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ARENA Community Battery Portfolio

Data Report 1

25 March 2026

Disclaimer

Introduction

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Purpose of this report

The purpose of this report is to provide a point-in-time overview of the current and planned community battery portfolio. These insights are intended to inform a discussion with ARENA about where further analysis and studies could be focussed that can contribute to industry development outcomes.

Scope of this report

This report presents a summary of data collected for the Community Batteries Project for the reporting period 30 June 2025 to 31 December 2025.

During this period, **survey responses** were received from 13 proponents, covering information on 284 community batteries across Australia. This data includes deployment schedules, geographic distribution, battery and connection characteristics, capital and operating expenditure, market participation arrangements, and community engagement approaches and targeted benefits.

In addition, **operational interval data** was provided for 28 batteries, enabling preliminary analysis of battery performance and network interactions.

All figures and findings presented are based solely on information supplied by proponents and should be interpreted in this context.

Overall, the report highlights the value of standardised data collection across the portfolio, and the types of further analysis that can be pursued going forward.

Data received

We received:

- Survey data from 13 out of the 16 proponents.
- Battery operation and event data from the 3 proponents (Shell Energy, Ausgrid and Hydro Tasmania). Shell Energy had a limited amount of interval data available and was excluded from this analysis..

Contents

Analysis of Survey Data

Battery installation schedule

Summary

- **Figure 1** illustrates the portfolio's total battery capacity over the lifetime of the project.
- **Figure 2** displays the portfolio's total dischargeable power over the course of the project.
- Batteries installed by Ausgrid account are expected to account for 81.7% of the portfolio's total capacity by 2028. This is 538 MWh of capacity.
- 227 batteries are expected to be installed by the end of 2026 and 284 installed by 2027. Currently, 23 batteries have been installed.

Figure 1

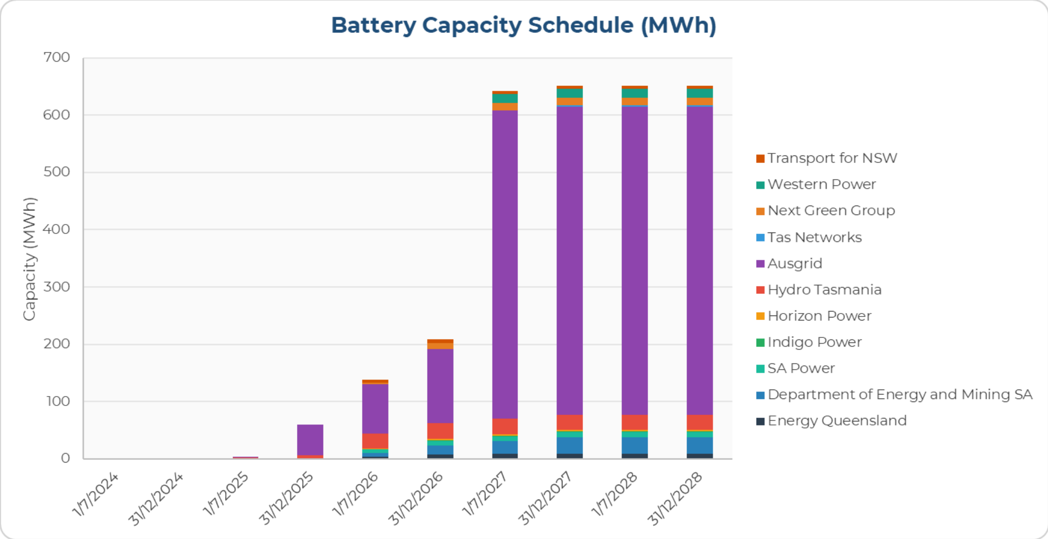
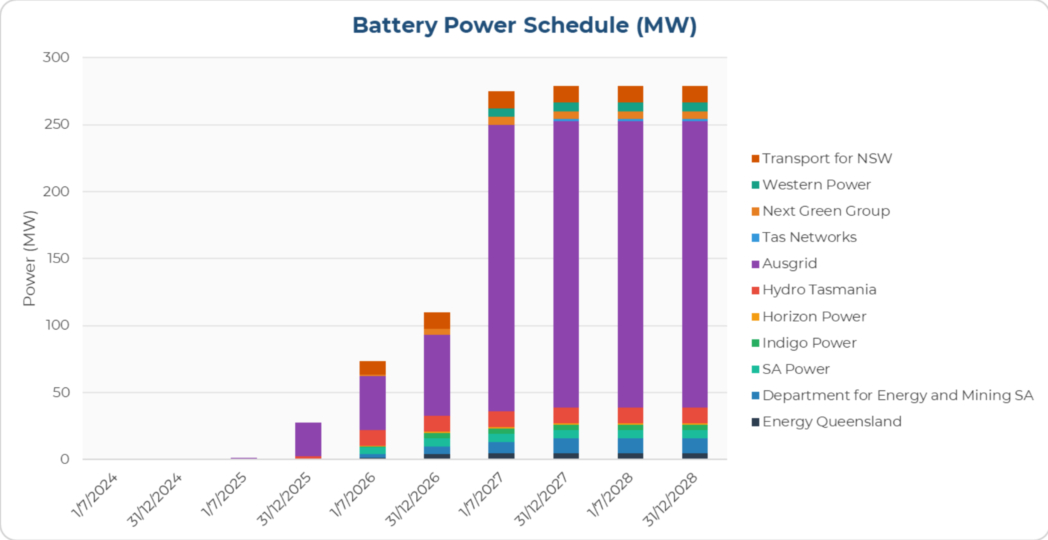


