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ARENA Community Battery Round 1 Pre-Deployment Challenges & Best Practices Report



Australian Government
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consumer energy
technology, policy & strategy

Acknowledgement & Disclaimer

Acknowledgement

ARENA and enX would like to acknowledge the significant contribution of the Project recipients for participating in multiple knowledge sharing activities that have been summarised in the learnings captured in this report.

Disclaimer

This report was commissioned by the Australian Renewable Energy Agency (ARENA). The report presents the findings of the enX, which was prepared to capture lessons learned by project proponents during the early, pre-deployment stages of community battery rollouts.

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Introduction

Scope of this report

This report captures lessons learned by project proponents during the early, pre-deployment stages of community battery rollouts from concept development through to construction and commissioning (for those project that have achieved that milestone). It covers 16 active projects and 315 batteries being deployed under ARENA's first Community Battery Funding Round. Further information on projects on that round can be found in the [Community Battery Market Snapshot Report](#).

This report aims to identify common challenges and emerging approaches across project elements to support future community battery deployments. By distilling early insights, pain points, and best practices, it provides practical guidance to help project teams avoid known pitfalls and highlights potential resources or interventions that could accelerate sector maturity.

How to navigate this report

This report is structured around a series of modular sections representing the key project elements and sub-elements listed on page 3. These are hyperlinked allowing readers to click through to areas of specific interest, rather than read the whole report from start to finish.

Each project element and sub-elements contains:

1. A description of activities covered
2. A summary of results from a survey of ARENA project proponents where they rated the overall level of difficulty they experienced
3. A qualitative description of the challenges identified
4. A summary of potential solutions and emerging best practices based on proponent survey responses, interviews and other sources.

Figure 1: lifecycle of a community battery project



Project methodology

Key data sources

The findings in this report are based on three main data sources:

- Presentations and discussions at a workshop of ARENA community battery portfolio members, held in Sydney in April 2025.
- The results of a survey sent to all active participants in ARENA's community battery (14 parties responded)
- One-on-one interviews with 14 project representatives (teams or individuals) drawing on their broad experience with community-scale battery projects.

Proponent surveys

Proponents were asked to rate the difficulty they faced for each project sub-element according to the rating scheme outlined in **Figure 2** and were also able to leave comments in the survey to explain their rating. Results have been used to highlight similarities and differences in proponent experiences across each sub-element. They are provided in charts throughout this report.

Proponent interviews

1-hour follow-up interviews were held with each survey respondent to identify relevant context for survey responses, lessons-learned and emerging best practices.

Figure 2: Rating scheme used for project element difficulty assessments

Rating	Rating definition
0 – Not Applicable (N/A)	This project sub-element is not relevant to the project.
1 - Highly Standardised	Processes and methodologies are well-established. Minimal risk or uncertainty. Requires little customisation or adaptation.
2 - Mostly Predictable	Some minor challenges but largely follows a clear framework. Risks are known and manageable. Some customisation may be needed.
3 - Moderately Complex	Involves a mix of standard procedures and unique considerations. Uncertainty and risks require active management. Requires coordination across different teams or disciplines.
4 - Highly Complex	Significant challenges due to variability or uncertainty. Requires innovative problem-solving and adaptability. Dependencies and stakeholder management are crucial.
5 - Exceptionally Challenging	No clear precedent or standardised approach. High risk, uncertainty and complexity. Requires extensive coordination, expertise, and flexibility.

Project elements index

Use these links to navigate to the relevant section of this report. Each page has a [Return to index](#) link in the top right corner to help you move around the report. Here, we also list the average reported difficulty rating (1-5).

Project element / sub-element	$\bar{x}$ difficulty
<u>1. Project Inception, scoping, feasibility, legal & funding</u>	2.8
1.1 Setting project objectives	2.4
1.2 Building a delivery team	2.1
1.3 Engaging stakeholders & partners	3.1
1.4 Demonstrating feasibility & securing funding	2.9
1.5 Legals, insurance & ownership structures	3.3
<u>2. Site selection and working with the community</u>	2.8
2.1 Identifying viable network locations	2.9
2.2 Assessing site suitability	2.7
2.3 Community engagement & managing expectations	2.6

Project element / sub-element	$\bar{x}$ difficulty
<u>3. Technical design, safety, risk management & procurement</u>	2.7
3.1 System sizing, chemistry selection, & integration	2.6
3.2 Energy management system & integration	2.6
3.3 Risk management including fire safety compliance	2.7
3.4 Cybersecurity & data management	2.4
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<u>4. Network connection & working with the DNSP</u>	2.7
4.1 Connection & approval process	2.5
4.2 SCADA, DOEs & DNSP operational requirements	2.8
4.3 Network support service opportunities & settlement	2.9
<u>5. Commercial Model, Tariffs</u>	3.1
5.1 Commercial revenue models	2.9
5.2 Financial & non-financial benefits sharing	2.8
5.3 Offtake agreement, 3rd party lease, etc.	3.8
<u>6. Construction & commissioning, monitoring & evaluation</u>	2.3
6.1 Site planning & integrated testing	2.4
6.2 Technical performance tracking	2.0
6.3 Community benefit & acceptance tracking	2.6

Section 1. Project inception, scoping, feasibility, legal & funding

Section 1. Project inception, scoping, feasibility, legal & funding

This section covers the foundational work required to initiate a community battery project and get it to a bankable, shovel-ready state. Activities span strategic, organisational, commercial, and legal domains, including:

- Defining project objectives across technical, financial, environmental, and social dimensions.
- Building the internal and external team required for delivery, across engineering, legal, finance, community engagement, IT, and commercial functions.
- Mapping and engaging key stakeholders such as DNSPs, councils, community groups, landholders, and retail partners.
- Developing feasibility assessments and business cases, including financial modelling, emissions analysis, and market engagement.
- Securing funding and aligning funding and grant milestones with internal budgeting and approval processes.
- Establishing legal frameworks: contracting vendors, securing land access, managing liability and insurance, and navigating ownership structures and ring-fencing requirements.



Section 1: Survey results

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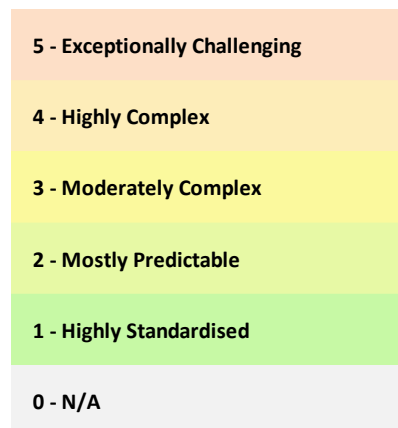
Project sub-elements

Challenges and opportunities in this section are reported against the following project sub-elements:

- 1.1 Setting project objectives
- 1.2 Building a delivery team
- 1.3 Engaging stakeholders/partners
- 1.4 Demonstrating feasibility & securing funding
- 1.5 Legals, insurance & ownership structures

Difficulty ratings

Proponents were asked to rate their difficulty level for each project sub-element against a 6-point scale:

