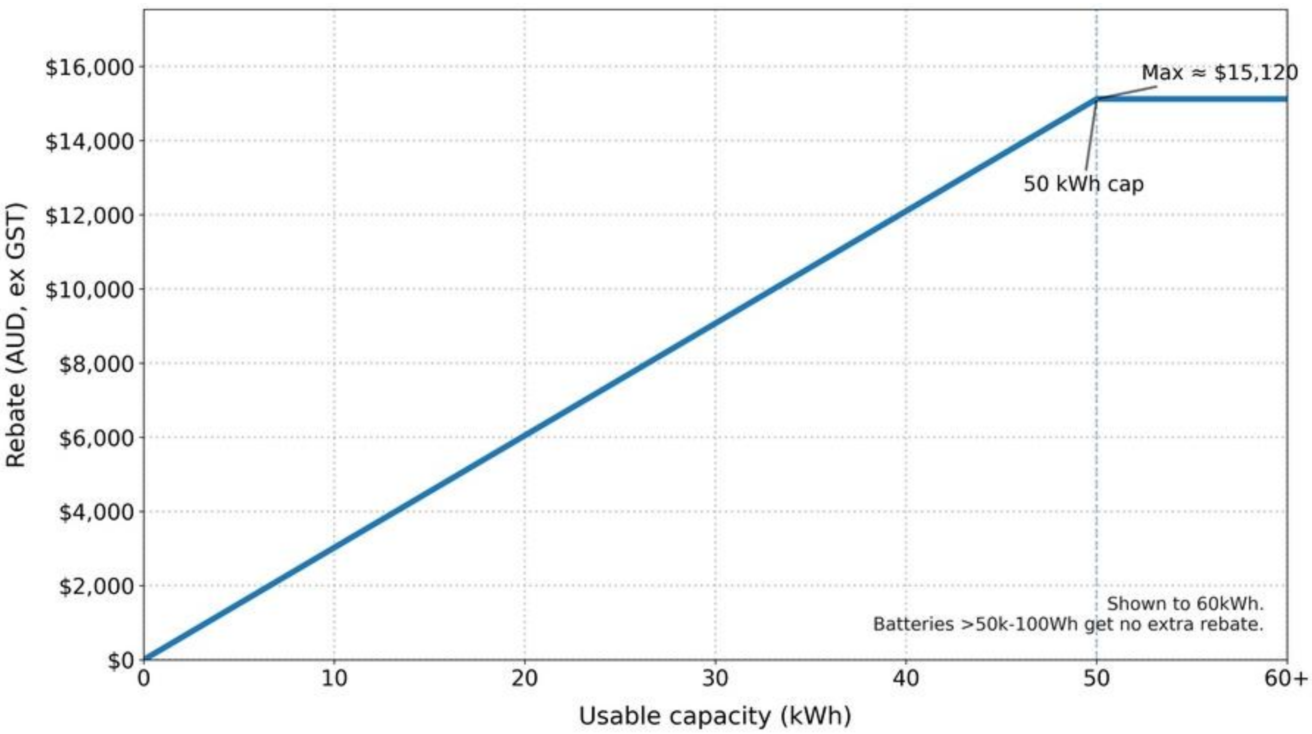

Figure 1: Federal Battery Rebate After Typical Administration Costs vs Usable Capacity (Jan-Apr 2026) │ Source: (SolarQuotes, 2026)

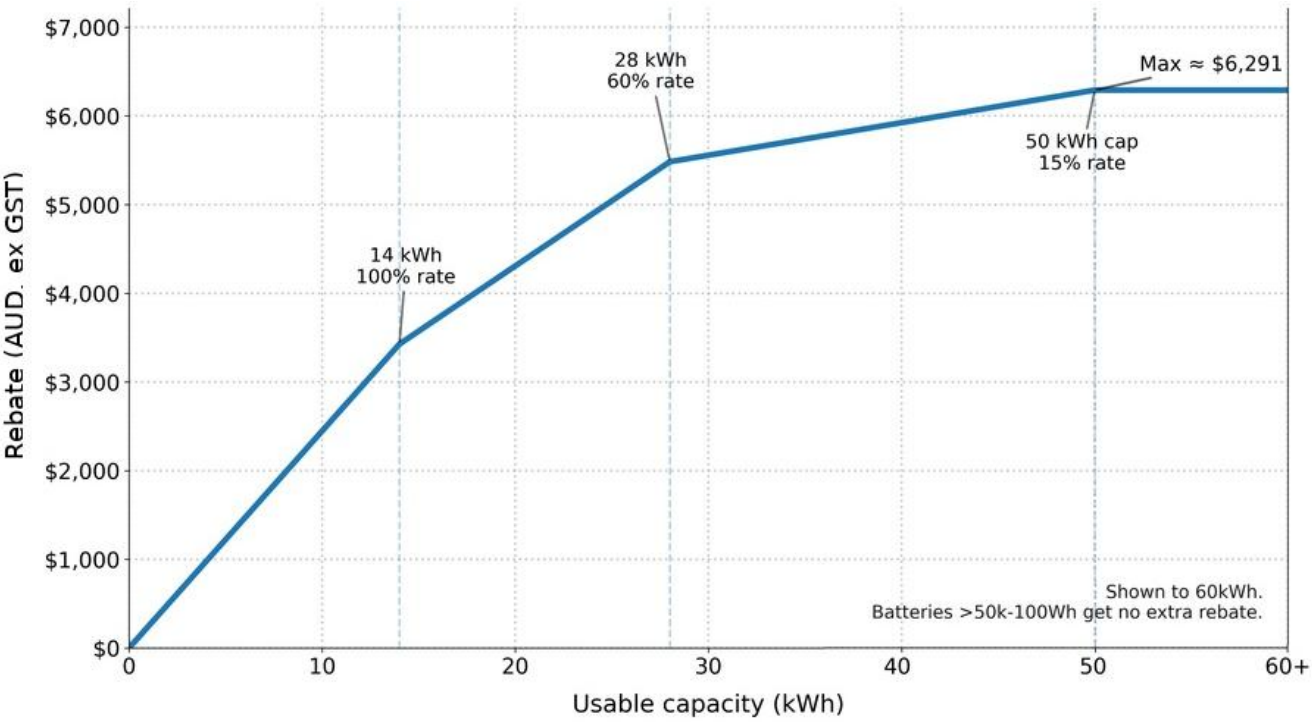

Figure 2: Federal Battery Rebate After Typical Administration Costs vs Usable Capacity (May-Dec 2026) │ Source: (SolarQuotes, 2026)

1.3.2 Regional variation in CER economics

Recommendation: Incorporate regional variation in electricity prices and household loads

Detailed modelling of CER and energy efficiency investment economics by IEEFA (Gordon, 2025), demonstrates the importance of regional variation in CER economics, particularly driven by the quantum of household load and its seasonality, variability and correlation with rooftop solar PV solar generation as well as its capacity factor.