Figure 2



Project Slippage

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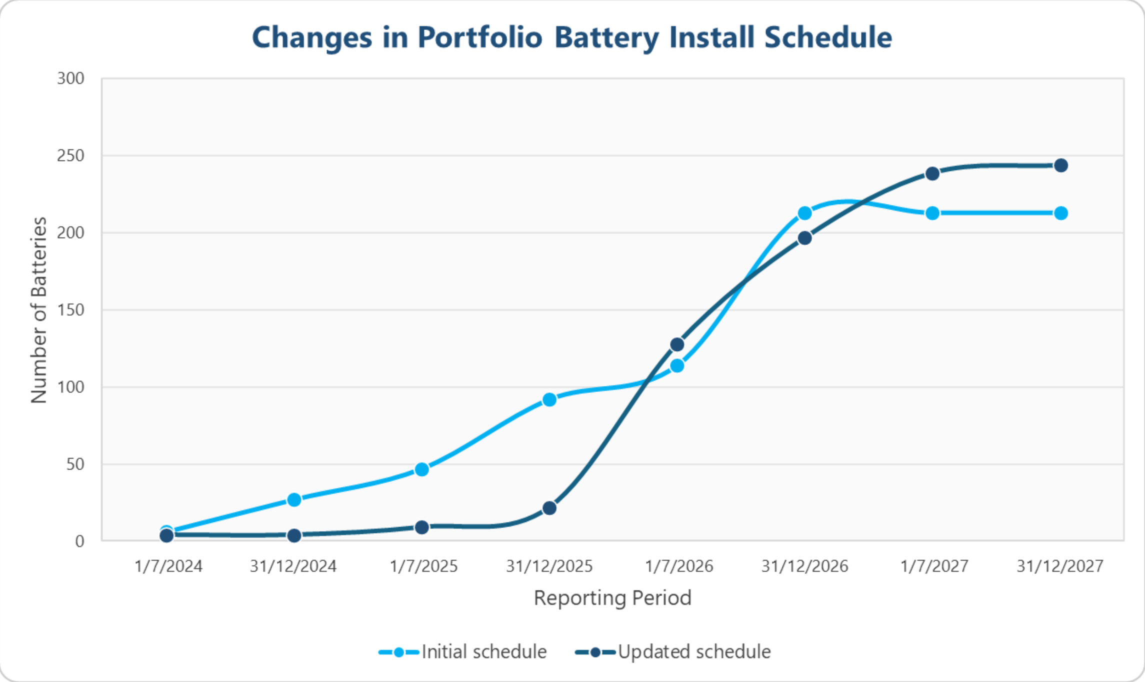
Summary

- Project slippage was analysed across proponents that have submitted survey data in at least 2 reporting periods. This accounts for 9 out of the 15 proponents that have submitted data to us.
- **Figure 1** illustrates the aggregate changes in the portfolio battery install schedule. While initial project planning projected there would be 92 batteries installed by 31/12/25, currently there is only 22 batteries that have been installed.
- The proponents that have experienced delays in completing their first install are SA Power Networks, Endeavour Energy, Horizon Power, Tasmanian Networks, Western Power, and Transport for NSW.
- Energy Queensland is the only proponent that has brought forward their planned first install, which is expected to be completed by 1/7/26.
- In figure 1, we can also see that the total number of batteries expected to be installed by 31/12/27 has increased. This is primarily due to Ausgrid's effort to increase their planned battery installs from 16 to 46.



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Location of batteries

Summary

- **Figure 1** illustrates the distribution of batteries expected to be installed in each state.
- NSW has the largest number of battery installations at 123, while TAS has the fewest number of battery installations at only 6.
- **Figure 2** displays the distribution of batteries across remoteness areas defined by the ABS.
- 57% of the batteries within the portfolio are expected to be installed within major cities.

Figure 1

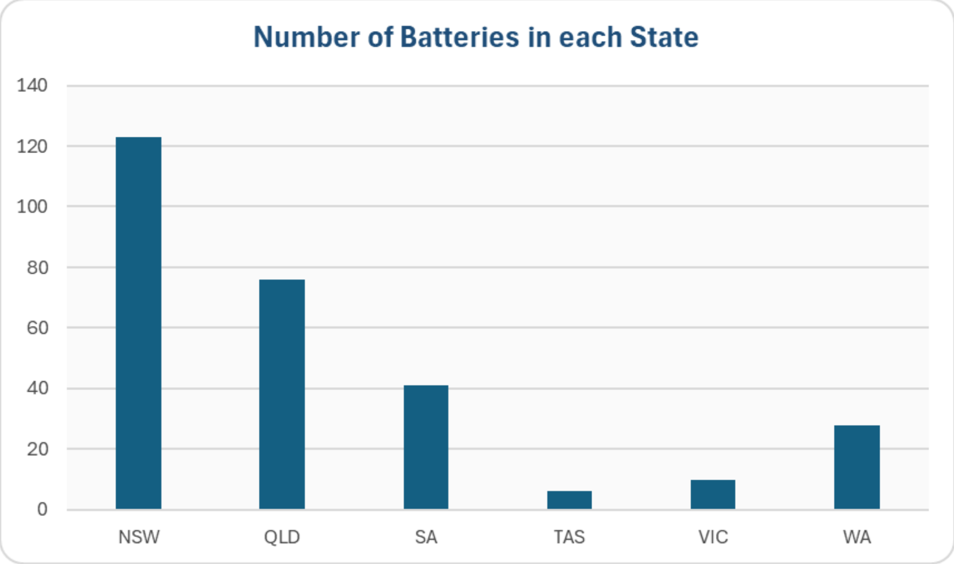
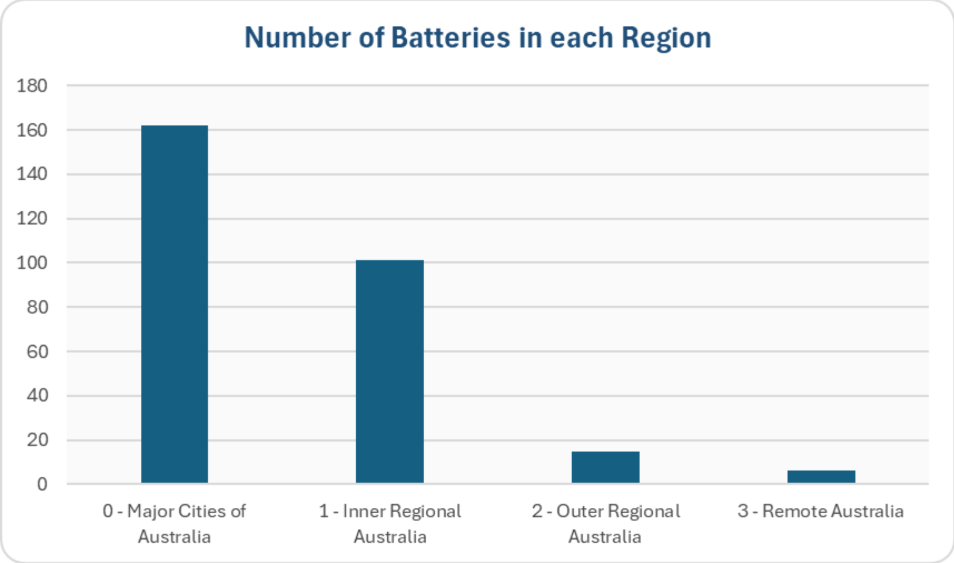