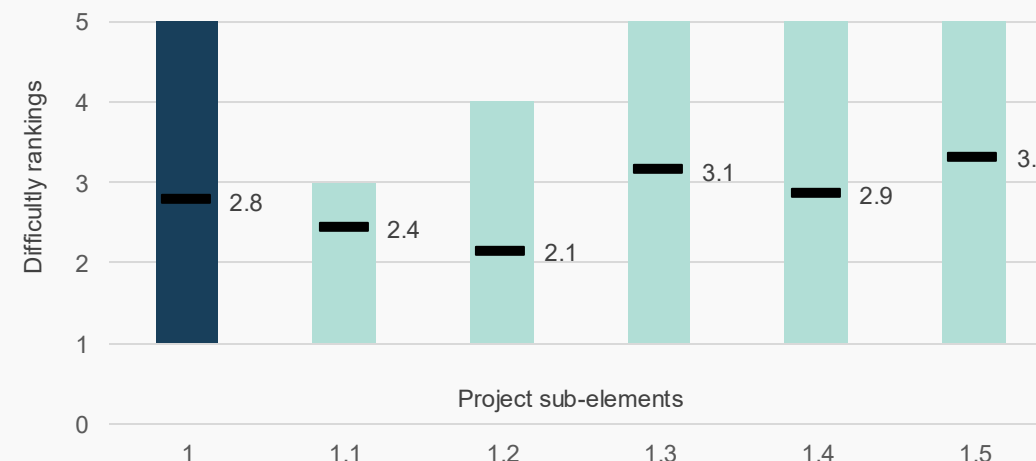


Difficulty survey rating results

Project proponents reported a wide spread of difficulty ratings across most sub-elements with ratings ranging from highly standardised (1) to exceptionally difficult (5) in some cases. The greatest challenges were reported against sub elements 1.3 to 1.5, with 3 proponents ranking legals, insurance & ownership structures as exceptionally challenging. “N/A” ratings are excluded in this analysis.

More detailed results by sub-elements are reported and discussed on the following pages.

Figure 3: Range and average ratings for section 1 and its sub elements



1.1 Setting project objectives

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Activities included in this sub-element

This sub-element includes early-stage work to define the purpose and success criteria of the community battery project. Activities involve:

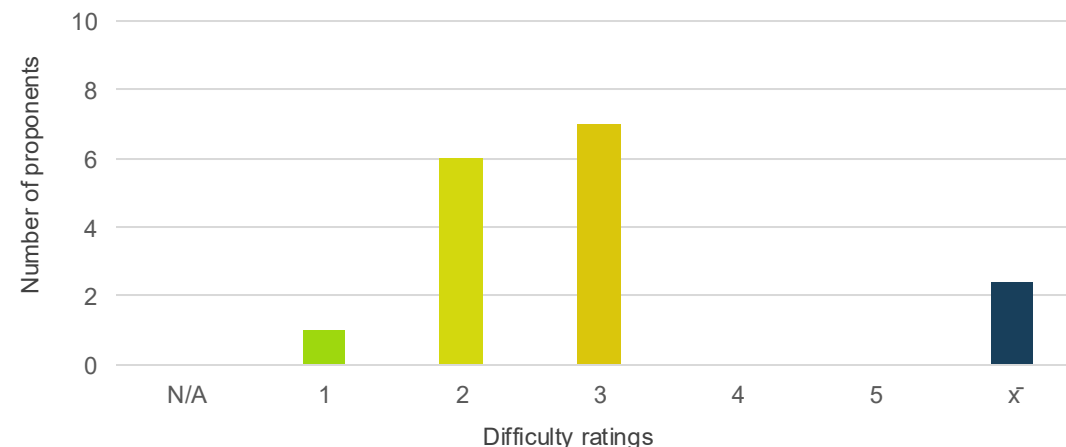
- Identifying and balancing objectives across technical (e.g. grid services, reliability), financial (e.g. cost recovery, stacking value streams), environmental (e.g. emissions reduction, solar hosting), and social (e.g. customer savings, equity) domains.
- Aligning with broader organisational mandates or government targets (e.g. net zero goals).
- Consulting internally across departments and externally with key stakeholders to frame a strategy.
- Translating strategic goals into design parameters (e.g. battery size, ownership model, participation criteria).
- Addressing tensions between network value and community benefit.
- Developing clear narratives for internal approval and external engagement.

Difficulty survey rating results

While setting project objectives was considered relatively straightforward when compared to other project sub-elements, half of the proponents found it highly standardised (1) or mostly predictable (2). No proponents rating it as highly complex (4) or exceptionally challenging (5).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 4: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



1.1 Setting project objectives

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Key challenges identified

Most proponents had well-defined objectives at project outset, often combining network, market, and community benefits. However, balancing these priorities in practice introduced complexity, particularly when integrating traditional network planning drivers (e.g. reliability, deferral value) with newer goals such as customer equity, backup power, or emissions reduction.

Some projects faced internal challenges aligning diverse stakeholders behind a unified business case. Network teams were typically focused on regulated outcomes, while customer or commercial teams emphasised market value and a smaller number explicitly targeting social outcomes such as resilience or cost relief for vulnerable customers. Internal investment committees often required clear risk–return narratives, and one DNSP noted it was difficult to explain hybrid value stacks when board-level familiarity with batteries was still developing.

System size and site context also influenced delivery complexity. Smaller batteries (50–100 kW), often linked to community resilience or customer benefit goals, faced tighter siting constraints and higher scrutiny around safety and noise. Larger systems (≥ 500 kW), designed to capture market revenue or enable network deferral, offered better economies of scale but delivered less direct visibility of benefit to local communities.

Other challenges included:

- Lack of standardised methodologies for estimating avoided emissions or network value.
- Overreliance on informal assumptions rather than structured feasibility studies.
- Early ambition outpacing available data and means (e.g. social housing integration, customer savings estimates).
- Changing regulatory and institutional environments introducing uncertainty mid-project.

Three proponents highlighted the need to regularly revisit and refine objectives to reflect changing technology maturity, stakeholder input, and regulatory settings.

1.1 Setting project objectives

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Potential approaches and solutions

Limit objectives: To manage complexity, several DNSPs recommended anchoring project design around one or two primary objectives, such as network deferral or bill savings for social housing, and treating other benefits as secondary. Trying to maximise all possible value streams often introduced unnecessary delivery challenges and diluted overall effectiveness.

Clear objectives: Framing objectives in plain language, for example, describing outcomes in terms of reliability or community resilience rather than technical metrics, helped projects communicate more effectively with boards, councils, and local residents. Several proponents stressed the importance of clarifying internal goals before initiating external engagement, noting that misalignment often led to overpromising or sunk-cost risks when expectations shifted.

Resilience matters: Backup power capability was as a strong driver of community support, particularly where batteries could serve critical infrastructure. Projects that included this functionality, or clearly explained why it wasn't feasible, tended to experience smoother engagement processes and stronger local buy-in.

Regulatory clarity: Some proponents called for streamlining AER ring-fencing exemptions for community batteries, arguing that current processes added administrative overhead with little competitive risk at small scale. Others emphasised the need for clearer industry governance frameworks to support hybrid delivery models, where regulated DNSP assets interface with commercial operations or customer programs.