While AEMO and consultant projections capture some regional variation, for instance due to differences in solar PV generation capacity factors, it appears that several simplifying assumptions have been made, which act to limit regional variations:

- AEMO, Green Energy Markets and CSIRO appear to use NEM wide residential prices outlined in the 2025 Inputs, Assumptions and Scenarios Report (AEMO, 2025). Using NEM wide prices conflicts with the material variation seen in electricity forward and cap prices between regions and doesn't reflect the impact of differences in the speed of transition and renewable resource quality between NEM regions.
- AEMO' methodology does not specifically consider regional variation in household load. NEM wide assumptions are made around rooftop solar PV self-consumption, which has the effect of regional variation in economics being driven primarily by regional solar PV generating capacity factor, with correlation of household electricity consumption with solar PV generation not considered.
- AEMO also make NEM wide assumption around battery cycling assumptions, which are also far too aggressive for an assumed 20kWh battery utilising a SolarShift operating profile.

More discussion and analysis regarding these and other issues is contained in Section 2, Section 3 and 4 of this report.

1.3.3 Electricity price input assumptions

Recommendation: Use more contemporary price forecast assumptions such as AEMC Residential Electricity Price Trends 2025

While sourced from the 2025 Inputs, Assumptions and Scenarios Report (AEMO, 2025), the retail price forecasts are based on the 2024 Final ISP, based on inputs from the 2023 IASR. The forecasts are dated and AEMC's Residential Electricity Price Trends 2025 (AEMC, 2025A) represent a more contemporary source, which also has the advantage of being produced for each NEM region.

1.3.4 Interaction between EV and CER BESS projections

Matters for consultation

- Are the battery outlooks plausible given the emerging popularity of EVs, or is there evidence to support a view that EV growth helps or hinders investment in home batteries?

Recommendation: There isn't evidence to support that EV growth will materially positive or negative driver of CER BESS uptake, though CER BESS uptake could be a negative driver for V2G uptake.

While it is expected that there would be high crossover between early adopters of CER BESS and electric vehicles, it is not clear what proportion would use their battery to charge their EV overnight. There may be limited value to operating a battery in this way given the existence of retail tariffs with low prices for EV charging, for instance AGL's Night Saver which is 8c/kWh between midnight and 6am (AGL, 2026) or Origin Energy's EV Power up which is 8c/kWh during a scheduled charge session (Origin Energy, 2026).

When considering V2G uptake projections and operating profiles, AEMO is encouraged to consider the negative impact of network connection export limits for single phase connections needing to be shared between CER BESS and V2G. There is likely to be high correlation between CER BESS owners and early adopters of V2G. The Cheaper Home Battery Program is driving attractive paybacks and rapid uptake of CER BESS (3-4x battery electric vehicle sales) and V2G is likely to be a potential secondary storage addition for households, given V2G is at a much earlier stage of deployment.

2. AEMO 2025 Distributed PV and Batteries/VPP Forecast Report

AEMO is commended for its efforts to improve the accuracy and transparency of rooftop solar PV and CER BESS forecasts, including developing its own forecasting model. AEMO's selection of key input assumptions that align with CSIRO's CER projections, such as system size and capital cost is supported, particularly as rooftop solar PV capital cost projections are sourced from GenCost, which is subject to a well-publicised consultation process. However, a range of changes could be made to AEMO's CER forecasting model to improve accuracy and transparency.

2.1 Solar PV

2.1.1 Self-consumption assumptions

Recommendation: Incorporate regional variation in solar PV self-consumption to reflect regional difference in correlation between solar PV generation and household loads

NEM wide assumptions are made around rooftop solar PV self-consumption, which has the effect of regional variation in economics being driven by solar PV generating capacity factor, rather than the coincidence of household demand and solar generation. Based on regional load traces and 8kw DC rooftop solar PV, IEEFA modelling (Gordon, 2025) shows a 990kWh variation in rooftop solar PV self-consumption for a household between NEM capital cities.

2.1.2 Network connection export capacity limits

Recommendation: Incorporate network connection export capacity limits for Queensland

AEMO is encouraged to integrate the impacts of network connection export capacity limits for standard connections for Queensland, where dynamic connections are not mandated and anecdotal evidence is that they are currently unpopular. For simplicity, this curtailed generation could be included as a percentage of PV generation not used for self-consumption, with this percentage increasing over time as system size increases. This data should be able to be accessed from AEMO's Distributed Energy Resource Register or sourced directly from Energy Queensland.

The author's 2025 Forecast Improvement Plan submission discusses the incorporation of network connection export capacity export limits when producing rooftop solar PV traces, with Green Energy Markets discussing the materiality of curtailment due to these constraints in its 2025 CER projections report (Green Energy Markets, 2025).

2.1.3 Electricity price input assumptions

Recommendation: Disclose retail tariff structure and price assumptions

Assumed retail tariffs structure, which incorporate network tariffs, are a key driver of rooftop solar PV and CER BESS economics and uptake. While the high-level methodology for price forecasts and load weighted residential prices are outlined in the 2025 Inputs, Assumptions and Scenarios Report (AEMO, 2025) it is not possible to identify which retail tariff structure is assumed, including prices for relevant Time of Use period and what wholesale prices apply for solar-feed in tariffs.