Figure 2



Portfolio capital expenditure

Summary

- **Figure 1** displays the capital expenditure across the portfolio across time.
- $480M in capital expenditure is expected over the timeline of the project. This figure has increased since last reporting period from $419M due to larger survey response rates and proponents firming up the budget of their project.
- **Figure 2** outlines the components of capital expenditure across the portfolio.
- Technology and EPC costs account for 87% of total portfolio-wide capital expenditure.

Figure 1

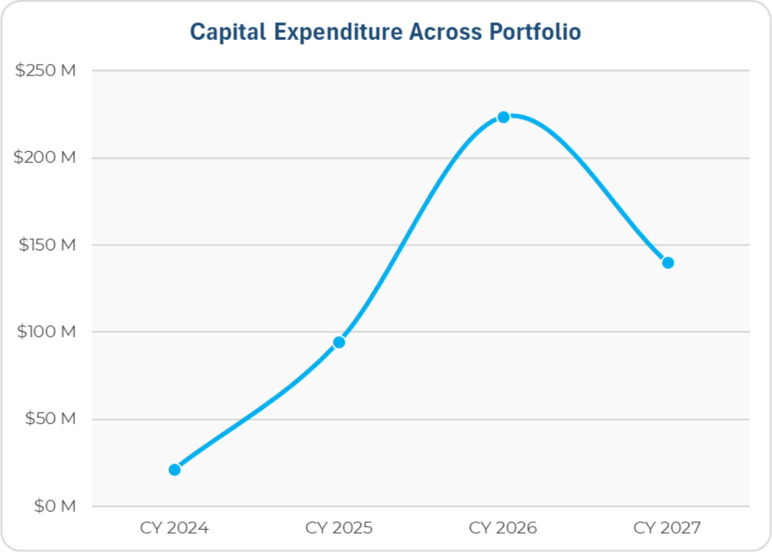
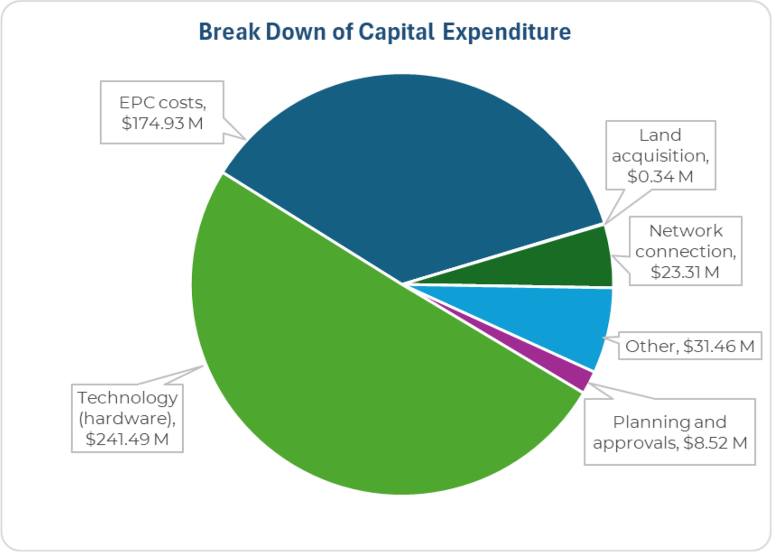


Figure 2



Location of different battery types

Summary

- The figures on the right illustrates where different battery types are located.
- Most batteries that are mounted on poles have an NMC battery chemistry and are expected to be installed in Queensland. These batteries are being installed by Energy Queensland.
- Visually, we can see that most batteries have been installed in and near major cities.

Figure 1

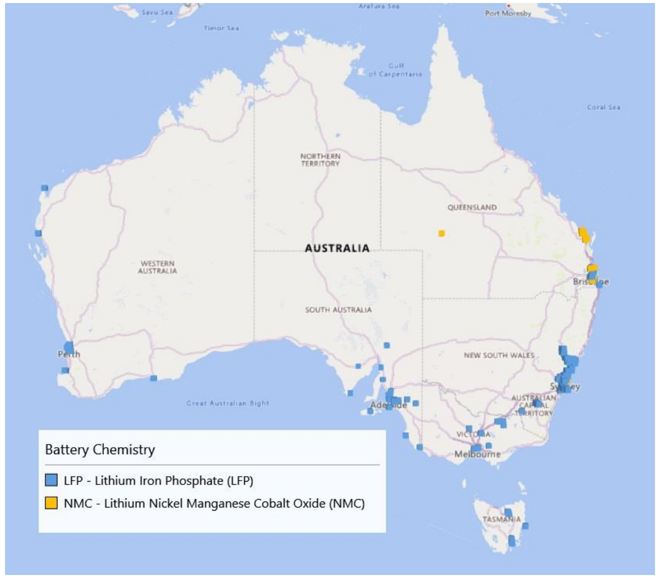
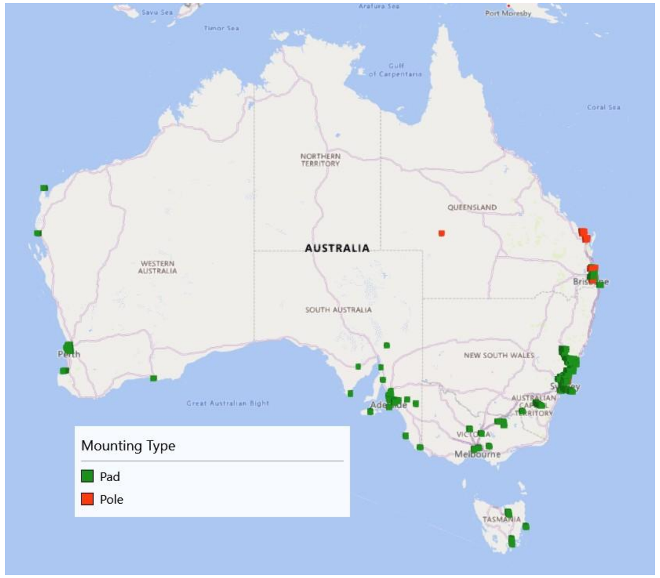