Valuing social benefits: Projects that targeted equity outcomes, such as supporting renters or social housing residents, noted the additional complexity and cost involved, and suggested these goals should be more formally recognised in funding objectives. Similarly, proponents seeking to deliver resilience or solar hosting benefits highlighted the difficulty of quantifying and monetising those outcomes under current market frameworks.

Tangible outcomes: Several teams underlined the value of clearly documenting how project outcomes would be measured and reported, particularly for environmental and social benefits to ensure early alignment across design, delivery and monitoring activities.

Evaluation templates: Proponents suggested that shared templates could be developed to support more consistent evaluation. Standardising the way outcomes are defined, measured and tracked would also make future evaluation and replication easier across the sector.

1.2 Building a delivery team

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Activities included in this sub-element

This sub-element focuses on assembling and organising the internal and external team responsible for delivering the project. Activities typically include:

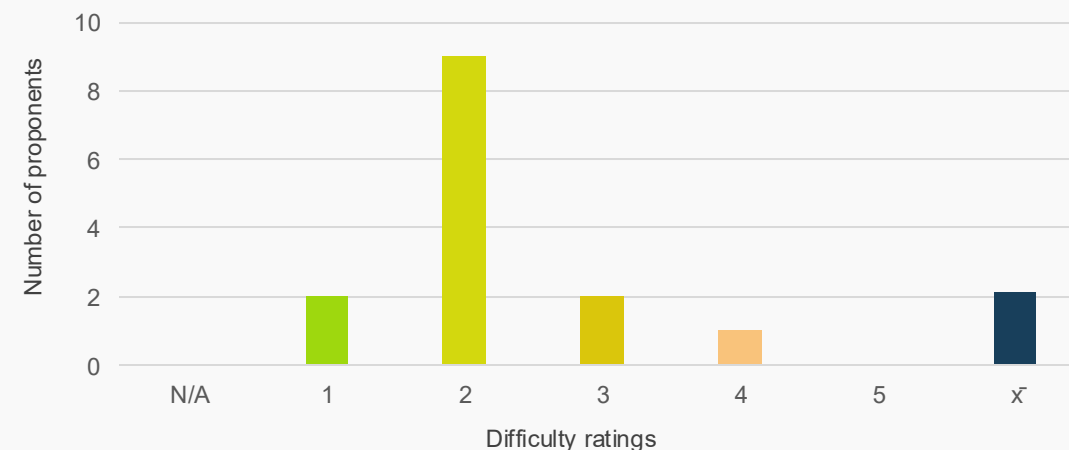
- Identifying the required disciplines (e.g. engineering, legal, procurement, regulatory, community engagement, data, cyber, commercial).
- Allocating internal roles and responsibilities across project phases (planning, delivery, operations).
- Engaging delivery partners such as retailers, OEMs, EPC contractors, and IT providers.
- Establishing governance, decision-making structures, and reporting protocols.
- Coordinating across departments or organisations with different cultures, incentives, and workflows.
- Filling capability gaps, either by upskilling internal staff or procuring specialist consultants.
- Managing resourcing and continuity through long funding and procurement timelines.

Difficulty survey rating results

While relative ease in this area is somewhat related to organisational size, this was not a blanket result. Overall, this sub element had the lowest difficulty rating across the proponent with an average of 2.1 and a median of 2.

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 5: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



1.2 Building a delivery team

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Key challenges identified

For DNSPs, a common challenge was that community battery projects typically straddled regulated and unregulated business units, often requiring collaboration between teams that do not usually work together. This included internal coordination across engineering, regulatory, strategy, commercial, customer engagement and legal teams, all of whom had a stake but approached the work with different lenses.

One of the most persistent difficulties was resourcing the early project phases. Several proponents reported needing to sustain years of preparatory work, including stakeholder engagement, feasibility assessments, and grant applications, before any funding was confirmed. This created tension between maintaining project momentum and justifying provisional staffing or external engagement without formal budget approval.

Battery deployments represented a new asset class for many proponents, requiring teams to build capability from the ground up. Others brought more direct experience with DER or large-scale batteries but still faced challenges forming integrated, end-to-end delivery teams. Across all projects, successful delivery relied on bridging internal silos and creating shared understanding across technical and non-technical domains.

Accessing subject matter expertise proved difficult, particularly in smaller organisations where key staff were already stretched. Control room teams, for instance, were sometimes hesitant to take on new assets, with one describing batteries as “another mouth to feed.”

Where external delivery partners were involved, such as aggregators or retailers, negotiating roles, responsibilities, and commercial arrangements proved highly resource-intensive. These processes were especially challenging when internal legal or procurement teams lacked experience with non-traditional delivery models or energy market contracts.

Project continuity was another challenge. With most deployments stretching over multiple years, staff turnover was common, both within project teams and among stakeholders or delivery partners. Several teams found themselves having to re-brief new decision-makers midstream, often without the benefit of structured onboarding materials. This created risks of delays, duplication, or lost context.

Consultants were found to be valuable for well-established tasks like procurement and modelling, but less helpful when projects required novel or innovative approaches. Some proponents found external advice often echoed internal views adding little new insight. Several reported spending over \$500,000 on consultancy pre-deployment, underscoring the need for strong internal coordination to extract value.

1.2 Building a delivery team

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Potential approaches and solutions

Clear roles: Projects that progressed smoothly generally invested early in cross-functional alignment. Several DNSPs emphasised the value of a dedicated project lead with both technical fluency and strategic oversight to bridge gaps between internal teams.

Using consultants: Consultants were most effective when focused on well-defined tasks such as financial modelling, procurement support, or standards interpretation. However, several projects noted that external advice was less useful when navigating novel technical or delivery models. In those cases, internal ownership and cross-team learning were more effective.

Senior buy-in: A few teams overcame early-phase resourcing barriers by securing provisional Board-level budgets or progressing work “at risk” under clearly defined staging plans. This allowed internal workstreams to begin ahead of formal funding agreements, while managing financial exposure.

Outsourcing: One project clearly recommended organisations commit to delivering the project fully in-house or fully outsourced, for efficiency and clearer accountability lines. In contrast, mixed approaches, where responsibilities were split between internal teams and external providers—often led to management burdens, unclear decision-making, and delays.

Internal communications: Tailored internal communications were key to maintaining alignment. Some projects suggested that, rather than broad updates, one-on-one briefings and informal conversations were more effective in bringing internal stakeholders along. Building internal understanding of the battery value stack, especially among finance and executive teams, helped secure support and justified investment over traditional infrastructure.

Control room engagement: Involving control room staff early helped clarify expectations around battery autonomy, with operators expressing a strong preference for systems that could operate autonomously, with minimal operational burden.

Team templates: Several proponents recommended industry or government create a basic delivery team template, mapping typical capabilities, resourcing levels, and coordination needs across each stage of a community battery project. This could help smaller or less experienced proponents avoid blind spots, particularly around IT, regulatory, and market-facing roles.