2.1.4 Retail tariff structure assumptions

Recommendation: Include retailer tariff with low or zero middle of the day price periods

Model diagrams contained in pages 15-20 of the report imply that only two part time of use tariffs are used, rather than time of use tariffs with a zero or low middle of the day prices. Recent developments supporting an increased uptake of such tariffs are discussed in 1.3.1, including the Solar Share Offer, which AEMO is encouraged to include in *Table 3 – AEMO incorporation of policies affecting consumer demand*. Please refer to the author's 2025 Forecast Improvement Plan Consultation for a discussion of potential increase in electricity consumption driven by the introduction of the Solar Share Offer, which is also discussed by Energy Queensland (Energy Queensland, 2025) and Origin Energy (Origin Energy, 2025) in their respective Solar Sharer Offer Consultation submissions.

Green Energy Markets also identifies that the Solar Sharer Offer would act to accentuate "cost reflective" tariff reform headwinds for solar uptake (Green Energy Markets, 2025). While (Farago, 2025) finds that ~40% of rooftop solar PV generation is produced in the 11am-2pm period aligning with the Solar Sharer Offer free electricity period.

2.1.5 Retail tariff structure market share

Recommendation: Disclose assumed market share by retailer tariff structure

Assumed retail tariff type market share is a key driver of rooftop solar PV and CER BESS economics and uptake, which is expected to change over time. AEMO is encouraged to disclose these assumptions in the same manner as CSIRO do for their electric vehicle projections (CSIRO, 2025A) and rooftop solar PV and CER BESS projections (CSIRO, 2025C).

2.1.6 Modelling results - paybacks

Recommendation: Disclose rooftop solar PV payback, including based on flat and TOU retail tariff structures, and with low or zero middle of the day price periods

It is expected that this disclosure would highlight that retail tariff assumptions and the speed of the transition to "cost reflective' tariffs are a key driver of rooftop solar PV economics and thus uptake projections.

It is noted that Green Energy Market discloses modelled payback results for rooftop solar PV and hybrid system paybacks (Green Energy Markets, 2025).

2.2 BESS

2.2.1 Cycling assumptions

Recommendation: Estimate cycling assumptions based on regional load traces and rooftop solar PV traces

Cycling assumptions are a critical driver of BESS payback and AEMO is encouraged to estimate cycling assumptions based on actual load trace data for each NEM region, assumed battery size for relevant year and Solar Shift operating profile, rather than harmonised generic assumptions.

Cycling assumption appear to be overly optimistic, unrealistic and unrelated to regional variation in electricity usage. A 90% cycling assumption for Step Change and long-term BESS size of 20kWh, implies discharges of 18kWh per day (6,570kWh) before degradation, which should be concentrated outside of peak solar production times. This compares to General Usage including for Default Market Offer Residential Annual Usage with Controlled Load of 4,200kWh – 5,200kWh depending on Distribution region (Australian Energy Regulator, 2025).

Detailed modelling of home batteries economics by IEEFA using household load trace data and assuming 8kW DC solar PV and a 10kWh battery utilising a SolarShift operating profile, shows cycling rates of 60%-76% for NEM capital cities (Gordon, 2025). For most NEM capital cities this resulted in zero to very low grid energy imports for the household. Thus if a 20kWh battery size was assumed, consistent with AEMO long term assumption for Step Change, cycling rates may be as low as 30-35%, vs AEMO's 90% assumption.

As evidenced by IEEFA's modelling (Gordon, 2025), regional variation in electricity load, primarily driven by different heating and cooling consumption, materially impacts CER BESS economics. Figure 3 from Australian Energy Market Commission modelling shows that, "*very rarely are batteries perfectly sized to meet the daily* *load requirements of a consumer* (AEMC, 2025B) and "*this means that consumers with low seasonal variation and consistent consumption, typically in peak price periods, achieve high value from a battery purchase.*" This distribution also highlights that AEMO's cycling assumptions are likely overly optimistic.

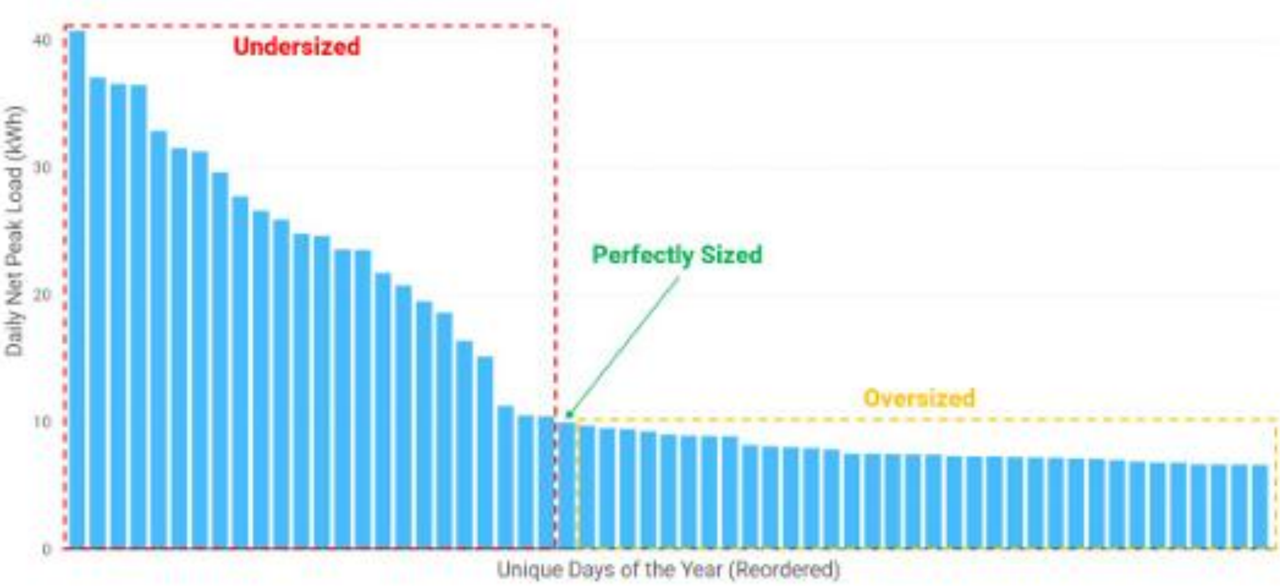

Figure 3: Batteries are very rarely perfectly sized to meet peak load. Results are indicative of a sample consumer with 14,500kWh annual load. | Source: (AEMC, 2025B)

It is acknowledged that load could grow over time with electrification and AEMO could attempt to incorporate this, however much of this load growth may have limited impact on BESS paybacks as:

- Electrification of hot water can be scheduled for solar producing hours.
- Electrification of heating has limited relevance for Queensland and New South Wales, with seasonal heating demand in Victoria and South Australia coinciding with shorter daylight hours and thus solar PV production, reducing charging opportunity for BESS.
- For a portion of consumers, electric vehicles charging can be scheduled for solar producing hours and CSIRO provides assumptions for market share of charging profiles (CSIRO, 2025A).