Figure 2



Community engagement survey responses

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Summary

- Survey recipients were asked a variety of questions relating to their intended and current community engagement approaches and the community benefits they are targeting.
- **Figure 1** displays the number of positive responses for each community engagement approach. Project webpages is the most frequent community engagement approach, while social media pages, co-design workshops, and community partnerships are the least frequent. There is high to moderate commitment to community engagement overall.
- **Figure 2** illustrates the number of responses for each community benefit that is being targeted. The majority of proponents are targeting increased solar energy export capacity, greater community engagement, and indirect customer bill relief as an outcome of the project.

Figure 1

Community engagement approaches	Count
Project webpage	12
Social media page	3
Advisory or reference group	4
Newsletters	7
Door-knocking and/or community stalls	6
Walking tours	5
Public meetings	6
Co-design workshops	3
Community partnerships	3
Surveys	5

Figure 2

Community benefits targetted	Count
Increased solar energy export capacity	12
Supporting electrification	10
Greater community engagement	11
Network resiliance	8
Indirect customer bill relief	11
Direct customer bill relief	7
Addressing energy equity	6
Local jobs and business opportunities	8
Electric vehicle charging	4

Analysis of Operational Data

Battery power and voltage – Small batteries

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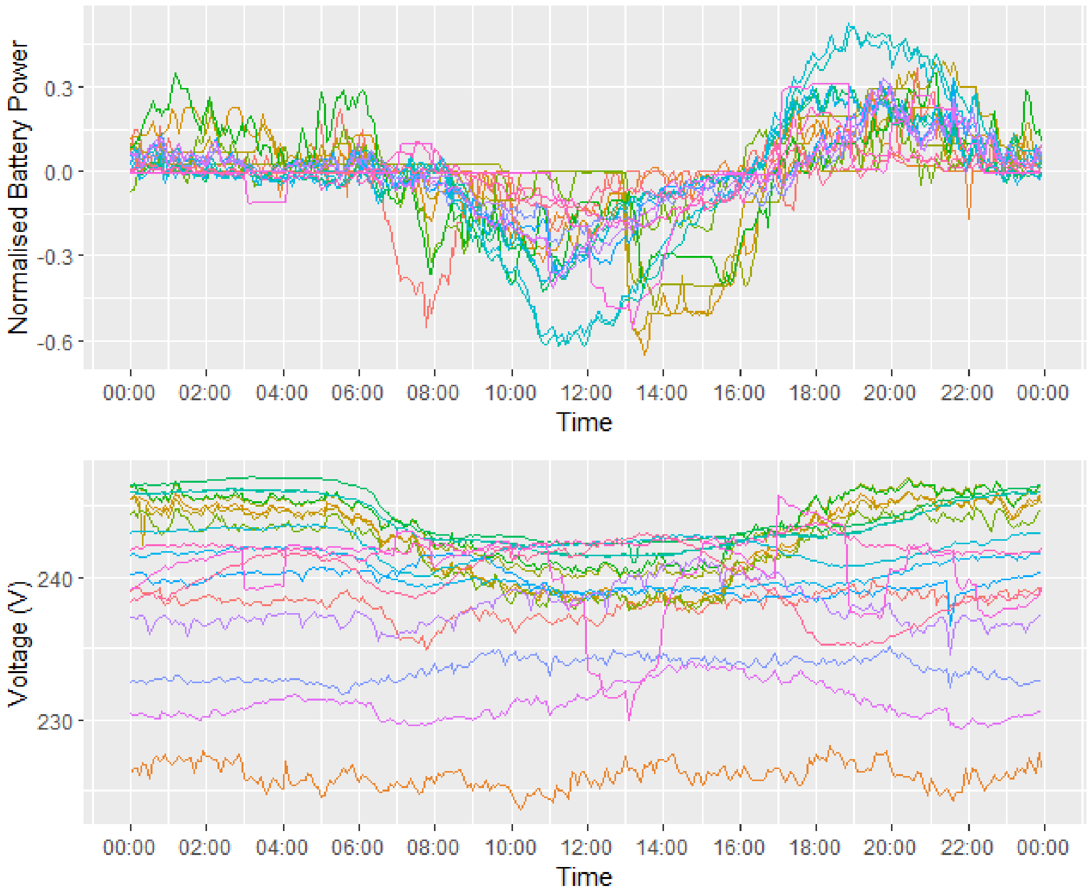
Summary

- The figure on the right illustrates the average battery power and network voltage readings across time of day. Each coloured line represents a different battery. Positive battery power indicates the battery is discharging, while negative indicates the battery is charging. Voltage readings are from a single phase.
- This chart focuses on smaller batteries that have a rated power less than 4,000 kW.
- Batteries are often discharging during the morning and evening peaks and are charging during the middle of the day. There is some level of overnight battery operation.
- Some batteries are charging when voltage is low and discharging when voltage is high. This indicates some batteries are struggling with voltage management.
- However, other batteries have a flatter voltage profile and are demonstrating good voltage management.