1.3 Engaging with stakeholders & partners

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Activities included in this sub-element

This sub-element encompasses early and ongoing engagement with key stakeholders necessary to deliver and operate a community battery project. Activities include:

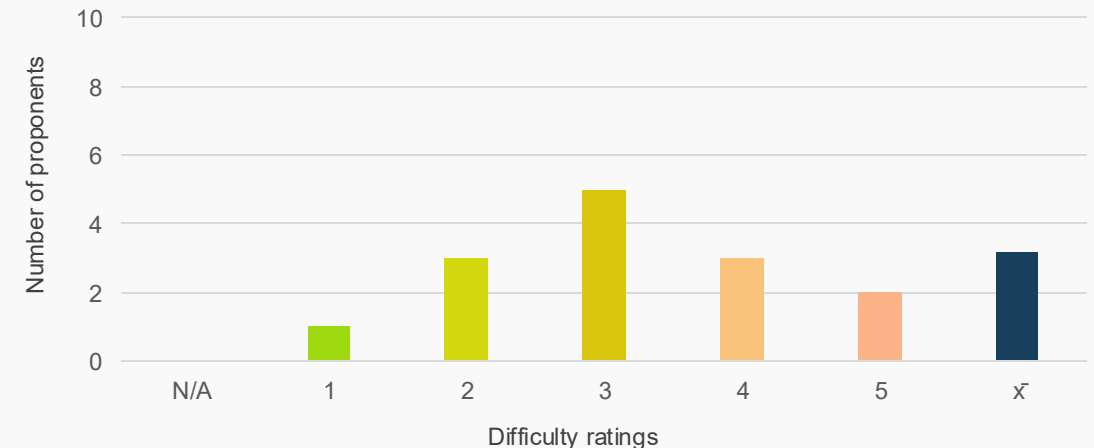
- Mapping and identifying critical stakeholders (e.g. councils, DNSPs, retailers, landholders, OEMs, community groups, regulatory bodies).
- Conducting early discussions to understand needs, expectations, and constraints.
- Establishing partnership structures, roles, and responsibilities (e.g. via MoUs, letters of support, steering committees).
- Gathering site-specific intelligence from planning authorities and DNSPs.
- Co-designing elements of the project with community representatives or commercial partners.
- Managing communications and expectation-setting across diverse audiences (from technical staff to elected officials).
- Aligning timelines, procurement approaches, and approval processes across organisations.

Difficulty survey rating results

This project sub-element was relative challenging for proponents with an average difficulty rating of 3.1 and a median of 3 (moderately complex). Seven proponents rating this as highly complex (4) or exceptionally challenging reflecting the tensions that can emerge in stakeholder and project relations, especially when projects are novel or there is a lack of internal experience or external guidance to draw on.

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 6: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



1.3 Engaging with stakeholders & partners

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Key challenges identified

Engagement complexity arose not from the number of stakeholders alone, but from the diversity in professions, expectations, internal processes, and risk appetites. Councils, DNSPs, retailers, and community groups all approached the project from different starting points in terms of interests, capabilities and experience, and this resulted in different experiences in relation to the specific stakeholder management challenges they faced.

Many proponents reported that councils, while supportive in principle, were hard to progress with in practice due to high internal coordination needs. Within a single council, teams responsible for parks, roads, planning, sustainability, and legal often had different concerns and levels of familiarity. The process of aligning them was highly resource-intensive and prone to stalling if key staff left or shifted their priorities.

Retailers varied significantly in their willingness to engage, depending on their internal strategy, capacity, and perception of commercial risk. Some were reluctant to commit to offtake arrangements without long data histories, while others embraced the opportunity for customer acquisition. Proponents had to adapt language and commercial models accordingly.

For DNSPs, even when the project was internally driven, proponents reported difficulty aligning operational, regulatory, and innovation teams. Where DNSPs were external partners, issues included uncertainty about network value of the battery, concern over control of the asset, and limited capacity to partner or work through alternative operational constructs.

Community engagement introduced another layer of complexity. Expectations around ownership, participation, and benefit-sharing were often high, and sometimes mismatched with the technical and financial realities of the project. Several teams noted that if engagement started too early (before funding or feasibility was confirmed) or was too broad, they risked creating expectations they later could not meet.

Timing was also a recurring issue, stakeholders often operated on different planning and approval cycles, making alignment difficult, especially when projects were fast-tracked.

1.3 Engaging with stakeholders & partners

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Potential approaches and solutions

Stakeholder mapping: Proponents highlighted benefits in investing in early in stakeholder mapping and segmentation, identifying who had influence, who had control, and who could enable or block key steps. This helped them tailor messaging and engagement strategies.

Working with councils: Several teams recommended structured, repeatable engagement processes: starting with general briefings for all departments, then tailoring technical and legal discussions to the right teams. Others created toolkits or one-page information packs to quickly align new council staff. Building relationships with both executive and operational layers reduced the risk of “black hole” referrals.

DNSP engagement: With DNSPs, early technical engagement around constraint data, operational use cases, and connection standards helped pre-empt design rework. Where possible, engaging DNSPs in co-design (rather than as gatekeepers) improved responsiveness.

Retailer engagement: To manage retailer engagement, proponents found it useful to provide simple commercial models upfront, even if indicative, to signal clarity on scale, revenue, and risk-sharing. Some provided historical battery data or simulation outputs to increase retailer comfort.

Community engagement: In community engagement, clarity of scope was critical. Teams emphasised setting clear boundaries early (e.g. on what could or couldn't be influenced) and avoiding technical jargon when describing benefits or constraints. A few used local champions, social housing agencies, or trusted intermediaries to build trust and explain complex trade-offs. Several proponents learned the lesson of not consulting too early or too broadly as this can greatly costs without clear engagement benefits.

To overcome timing mismatches, some proponents staged engagement: initiating light early contact for awareness, then intensifying it post-funding or once design parameters were clearer. Once contact is established, maintaining transparency through light touch updates, even when progress was slow, helped sustain goodwill.

Engagement templates: Finally, some suggested that a government or an industry body could convene shared forums or templates (e.g. “how to talk to councils”, “what retailers need to know”) to reduce duplication across the sector and accelerate alignment between projects and stakeholder types.

1.4 Demonstrating feasibility & securing funding

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Activities included in this sub-element

This sub-element covers the full scope of activities related to securing project funding and internal investment approvals. Key activities include:

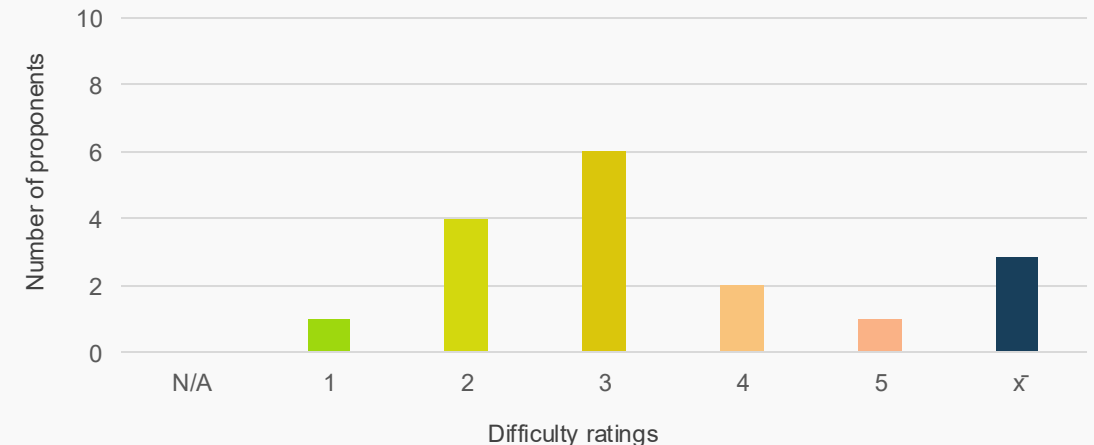
- Developing technical and commercial feasibility assessments (network value, retail revenue, customer benefits).
- Constructing financial models, including capital and operating cost forecasts, revenue stacking, and discount rate assumptions.
- Justifying the business case under regulated or contestable asset frameworks.
- Responding to funder requirements (including milestone structures, cost sharing, and impact estimation & internal approvals).
- Reconciling the difference in timing, expectations, and risk appetite between project funders and project owners.
- Iterating commercial structures (e.g. offtake, benefit-sharing) to close gaps in financial viability.