2.2.2 Battery duration assumptions

Recommendation: Base battery duration assumptions on actual data from AEMO's Distributed Energy Resource Register or data sourced directly from DNSP

This recommendation is consistent with the author's 2025 Forecast Improvement Plan Consultation Submission. The data from the Distributed Energy Resource Register for Queensland is suitable for this purpose. Potential data issues in other regions is not a valid reason for not improving accuracy of input assumptions for regions where quality data is available.

AEMO is projecting that battery size will normalise at 20kWh for Step Change and 25kWh (current level) for Accelerated Transition, implying inverter capacity of 8kW and 10kW respectively. Energex (South East Queensland) Standard Connection is 5kW per phase, with dynamic connection of up to 10kW per phase. Anecdotal evidence from installers is that dynamic connections are currently unpopular in South East Queensland. Thus a 2.5hr storage duration implies that for a single phase connection, inverter capacity is materially higher than connection capacity with exports being significantly constrained.

2.2.3 Standalone batteries

Recommendation: Estimate payback for standalone batteries based on TOU tariff structures, including with low or zero middle of the day price periods

AEMO's finding that, *"there is insufficient payback associated with battery only installations to forecast them."* may be a modelling artefact driven by not considering TOU tariff structures with low or zero middle of the day price periods. These tariffs negatively impact payback period for rooftop solar PV, but are beneficial for CER BESS economics. For instance:

- Modelling undertaken by AEMC finds that home battery paybacks are higher for TOU tariffs vs flat tariffs (AEMC, 2025B).
- Based on wholesale prices, IEEFA home battery modelling shows an improvement in battery economics from charging in a 2hr low price middle of the day and exporting during peak night period in its "better tariffs" sensitivity (Gordon, 2025).
- Clean Energy Council has advocated for extending the Cheaper Home Battery Program to standalone batteries, to allow customers who can't install solar PV to take advantage of the Solar Sharer Offer (Clean Energy Council, 2025).

Post the Cheaper Home Battery Program (which requires pairing a BESS with rooftop solar PV), when using a TOU tariff structure with low or zero middle of the day price periods, a standalone BESS may have a higher payback period than a hybrid system. This is particularly the case when major household load such as electric hot water and electric vehicles have the potential to be scheduled for this low-price period.

Two key factors that drive potentially superior standalone battery economics are:

- The export value of rooftop solar PV that is not consumed by the household is likely lower than its LCOE based on current feed in tariffs and that over time prices in peak solar producing hours should be limited by new entrant utility scale solar PV (Green Energy Markets, 2025), which has lower LCOE with the gap to rooftop solar PV projected to increase over time (CSIRO, 2025B).
- While it is acknowledged that there is some trade-off with these tariffs through higher energy usage charges in other periods, energy charges in the middle of the day period may be lower than the LCOE of rooftop solar PV, reducing the payback of rooftop solar PV. Evidence of this includes:
    - Retail offers with 3hrs of free electricity daily – OVO, AGL, GloBird Energy (Wattever, 2025)
    - Ergon Retail's (regional Queensland) Solar Soaker tariff which has an energy usage charge of 7.724c/kWh from 11am-4pm (Ergon Retail, 2025)
    - Amber Electric– which passes through wholesale prices, network tariffs and ~3c/kWh for environmental costs, market charges and price protection hedging. Energex (South East Queensland) Residential TOU Energy and Residential TOU Demand & Energy consumption charges from 11am-4pm is $0.5c/kWh (Energex, 2025)

2.2.4 Modelling results - paybacks

Recommendation: Disclose standalone battery and hybrid system (solar PV + BESS) paybacks including based on flat and TOU retail tariff structures, including with low or zero middle of the day price periods

It is expected that this would highlight that retail tariff assumptions are a key driver of CER BESS economics and thus uptake projections.

It is noted that Green Energy Market discloses modelling results for rooftop solar PV capacity and hybrid system paybacks (Green Energy Markets, 2025).

3. CSIRO small-scale solar PV and battery projections 2025-26

Many of the identified issues are common to AEMO's projections and as such CSIRO are encouraged to also consider the content and recommendations in Section **Error! Reference source not found.** and Section 2.

3.1.1 Network connection export capacity limits

Recommendation: Incorporate network connection export capacity limits for Queensland

3.1.2 Electricity price and retail tariff structure input assumptions

Recommendation: Disclose retail tariff prices and structure and their source

3.1.3 Solar soak retail tariff structure

Recommendation: Include retailer tariff with low or zero middle of the day price periods

While CSIRO's disclosure of assumed tariff market share is welcomed, unlike CSIRO's EV projections (CSIRO, 2025A) there appears to be no separate consideration of retail tariffs with low or zero middle of the day price periods.

3.1.4 Modelling results – paybacks

Recommendation: Disclose rooftop solar PV payback and hybrid system (solar PV + BESS)*, including based of flat and TOU retail tariff structures, including with low or zero middle of the day price periods.*

4. Green Energy Markets distributed energy resource projections

Many of the identified issues are common to AEMO's projections and as such Green Energy Markets are encouraged to also read Section **Error! Reference source not found.** and Section 2.

4.1.1 Network connection export capacity limits

Recommendation: Incorporate network connection export capacity constraints for Queensland

While Green Energy Markets argues that CER BESS will act to limit impact of network connection export limit on solar PV, per discussion in Section 2.2.2 network export limits also apply to battery exports, which could impact arbitrage revenue. This is particularly the case given Green Energy Markets' higher battery size assumption and that their BESS operating profile is consistent with a wholesale pass price through VPP.