Average battery power and voltage across time of day filtered for smaller batteries (rated power < 4,000 kW)

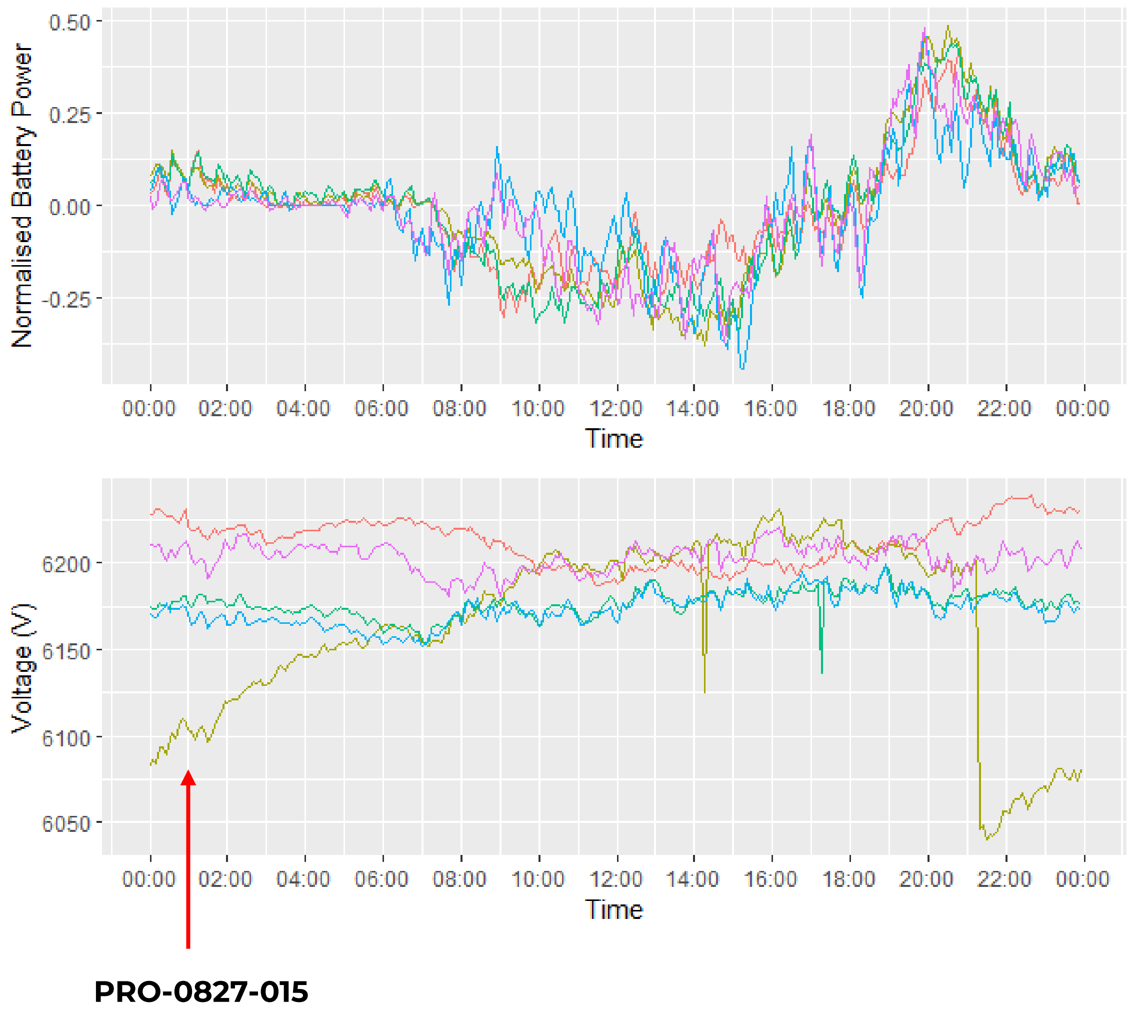


Battery power and voltage – Big batteries

Summary

- The figure on the right illustrates the average battery power and network voltage readings across time of day. Each coloured line represents a different battery. Positive battery power indicates the battery is discharging, while negative indicates the battery is charging. Voltage readings are from a single phase.
- This chart focuses on larger batteries that have a rated power greater than 4,000 kW.
- Similar to the smaller batteries, the larger batteries are often discharging during evening peaks and are charging during the middle of the day. We observe less morning and overnight battery operation, and a sharper discharge profile during the afternoon peaks.
- Apart from battery **PRO-0827-015** (dark green line), the bigger batteries have a flatter voltage profile. This indicates these bigger batteries are currently doing a better job at voltage management.
- Battery PRO-0827-015 has an anomalous voltage profile with a seemingly regular drop in voltage at around 21:00. This strange profile is due to the battery going offline at numerous points. The events record log indicates that the battery went offline 12 times in the reporting period due to technical faults.

Average battery power and voltage across time of day filtered for larger batteries (rated power > 4,000 kW)