Difficulty survey rating results

This project sub-element was moderately challenging for proponents with an average difficulty rating of 2.9 and a median of 3 (moderately complex).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 7: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



1.4 Demonstrating feasibility & securing funding

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Key challenges identified

Many proponents noted that while external funding was critical to unlocking delivery, it was sometimes complex to align external funding processes with internal governance structures. A major challenge was the effort required to demonstrate project feasibility prior to securing funding. Proponents described it as a “catch-22”: needing detailed engineering, community, and legal inputs to support funding approaches, but lacking funds to pay for that work without funding being granted. This led some to carry significant costs at risk or ‘unpaid’ work over extended periods.

In some cases, proponents internal finance systems did not provide project cashflows at that level of granularity required for funding negotiations. This created delays and resulted in some proponents needing to provide ‘best estimate’ cashflows.

Smaller-scale deployments continued to face high unit costs due to limited economies of scale. Multiple proponents noted that most batteries were still being procured in low volumes, with limited standardisation. This constrained cost reductions and left some projects struggling to justify value for money without broader rollout plans.

Demonstrating financial viability was also a major hurdle, especially for DNSPs, who are required to model unregulated revenue streams outside their typical business models. While technical feasibility was well accepted, proponents consistently highlighted challenges in quantifying long-term value from network services, resilience benefits, and wholesale market participation. For some, the business case remained marginal despite grant funding, prompting internal discussions about risk and return.

The lack of standard methods for estimating avoided emissions and social benefits further complicated the communication of project value, as non-financial impacts remained difficult to quantify in a consistent way.

In terms of business case development, uncertainty in key inputs, such as network value, capital and operating costs, and energy and FCAS revenues, made it difficult to prove viability. Many projects showed marginal returns including the grant funding, leading to long internal debates about risk appetite.

1.4 Demonstrating feasibility & securing funding

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Potential approaches and solutions

Engaging delegates: Internally, teams that succeeded often ran early cross-functional reviews of their business case, involving finance, strategy, and delivery arms, to ensure buy-in before formal submissions. Those that secured early endorsement from delegates or investment committees also noted fewer issues when navigating the requirements and processes of external funding parties.

Business case management: To address marginal economics, several proponents took a modular or programmatic approach. Rather than justifying viability site-by-site, they presented a portfolio view, with shared delivery costs and co-optimised benefits and risks, to improve the financial case and enable scale. Others leaned on retail partners or DNSPs to secure fixed income through long term off-take arrangements.

Non-financial benefits: In non-financial areas, some proponents developed logic frameworks or simple “impact calculators” to trace expected community or emissions benefits over time. These were used both to support funding bids and internal communications with boards, executives, and government stakeholders.

1.5 Legals, insurance & ownership structures

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Activities included in this sub-element

This sub-element covers the legal and regulatory groundwork required to secure rights to build and operate a community battery project. It typically involves:

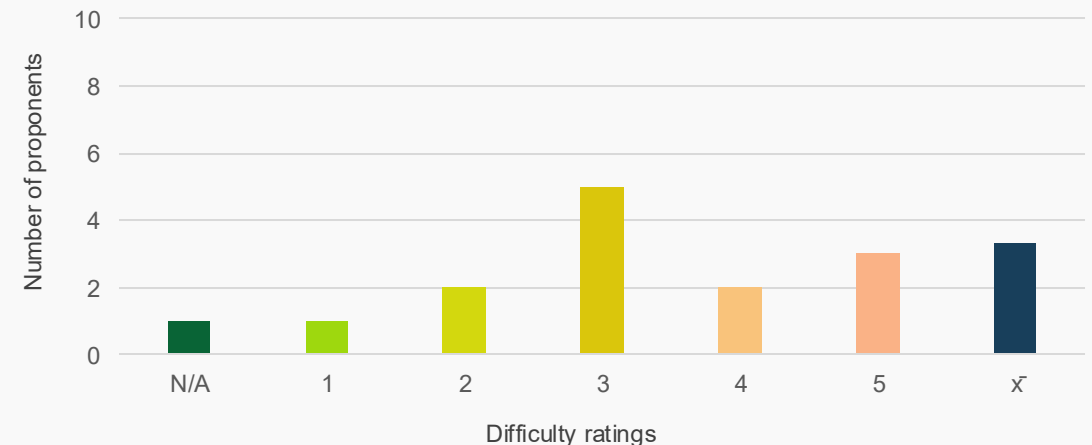
- Negotiating land leases or easements with councils, utilities, or private landowners.
- Drafting and reviewing EPC (engineering, procurement, and construction) contracts, operations and maintenance agreements, and offtake.
- Developing asset ownership structures (e.g. DNSP-owned, third-party owned, joint venture).
- Managing liability and indemnity provisions for high-risk infrastructure, including insurance coverage.
- Navigating ring-fencing guidelines where the DNSP is a proponent or co-owner, requiring regulatory waivers or functional separation.
- Managing legal review across multiple parties, often with differing incentives, timeframes, and internal processes.

Difficulty survey rating results

This project sub-element posed material challenges for the majority proponents with an average difficulty rating of 3.3 and a median of 3 (moderately complex). Five proponents rating this as highly complex (4) or exceptionally challenging (5) while most rated it as mostly predictable (2) to moderately complex (3).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next page.

Figure 8: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



1.5 Legals, insurance & ownership structures

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Key challenges identified

Contracting was resource-intensive and time-consuming, largely due to the novelty of community battery projects relative to traditional infrastructure. Legal complexity increased significantly in multi-party projects, where differing expectations and approval processes had to be aligned, for example, between state agencies, DNSPs, and retailers. Councils and public sector bodies often encountered legal terms standard in EPC contracts that were ill-suited to government-owned land or assets.

Government-led proponents faced particularly long legal pathways due to Crown Solicitor reviews, multi-agency coordination, and staff turnover. Approvals on Crown land required additional community engagement and land use justification.

Liability and insurance were recurring friction points. Battery vendors and EPCs often proposed exclusions that internal legal teams deemed unacceptable. Proponents without deep energy experience struggled to assess what was “market standard.” One project encountered major delays due to late-stage disputes over fire and environmental liability.

Ring-fencing added another layer of complexity. DNSP-owned batteries providing contestable services required individual AER waivers, even for similar deployments, a process described as slow and administratively heavy, especially for small-scale or low-risk assets.