4.1.2 Electricity price and retail tariff structure input assumptions

Recommendation: Disclose retail tariff prices and structure

Green Energy Markets assumption of a three-part Time of Use tariff structure is supported. However, there is less price assumption transparency than the last report and Green Energy Markets is encouraged to disclose price assumptions for the three Time of Use periods.

4.1.3 Solar soak retail tariff structure

Recommendation: Include retailer tariff with low or zero middle of the day price periods

4.1.4 Battery operating profile

Recommendation: Include operating profile consistent with Solar Shift as well as wholesale pool price pass though VPP

The description of the BESS operating profile is consistent with a wholesale pool price pass through VPP such as Amber Electric. AEMO assumes VPP market share is currently only ~13% and Green Energy Market should also model a Solar Shift profile consistent with what AEMO is assuming most customers are using.

4.1.5 Wholesale pool price pass through VPP operating algorithm

Recommendation: incorporate assumptions such as an energy reserve, c/kWh energy usage costs and minimum export prices to be more consistent with actual VPP operation

Per discussion in the author's 2025 Forecast Improvement Plan Consultation Submission actual operation of Amber Electric's Smart Shift algorithm is far more conservative than a utility scale battery, with much less cycling/grid interaction. Green Energy Markets is encouraged to incorporate assumptions such as an energy reserve, c/kWh energy usage costs and minimum export prices to be more consistent with actual VPP operation.

4.1.6 VPP incentive assumptions

Recommendation: Remove VPP incentive as not relevant for wholesale price pass through VPP

A material upfront VPP incentive of $50/kWh is assumed, however the operating algorithm already assumes that the battery operates as a wholesale price pass through VPP, with arbitrage revenue earned from charging and discharging from the grid. Amber Electric is a key example of such a VPP and unlike other VPP does not offer VPP subsidies/incentives (SolarQuotes, 2025), including due to wholesale prices encouraging export in peak demand periods.

5. CSIRO electric vehicle projections

5.1 Incorporation of losses

Recommendation 1: Incorporate difference in charging efficiency between charger types

Recommendation 2: State that EV phantom drain is included in EV efficiency assumptions

It is not clear how losses are incorporated as they are not shown in the model logic diagram from the report shown in Figure 4, including:

- Difference in efficiency between EV charger types. Electric vehicle test range and efficiency data is based on a specific charger type, for instance recent Australian Automobile Association testing used a 22kW AC home charger (Australian Automobile Association, 2025). A European study by ADAC found that depending on vehicle, a Wallbox (Type 2) charger operating at rated capacity of 11kW could have 4.6% to 14.5% less losses than a Type 1 charger, while this benefit reduced or even became negative if the Wallbox was operated at half of rated capacity of 5.5kW (ADAC, 2025)

- EV phantom battery drain which could be 1% per day or higher (Tesla, 2025). Based on an 80kWh battery this would equate to 296kWh/pa, representing more than 10% of the average large passenger vehicle's modelled annual energy consumption of 2,553kWh. If this loss is included in the overall vehicle efficiency assumption, this should be disclosed.

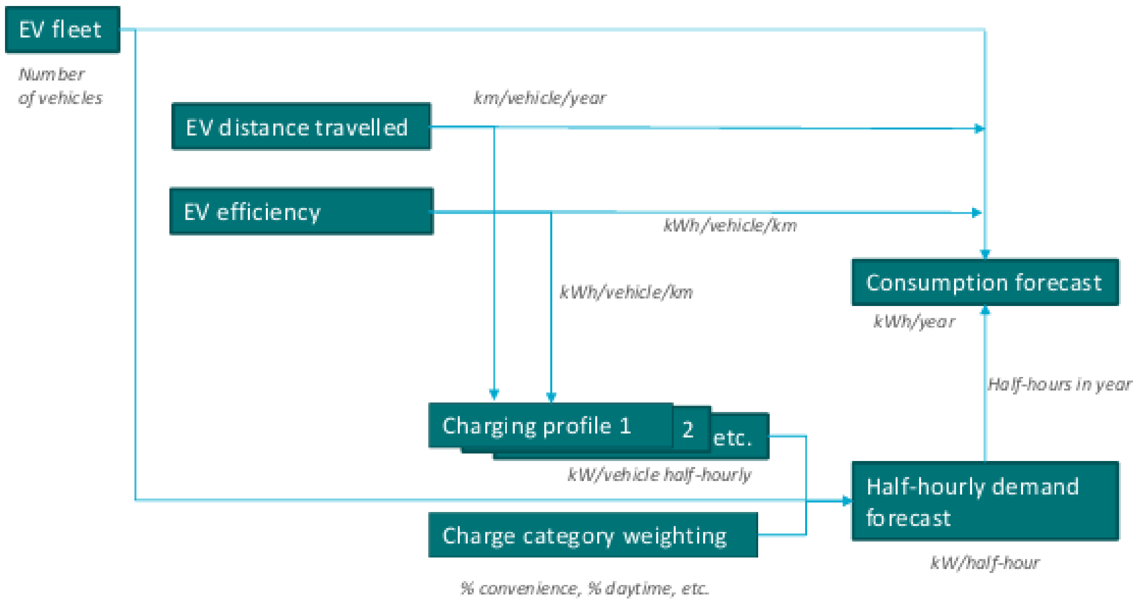

Figure 4: Illustration of the two ways in which electric vehicle consumption is calculated (jointly developed with AEMO) | Source: (CSIRO, 2025A)

5.2 Seasonality in EV charging load

Recommendation 1: Incorporate greater seasonality in electric vehicle charging loads due to seasonality in travel

Recommendation 2: Meet with Energy Queensland to discuss the analysis they have undertaken on vehicle travel patterns

Recommendation 3: Incorporate seasonality in electric vehicle charging loads due to the impact of temperature on EV battery performance and air conditioning electricity consumption

CSIRO currently incorporates seasonality in electric vehicle charging load based on traffic data. CSIRO is encouraged to consider using petrol and diesel consumption data, a publicly available data set that captures seasonality in transport demand (Department of Climate Change, Energy, the Environment and Water, 2025A).