State of charge

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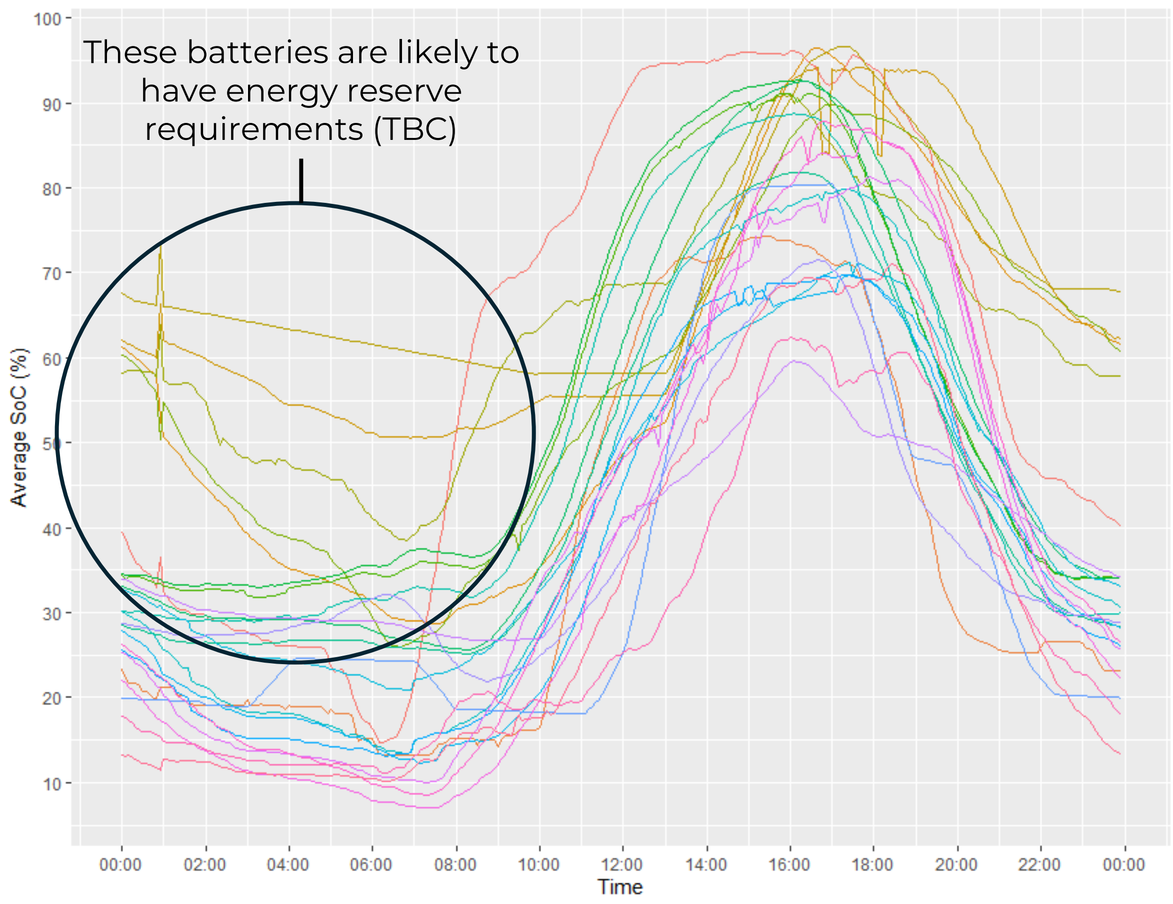
Summary

- The figure on the right illustrates the average state-of-charge across time of day for each battery. Each coloured line represents a different battery.
- The battery portfolio generally follows a similar state-of-charge profile. The batteries typically have a low state-of-charge overnight while the highest state-of-charge often occurs during the start of the evening peak.
- In future studies, we can explore the relationship between state-of-charge and different weather conditions. This will broaden our understanding of when community batteries are available to the network.

Average state-of-charge across time of day



Battery power and voltage deviation

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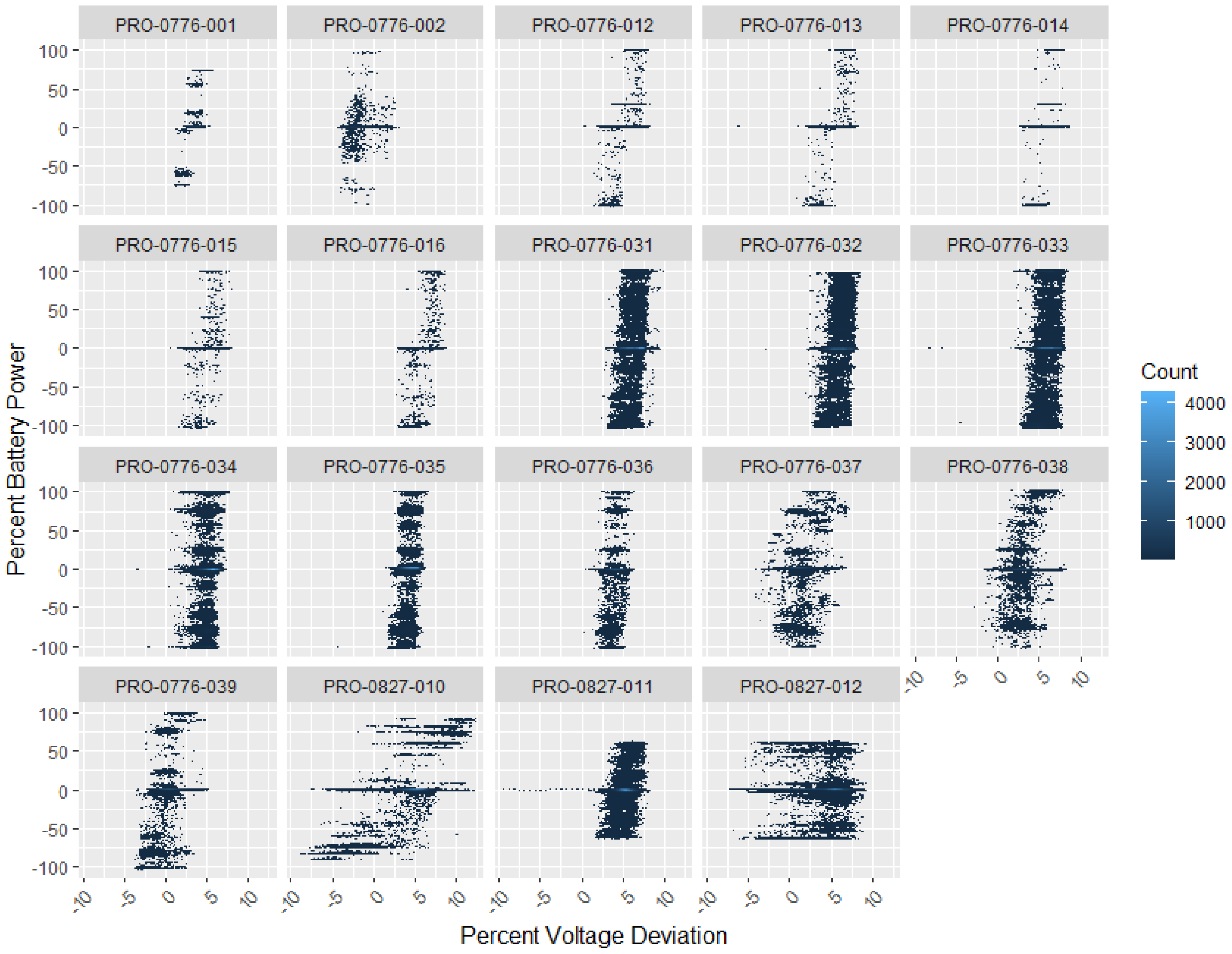
Summary

- The chart on the right illustrates the relationship between battery power and voltage. Each point in the chart represents a 5-minute interval data entry.
- **Battery power** is represented as a percentage of its rated maximum power e.g. 100% indicates the battery is exporting at maximum power.
- **Voltage** is represented as the percent deviation from the battery's assumed rated voltage. As we don't currently have information on each battery's rated voltage, we have assumed a voltage rating of 230V and excluded large batteries from this analysis. The inclusion of actual battery voltage rating will be introduced in the next data survey.
- In the figure, we can see there is variation in the relationship between battery power and voltage. Some batteries maintain a more consistent voltage independent of battery operation while other batteries have more variation in voltage. The next couple of slides explore this relationship in more detail.