Ownership models also introduced legal and commercial complexity. For one project, transferring asset ownership to customers after 15 years raised concerns about future liability and obsolescence. Another project mitigated this by coordinating procurement with both OEMs and retailers from the outset, though it required extensive external legal support (approx. \$80k) to develop fit-for-purpose contracts.

Insurance and liability were easier to manage for proponents with internal legal and risk frameworks or who could self-insure. Others relied on external legal support but found the absence of battery-specific precedent made even basic terms uncertain. Several proponents suggested battery vendors would benefit from clearer understanding of liability expectations when working with large regulated entities.

Finally, emerging risks, such as battery fire behaviour, cyber liability, and EMS cloud integration, created legal grey areas in handover terms and insurability, especially in novel delivery models.

1.5 Legals, insurance & ownership structures

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Potential approaches and solutions

Managing complexity: To manage legal complexity, several proponents recommended developing clear, modular legal templates early in the project, and ideally before engaging external partners. These included standard site lease agreements, liability frameworks, and heads of agreement for shared ownership or offtake.

Specialist legals: Where public agencies were involved, proponents advised engaging legal counsel with energy infrastructure experience as early as possible. Some projects incurred delays due to misalignment between generalist legal teams and the specific requirements of energy contracting. Others brought in specialist legal advisors mid-project to salvage stagnated negotiations, a reactive but effective step.

Liability principles: Liability negotiations benefitted from early transparency about risk allocation. Projects that included high-level liability principles in their initial MoUs or term sheets sometimes found it easier to resolve contractual details later. A few teams recommended pre-agreed insurance thresholds and environmental response protocols as part of the tender documentation.

Land access: key strategy was working closely with councils across departments from the outset, including legal, planning, and community. Where relationships were strong, councils were more willing to expedite land agreements or tolerate minor non-standard terms. In other cases, proponents shifted sites entirely when councils were unresponsive.

Standing waiver: To reduce regulatory friction, some DNSP proponents called for a standing ring-fencing waiver process or national guideline for DNSP-owned batteries providing limited contestable services.

Public sector proponents: Public sector proponents recommended internal cross-functional legal review forums (e.g. ongoing working groups) to align risk, procurement, and delivery teams.

Contract templating: Several teams suggested that government or industry develop a shared legal resource, such as hosted library of model contracts, common clauses, risk allocation matrices, and ring-fencing precedents. Access to standardised templates tailored to community battery delivery models could streamline legal negotiations, reduce duplicated effort, and help smaller or less experienced proponents avoid costly missteps when structuring contracts for complex, multi-party projects.

Section 2. Site selection and working with the community

Section 2. Site selection and working with the community

This section encompasses the technical, planning, and social processes required to identify and secure a viable location for the battery, and to engage the community meaningfully. Activities include:

- Analysing network data (e.g. hosting capacity, voltage constraints) to shortlist technically viable sites.
- Assessing physical site suitability: zoning, heritage overlays, land tenure, access, topography, and bushfire risk.
- Engaging with councils and landowners to confirm land availability and negotiate access or lease terms.
- Evaluating the likelihood of social licence: historical sentiment, proximity to residences, visibility, and engagement history.
- Designing and delivering community engagement strategies: drop-in sessions, surveys, co-design workshops, and governance mechanisms.
- Managing expectations around benefits, safety, and control.
- Tailoring site aesthetics and layout to the local context (e.g. murals, fencing, landscaping).
- Maintaining transparency and responsiveness over long development timelines.



Section 2: Survey results

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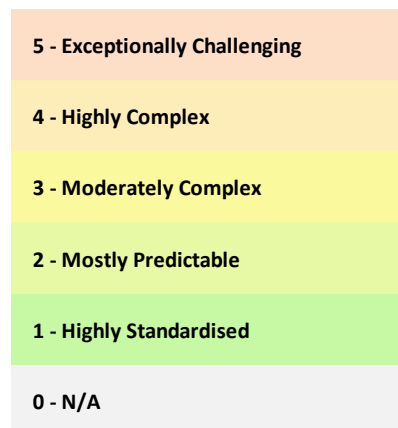
Project sub-elements

Challenges and opportunities in this section are reported against the following project sub-elements:

- 2.1 Identifying viable network locations
- 2.2 Assessing site suitability
- 2.3 Community engagement & managing expectations

Difficulty ratings

Proponents were asked to rate their difficulty level for each project sub-element against a 6-point scale:

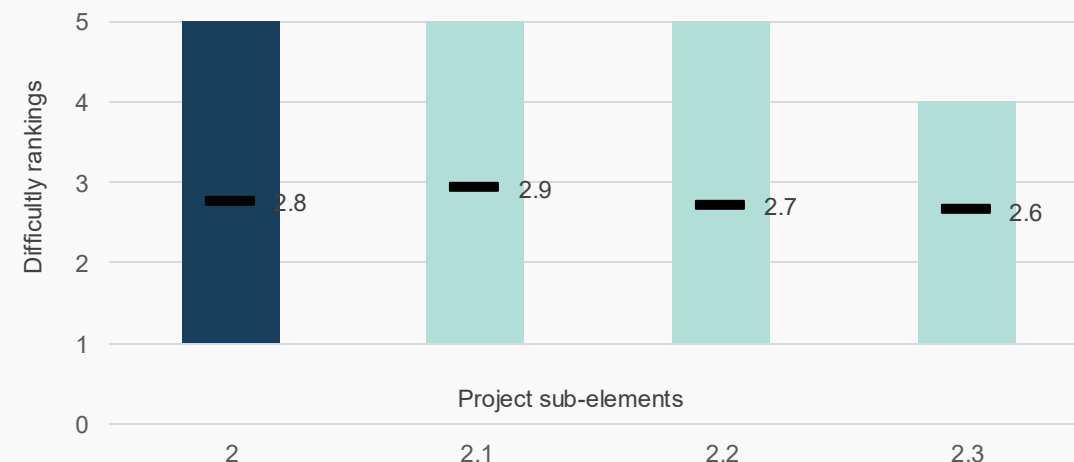


Difficulty survey rating results

Project proponents reported a wide spread of difficulty ratings across the three sub-elements with ratings ranging from highly standardised (1) to exceptionally difficult (5) in two cases. The greatest challenges were reported against sub elements 2.1 to 2.2. “N/A” ratings are excluded in this analysis.

More detailed results by sub-elements are reported and discussed on the following pages.