It would be ideal to estimate daily variations in electric vehicle charging consumption, including behaviour around and during school holiday periods, however public data supporting such estimates is unlikely to be available. Energy Queensland is currently undertaking analysis on vehicle travel patterns, based on procured telecommunication data. Once complete, Energy Queensland would be pleased to discuss the findings of this analysis with CSIRO and explore whether similar data sources could be suitable for supporting CSIRO's modelling. The author would be pleased to introduce CSIRO to the relevant experts at Energy Queensland.

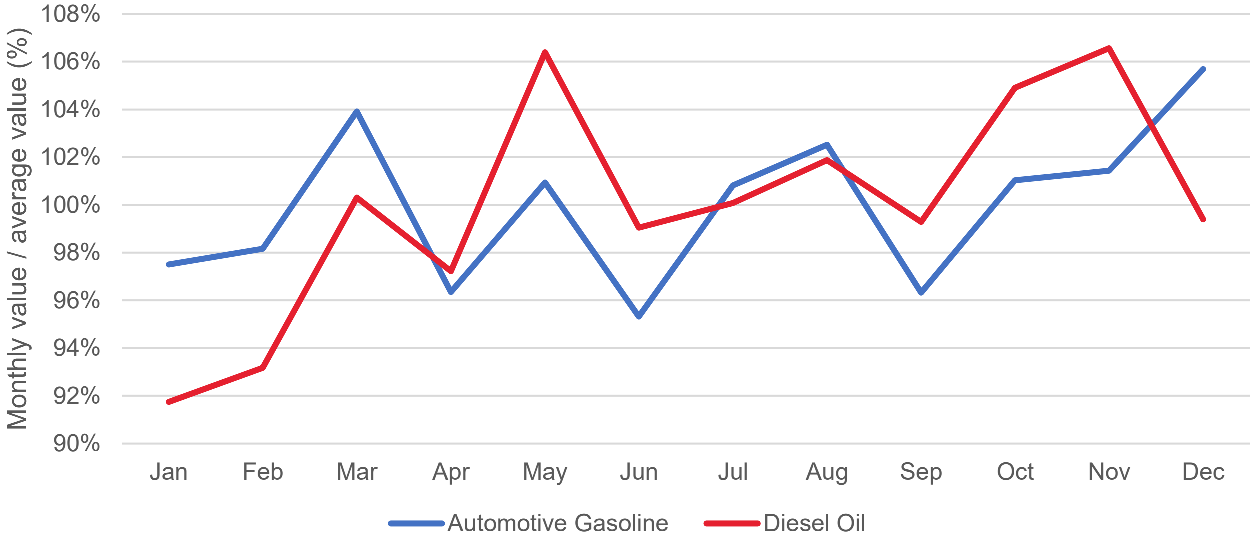

Figure 5: Seasonality in transport fuel consumption (2011-2019,2023-2024) | Source: (Department of Climate Change, Energy, the Environment and Water, 2025A)

Per Figure 6 there is a U-shaped relationship between electric vehicle energy consumption and temperature. While CSIRO has adjusted electric vehicle energy efficiency to account for Australian conditions, they are encouraged to seasonally adjust for temperature effects. While impacts will not be as extreme as in cold climates, seasonal impacts could be important. This is particularly the case for Victoria, where the future electricity system is expected to be under most stress in winter, when there is less solar PV production and lower temperatures will drive heating demand and lower electric vehicle efficiency.

Given the materiality of future electric vehicle charging load to the electricity system and variability in Melbourne's weather as seen in Figure 7, CSIRO/AEMO are encouraged to move towards forecasting of EV charging loads based on more granular temperature data, such as hourly or daily, for relevant reference years.