Percent battery power vs percent voltage deviation



Voltage behaviour in different battery operating modes

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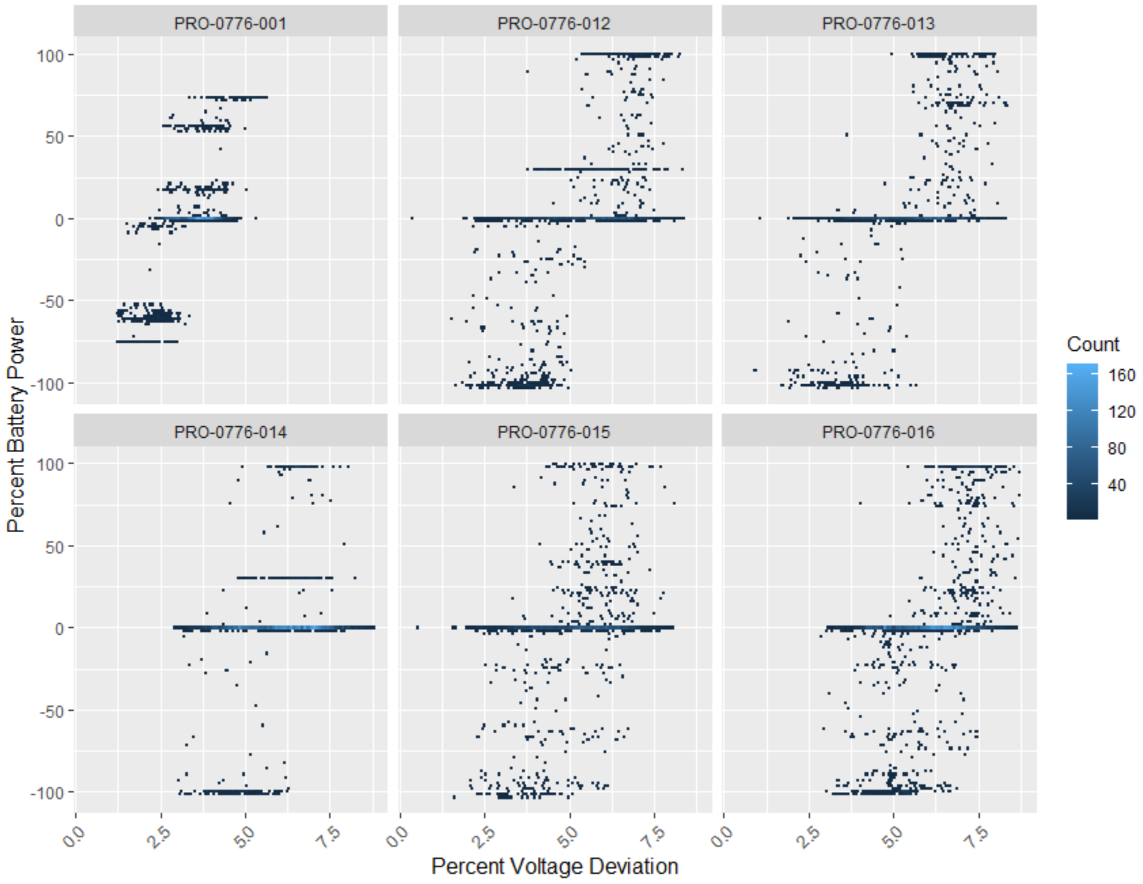
Summary

- The figure on the right includes batteries that demonstrate weaker voltage management. When the batteries are exporting (positive percent battery power) voltage tends to be high, while when the batteries are importing (negative percent battery power) voltage tends to be low.
- However, the range in voltage deviation is within regulation as it is within -6%/+10%.
- While power and voltage can be seen to be corelated, determining the direction of causality will require an analysis of higher resolution data. This can be achieved in future studies.
- We can also see some batteries use fixed set-points for battery operation which are illustrated by the horizontal lines. For example, battery **PRO-0776-014** often exports at either maximum power or at ~27% of capacity and charges at full capacity when its importing.