Figure 9: Range and average ratings for section 2 and its sub elements



2.1 Identifying viable network locations

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Activities included in this sub-element

This sub-element involves identifying where on the network a community battery can provide the most value and be feasibly installed. Key activities include:

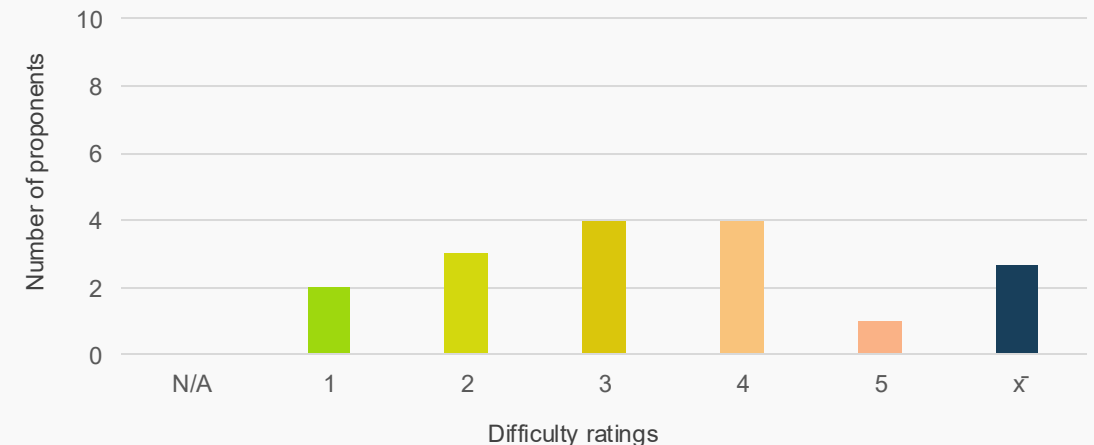
- Analysing network constraint data, including peak demand, minimum demand, voltage issues, and thermal limits.
- Reviewing hosting capacity maps or planning tools from DNSPs or third parties.
- Engaging directly with DNSP planning or future networks teams to validate assumptions.
- Cross-referencing technical viability with practical land access and planning constraints.
- Prioritising locations where network deferral value or operational benefit is highest (e.g. long rural feeders, areas of high rooftop solar penetration, or weak grid zones).
- Shortlisting sites with favourable grid, land, and community characteristics for detailed feasibility assessment.

Difficulty survey rating results

This project sub-element was significantly challenging for the majority of both DNSP and non DNSP proponents with an average difficulty rating of 2.9 and a median of 3 (moderately complex). Five proponents (both DNSPs and non-DNSPs) rated this as highly complex (4) or exceptionally challenging (5) while seven rated it as mostly predictable (2) to moderately complex (3).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 10: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



2.1 Identifying viable network locations

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Key challenges identified

While DNSPs generally had internal capability to analyse hosting capacity and locate optimal sites, other proponents found this process opaque and resource-intensive. In some cases, DNSPs were cooperative and shared feeder-level data, in others, there were delays or reluctance due to perceived data sensitivity or unclear data sharing protocols.

A major challenge was the lack of up-to-date, granular, and easily interpretable hosting capacity data. In several cases, publicly available maps were outdated, limited in spatial resolution, or did not reflect recent network changes. This led to wasted effort investigating locations later ruled out by DNSP engineers.

Even where high-level network constraint data was available, it rarely aligned with practical site installability. Many technically optimal locations lacked accessible land or faced planning constraints, such as parks with heritage overlays or difficult terrain. Conversely, land-rich sites were often in areas with limited grid need. This disconnect required close iteration between network modelling and on-the-ground feasibility. In one case, a project team reconsidered initially identified sites as additional use cases emerged, shifting from pad-mount to potential pole-mounted configurations to suit site and system constraints.

Some DNSP-led projects noted internal barriers. Constraint models built for traditional planning needed adaptation for storage. Differences in assumptions between planning and operations teams led to conflicting views on what constituted a “viable” site. Time-consuming internal approvals further delayed progress.

Some projects experienced delays or cost overruns due to overly optimistic assumptions about network availability. In one instance, a council volunteered land but the entire LGA had no viable grid capacity for a 500 kW battery. This was not discovered until late in the process.

Another issue was that DNSPs preferred to prioritise low-risk “low hanging fruit” locations (e.g. near substations), which sometimes reduced community co-benefits or visibility. Balancing technical viability with project visibility and engagement goals was not always straightforward.

2.1 Identifying viable network locations

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Potential approaches and solutions

Opportunity maps: Successful projects combined technical analysis with practical siting constraints, rather than relying solely on hosting capacity. Teams highlighted the value of overlaying network data with land availability, planning constraints, and social licence. Some developed internal multi-criteria frameworks to support this. In areas with permissive grid conditions but limited land, a “land-first” approach, starting with available council sites and assessing technical feasibility, was effective.

Early engagement: For non-DNSP proponents, early engagement with DNSP planning teams was essential. Public hosting maps were often too coarse to guide decisions; several teams recommended a formal request process for detailed feeder data and interpretation support. Some suggested industry or government establish a standardised DNSP data-sharing protocol.

To reduce rework, some proponents sought DNSP pre-endorsement of site shortlists before engaging communities. Joint reviews between planning and operations teams helped resolve internal conflicts.

Network data access: Early access to live, high-resolution network capacity tools was seen as valuable. Some DNSPs already use internal constraint and risk maps to guide siting.

Site learning: Some teams initially targeted “low-hanging fruit”, sites near substations with existing approvals. Others deliberately selected technically challenging locations to explore the network value of batteries and build internal capability under government funding.

Candidate sites: A few DNSPs created “battery-ready” typologies, such as fenced easements or spare substation land, to simplify rollout. While efficient, these options offered less community visibility. Maintaining a longlist of candidate sites helped avoid delays when preferred sites fell through.

BTM assessments: Behind-the-meter (BTM) projects required detailed site-by-site checks. Considerations included cable length to MSBs, internal vs external placement, future development conflicts, and zoning or heritage overlays. Older sites often needed electrical upgrades.

National siting tool: Looking ahead, some called for a national siting tool that integrates hosting capacity, land use, and social licence indicators to improve early-stage viability assessments and reduce risk.

2.2 Assessing site suitability

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Activities included in this sub-element

This sub-element focuses on evaluating whether a site is actually usable for battery deployment. It includes:

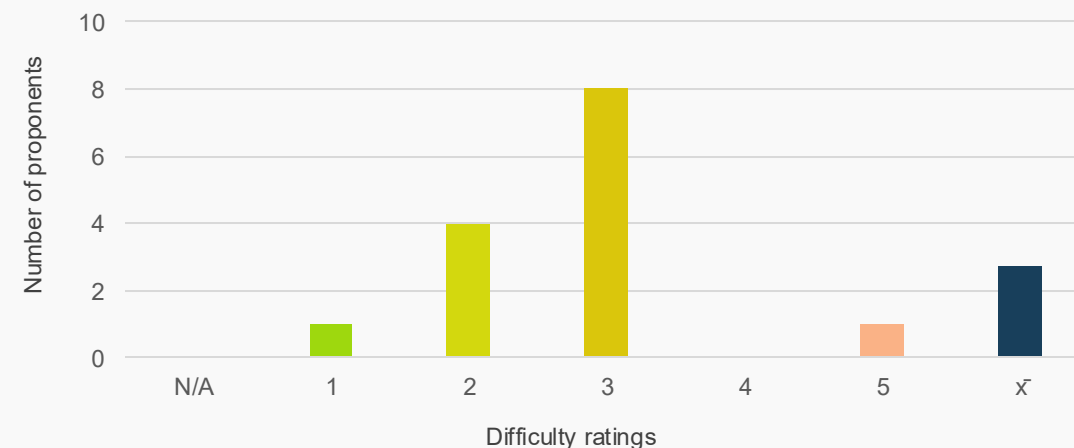
- Reviewing zoning regulations to confirm permissibility of energy infrastructure use.
- Identifying planning overlays (e.g. heritage, vegetation, bushfire, flood zones) that could delay or prevent development.
- Conducting preliminary safety assessments: proximity to residential areas, schools, or sensitive areas.
- Assessing social licence risk: likelihood of community objections, history of infrastructure opposition, or proximity to public spaces.
- Engaging with council planning teams and regulatory bodies to confirm approvals pathways and likely conditions.
- Securing land: ownership, tenure, lease terms, or easement requirements.