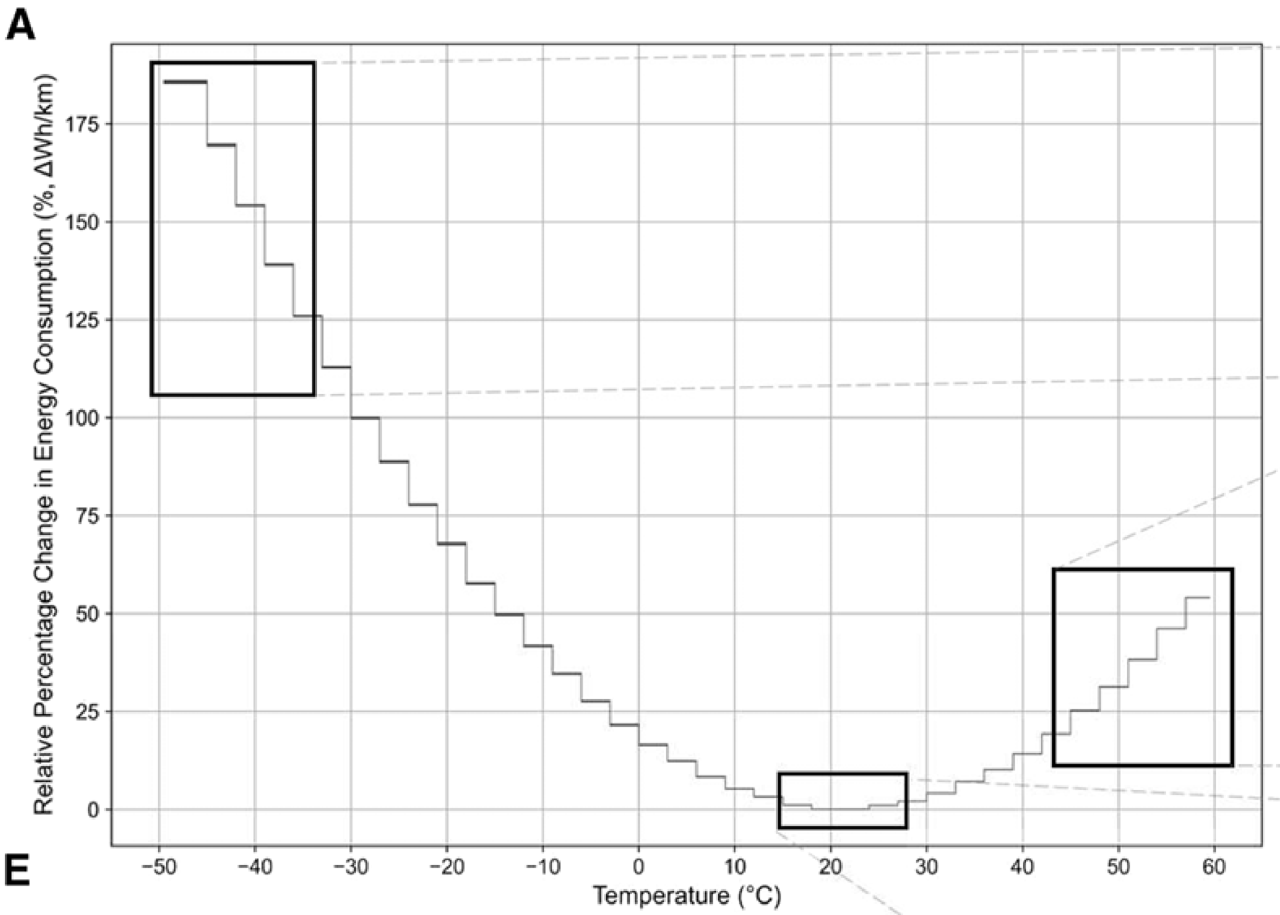

Figure 6: Electric vehicle electricity consumption's U-shaped response to ambient temperature

Source: (Wu & Zhu, 2025)

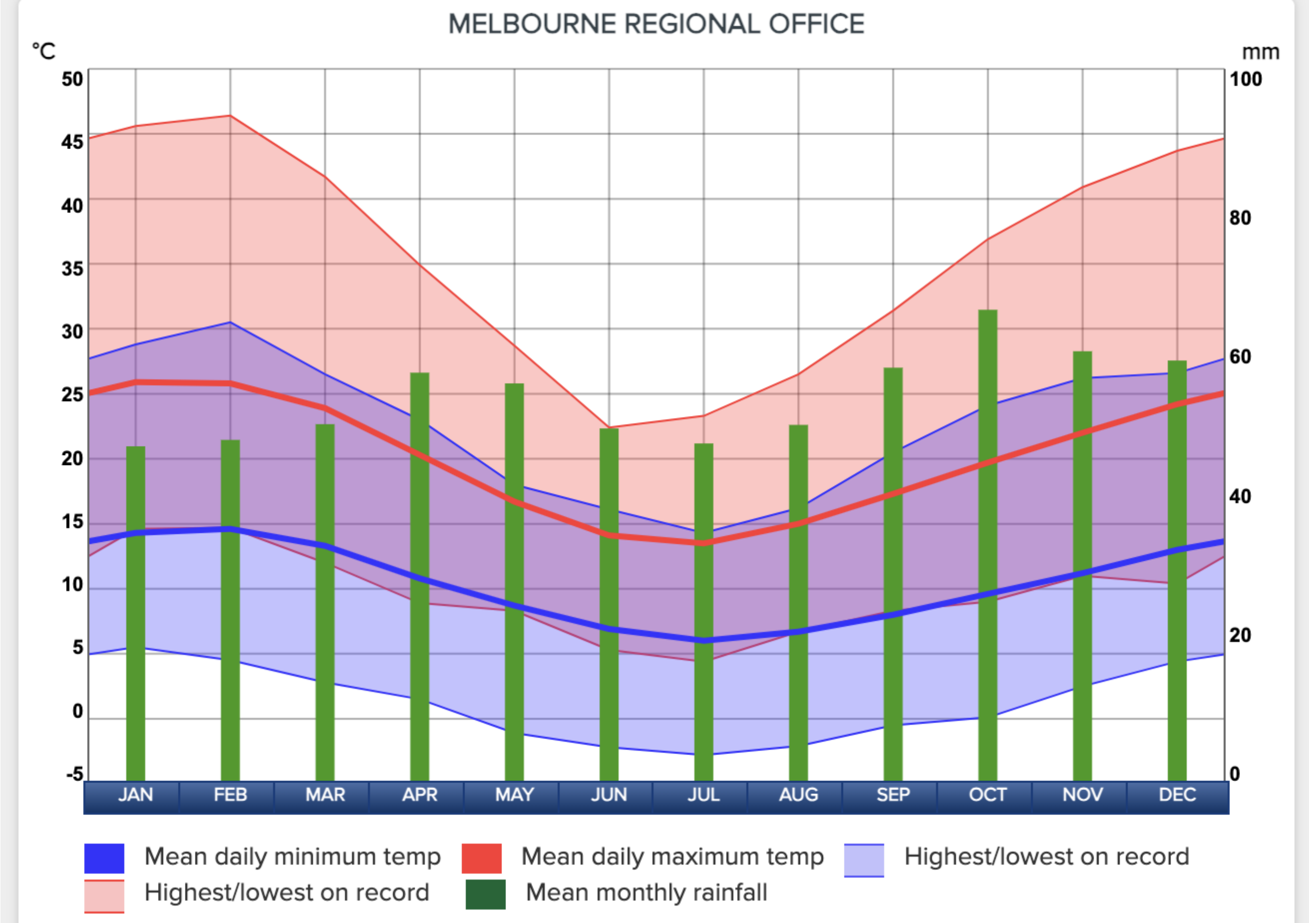

Figure 7: Melbourne Annual Temperature and Rainfall | Source: (Weatherzone, 2024)

5.3 Electric vehicle rebound effect

Recommendation: Provide greater transparency of the magnitude of any rebound effects, particularly increases in assumed travel distances

While there is a solid theoretical and practical evidence of an energy consumption rebound effect due to lower operating costs for electric vehicles resulting in greater distance travelled (Haghani, Hensher, & Ghaderi, 2024), this phenomenon is not well understood by many stakeholders.