Percent battery power vs percent voltage deviation

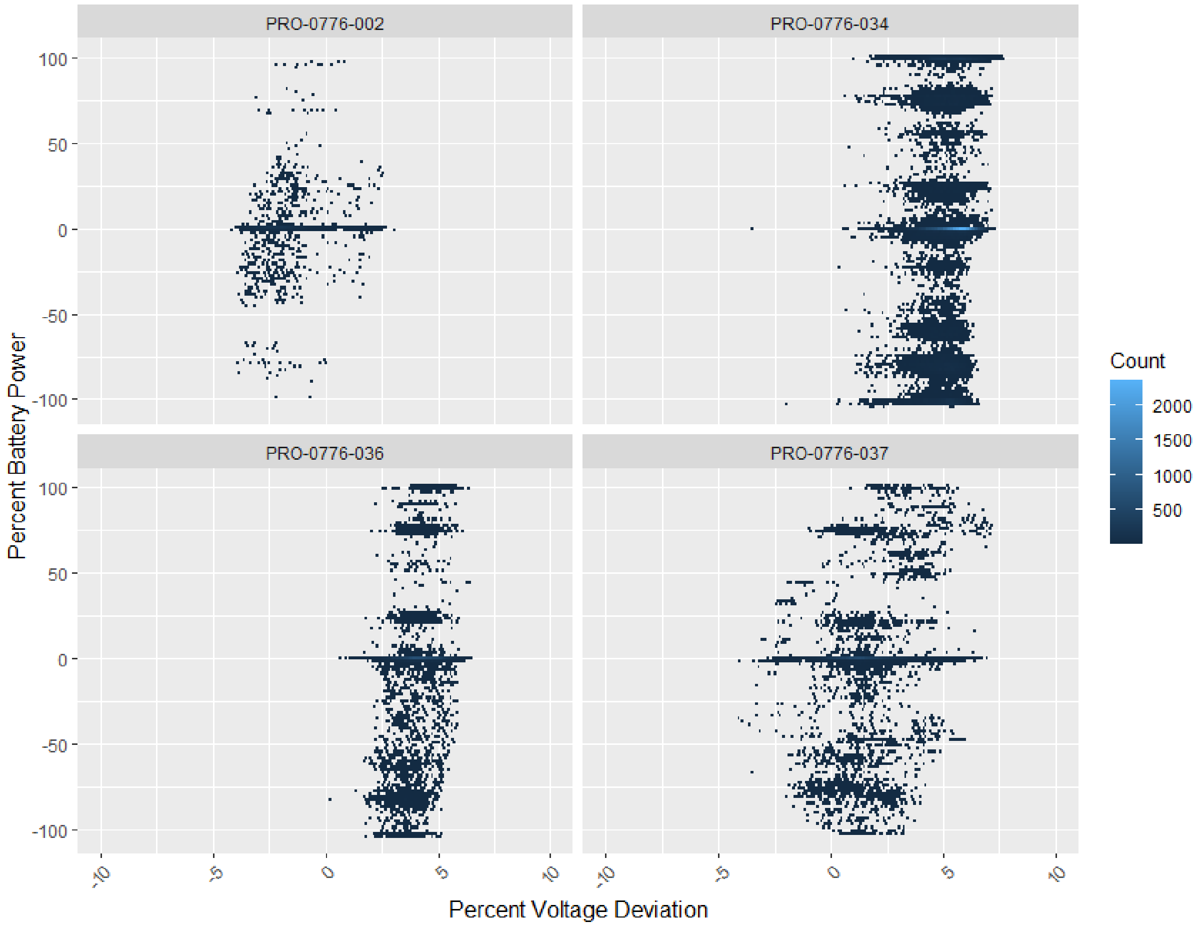


Batteries with more consistent voltage

Summary

- The figure on the right includes batteries that maintain a more consistent voltage regardless of whether the battery is charging or discharging. These batteries also have a tighter percent voltage deviation
- We can see that these batteries also use fixed set-points for battery operation. For example, battery **PRO-0776-036** often discharges at 25%, 75%, and 100% of maximum rated power and charges at more varied power levels.
- These network areas exhibit good voltage regulation as voltage deviation is always within -6%/+10%.

Percent battery power vs percent voltage deviation



Future analysis

Potential further research topics

1. **Portfolio operating "archetypes" via clustering (behaviour patterns)**
   Apply clustering to 5-minute time-series (kW/kVar, SoC, voltage, net power, solar) to identify repeatable operating modes (e.g., solar soaking, peak discharge, constraint-driven operation) and how they vary by function and project context.

2. **Voltage management effectiveness & local hosting capacity uplift**
   Quantify when battery charging/discharging correlates with improved voltage stability using interval voltage (min/avg/max, multi-phase) and battery power; then use the 1-second "snapshot" voltage/power data to test causality at selected sites.

3. **Dynamic Operating Envelopes (DOEs): limits, behaviour, and outcomes**
   Assess how changing import/export limits influence dispatch patterns, SoC trajectories, and voltage outcomes, comparing static vs dynamic connection arrangements and "min/max limit" fields. This directly tests controllability and network-benefit claims.

4. **Reactive power utilisation and voltage support capability**
   Analyse kVar behaviour alongside voltage profiles to understand whether batteries actively use reactive power for voltage regulation, when it occurs, and whether it reduces voltage excursions compared with real-power-only strategies across similar sites.

5. **Solar co-location and net-power interactions (solar soaking vs congestion**
   Use "solar co-located", solar generation (kW), and net power (kW) fields to test whether batteries actually absorb midday solar and reduce export peaks, and how this differs for behind-the-meter vs standalone configurations.

6. **Market participation vs operating behaviour (FCAS/spot/tariffs)**
   Compare operating patterns for batteries with different market registrations (spot, FCAS categories, WEM services) and tariff arrangements, using enablement fields (e.g., RAISE/LOWER products) alongside dispatch and SoC profiles to infer value-stack strategies and outcomes.

7. **Network support events: performance, frequency, and reliability impacts**
   Combine event records (network support, critical peak pricing, battery offline) with interval power/voltage to measure response magnitude, duration, repeatability, and any reliability penalties (e.g., faults/availability), informing "network services" value propositions.

8. **Cycling intensity vs warranted limits (utilisation and potential degradation)**
   Estimate cycling and throughput from SoC/power time-series and compare against warranted cycles/life and expected round-trip efficiency. Identify which business models or control strategies drive high cycling and potential longevity trade-offs.

9. **Economics-to-operations linkage: capex/opex/WACC vs utilisation**
   Relate proponent-reported capex/opex categories and WACC to observable operational utilisation (energy moved, peak discharge contribution, service events). Identify cost drivers and whether higher spend correlates with stronger network/market outcomes.

10. **Community engagement approaches vs targeted benefits**
    Use the proponent's targeted community benefits strategy to profile which approaches are most common, how they bundle with "direct/indirect bill relief" or equity goals, and where future proponents may need shared best-practice guidance.

11. **Project timeline slippage: where it occurs and what correlates with it**
    Using the six-monthly schedules (capacity and battery counts) and commissioning dates, quantify slippage patterns across the portfolio and correlate with connection type, land ownership, planning/approvals cost categories, and organisational/project attributes.

12. **Network support readiness": direct control, contracts, and operational signatures**
    Test whether sites with direct DNSP control, network support contracts, or custom tariffs show distinct operational signatures (dispatch timing, set-points, voltage outcomes, event frequency).