6. References

ADAC. (2025, May 27). *Elektroauto Ladeverluste: AC oder DC – was ist effizienter?* Retrieved from ADAC: https://www.adac.de/rund-ums-fahrzeug/elektromobilitaet/laden/ladeverluste-elektroauto-studie/

AEMC. (2025A). *Residential Electricity Price Trends 2025.* Retrieved from https://www.aemc.gov.au/market-reviews-advice/residential-electricity-price-trends-2025

AEMC. (2025B). *Residential Battery Perspectives Article Appendix - Methodology, Assumptions and Detailed Results.* Retrieved from https://www.aemc.gov.au/sites/default/files/2025-08/Residential%20Battery%20Perspectives%20Appendix%20FINAL.pdf

AEMO. (2025). *2025 Inputs, Assumptions and Scenarios Report.* Retrieved from https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2024/2025-iasr-scenarios/final-docs/2025-inputs-assumptions-and-scenarios-report.pdf?rev=63268acd3f044adb9f5f3a32b6880c27&sc_lang=en

AGL. (2026, January 28). *Night Saver EV electricity plan*. Retrieved from https://www.agl.com.au/residential/energy/compare-plans/night-saver-ev-plan

Australian Automobile Association. (2025, August 7). *How EV testing can help Australian car buyers*. Retrieved from Australian Automobile Association: https://www.aaa.asn.au/2025/08/new-real-world-tests-tackle-ev-range-anxiety/

Australian Energy Regulator. (2025). *20225-26 Default market offer prices.* Retrieved from https://www.aer.gov.au/system/files/2025-05/AER%20-%20Final%20determination%20-%20Default%20market%20offer%20prices%202025%E2%80%9326%20-%2026%20May%202025_0.pdf

Clean Energy Council. (2025). *Clean Energy Council - Solar Sharer Offer Consultation Submission.* Retrieved from https://consult.dcceew.gov.au/download/fil3a5c0ea3487cecf1452df

CSIRO. (2025A). *Electric vehicle projections 2025.* Retrieved from https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2025/draft-2026-fau/csiro-electric-vehicle-projections.pdf?rev=e37fcf0e52ae4491b42eac5638decd27&sc_lang=en

CSIRO. (2025B). *GenCost 2025-26 Consultation Draft.* Retrieved from https://www.csiro.au/-/media/Energy/GenCost-2025-26-Draft/GenCost2025-26ConsultDraft_20251216-FINAL.pdf

CSIRO. (2025C). *Small-scale solar PV and battery projections 2025-26.* Retrieved from https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2025/draft-2026-fau/csiro-small-scale-solar-pv-and-battery-projections-2025-26-report.pdf?rev=9239d5a7e9424464bba33e1fd91bce17&sc_lang=en

Department of Climate Change, Energy, the Environment and Water. (2025A). *Australian Petroleum Statistics 2025*. Retrieved from energy.gov.au: https://www.energy.gov.au/publications/australian-petroleum-statistics-2025

Department of Climate Change, Energy, the Environment and Water. (2025B). *Have your say on a Solar Sharer Offer (SSO)*. Retrieved from https://consult.dcceew.gov.au/solar-sharer-offer

Energex. (2025). *Residential Tariffs.* Retrieved from https://www.energex.com.au/manage-your-energy/ways-to-save-for-businesses-and-farms/tariffs/residential-tariffs

Energy Queensland. (2025). *Energy Queenslandd Solar Sharer Offer Consultation Submission.* Retrieved from https://consult.dcceew.gov.au/download/fil3a5c0538df372dc5dc4bf

Ergon Retail. (2025). Retrieved from Tariff Facts: https://www.ergon.com.au/retail/residential/tariffs-and-prices/compare-residential-tariffs/tariff-facts

Farago, R. (2025, December). *Will "solar sharer" kill the rooftop solar industry?* . Retrieved from LinkedIn: https://www.linkedin.com/posts/robert-farago-3858403_will-solar-sharer-kill-the-rooftop-solar-activity-7393813950225739776--HWl?utm_source=share&utm_medium=member_desktop&rcm=ACoAACFwJLsBnc4N5qjoWgzbWm4WnaPPSe_IPyI

Gordon, J. (2025). *Technical appendix: A focus on homes, not power plants, could halve energy bills.* Institute for Energy Econmics and Financial Analysis. Retrieved from https://ieefa.org/media/5488/download

Green Energy Markets. (2025). *Projections for distributed energy resources – solar PV and stationary energy battery systems.* Retrieved from https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2025/draft-2026-fau/gem-projections-for-der-solar-pv-stationary-energy-battery-systems-report.pdf?rev=e45f27c5069d4b5385a2d4b11c4e93de&sc_lang=en

Haghani, M., Hensher, D., & Ghaderi, H. (2024, September 13). *UNSW Sydney*. Retrieved from How the ‘rebound effect’ could eat away at the green gains from electric vehicles: https://www.unsw.edu.au/newsroom/news/2024/09/how-rebound-effect-eat-way-at-green-gains-evs

Origin Energy. (2025). *Origin Energy Solar Sharer Offer Consultstion Submission.* Retrieved from https://consult.dcceew.gov.au/solar-sharer-offer/lodge-submission/view/60

Origin Energy. (2026, January 29). *Charge your EV from zero to full from as little as $5**. Retrieved from https://www.originenergy.com.au/ev-power-up/

SolarQuotes. (2025, September 25). *Virtual Power Plant (VPP) Comparison Table*. Retrieved from https://www.solarquotes.com.au/: https://www.solarquotes.com.au/battery-storage/vpp-comparison/

SolarQuotes. (2026, January 2). *The Federal Government Battery Rebate: A Complete Guide*. Retrieved from https://www.solarquotes.com.au/: https://www.solarquotes.com.au/battery-storage/federal-rebate/

Tesla. (2025). *Model Y Owner's Manunal - High Voltage Battery Information*. Retrieved from Tesla: https://www.tesla.com/ownersmanual/modely/en_us/GUID-7FE78D73-0A17-47C4-B21B-54F641FFAEF4.html

Wattever. (2025). Retrieved from Compare Free Electricity Plans: https://wattever.com.au/compare-free-electricity-plans/

Weatherzone. (2024, January 27). *Australian Open Final weather looks distinctly European*. Retrieved from Weatherzone: https://www.weatherzone.com.au/news/australian-open-final-weather-looks-distinctly-european-/1762588

Wu, Q., & Zhu, Y. (2025). Effects of ambient temperature on electric vehicle electricity consumption are reduced in a warming world. *iScience, 28*(9). Retrieved from https://www.sciencedirect.com/science/article/pii/S2589004225015895