Difficulty survey rating results

This project sub-element was moderately challenging for the majority of both DNSP and non DNSP proponents with an average difficulty rating of 2.7 and a median of 3 (moderately complex). Only 1 (government) proponent rating this as exceptionally challenging (5) while twelve rated it as mostly predictable (2) to moderately complex (3).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 11: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



2.2 Assessing site suitability

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Key challenges identified

While not reflected in the survey results, site selection was consistently described as one of the most complex phases of project delivery, requiring far more than just identifying network-viable locations. Most projects used a multi-stage screening process, beginning with hosting capacity, then assessing engineering feasibility (e.g. terrain, flood risk, vegetation, MSB access, heritage overlays), and finally considering social licence and community amenity. Even where technical criteria were met, sites often proved unworkable due to land access challenges, particularly on council-owned land.

Council responses were inconsistent. Some were highly supportive, while others rejected proposals with minimal explanation. Within councils, approvals had to pass through multiple departments, planning, legal, arborist, parks, creating fragmented and risk-averse processes. Even templated leases triggered delays or objections.

Vegetation and heritage constraints frequently caused setbacks. Individual trees or root systems delayed projects, and “significant tree” or heritage overlays ruled out otherwise viable locations. One site required redesign due to unexpected root intrusion. Parks or high-traffic areas were often off-limits due to zoning or aesthetic concerns.

Field visits were critical to confirm desktop assessments, surfacing issues like slope, layout clashes, or overlooked constraints. Where available, environmental frameworks from other infrastructure projects helped streamline site assessments.

Social licence associated with specific sites was hard to predict. Support was stronger in areas with high rooftop solar or social housing, but opposition arose around noise, aesthetics, fire risk or battery safety concerns.

Access to private or state-owned land added further complexity. Lease terms didn’t always match project timelines, and liability or insurance clauses could stall negotiations. Sites with shared governance (e.g. Crown land) presented legal uncertainties.

Planning approvals were also a common bottleneck. In some jurisdictions, even simple installations took 4–6 months to approve, misaligned with grant funding milestones and internal delivery timelines.

2.2 Assessing site suitability

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Potential approaches and solutions

Integrated approach: To navigate site suitability effectively, successful proponents applied a parallel rather than sequential approach, assessing technical feasibility, land access, planning risk, and social licence concurrently.

Many emphasised the importance of early desktop screening to filter out sites with obvious zoning, heritage, or environmental constraints. Using spatial overlays and publicly available GIS tools, some teams developed custom filters to identify “no-go” zones before committing resources.

Council-owned land: strong internal sponsor within the council made a significant difference. Councils that had an integrated sustainability or smart infrastructure strategy, and internal project champions, were often more likely to fast-track approvals and resolve internal tensions. Where these champions were absent, proponents often spent months navigating bureaucracy with limited progress.

Nature and heritage: To reduce tree and heritage risk, some teams engaged arborists and planners early, before finalising designs, and adapted foundations or locations accordingly. In bushfire-prone areas, fire risk assessments and fire response plans were developed in parallel with design to address planning concerns.

Social licence: Social licence risk was mitigated by mapping known points of community concern, e.g. visibility, perceived health or fire hazards, and designing the site layout and communication strategy accordingly. In areas with high concern, visual screens, acoustic barriers, and detailed engagement materials were used proactively. There were several instances where infrastructure design and layout needed major revisions to mitigate concerns such as around noise.

Planning approval: Planning approval complexity was managed by “designing for exemption” where possible. In some jurisdictions, proponents deliberately designed installations below thresholds (e.g. in size or height) to avoid triggering full development applications. Others worked with planning teams to develop standardised design templates that could be fast-tracked.

Battery ready sites: Longer term, several proponents called for shared infrastructure with pre-approved siting (e.g. battery-ready parcels near substations) or streamlined planning pathways for community-scale batteries, similar to solar PV. This would dramatically reduce the site-by-site risk that currently stalls many projects after technical and commercial feasibility has been confirmed.

2.3 Community engagement

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Activities included in this sub-element

This sub-element covers all community-facing engagement before and during the deployment of the community battery. Key activities include:

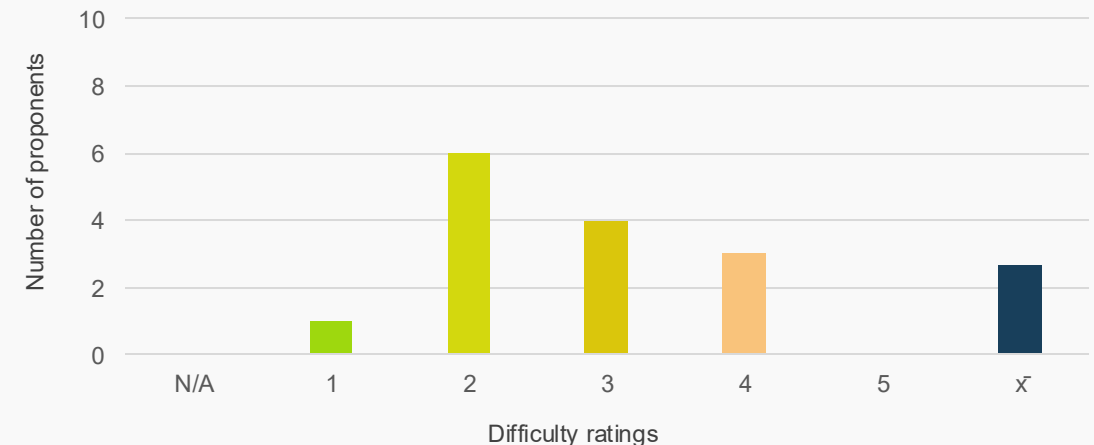
- Informing the community about the purpose, benefits, risks, and scope of the battery in an accessible, non-complex terms.
- Managing expectations around what the battery will deliver (e.g. bill savings, emissions reduction, grid support).
- Identifying local concerns or myths (e.g. fire risk, visual impact, noise).
- Using co-design mechanisms (such as reference groups, workshops, surveys) to involve community members in decisions about location, benefits, or operation.
- Addressing equity issues, ensuring diverse voices are heard, including renters and low-income households.
- Designing the physical appearance of the battery site (e.g. fencing, murals, landscaping) to suit local context.
- Creating feedback loops to report progress and maintain trust throughout development and operation.

Difficulty survey rating results

This project sub-element was moderately challenging for the majority of both DNSP and non DNSP proponents with an average difficulty rating of 2.6 and a median of 3 (moderately complex). Three proponents rating this as highly complex (4) while ten rated it as mostly predictable (2) to moderately complex (3).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 12: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



2.3 Community engagement

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Key challenges identified

Despite modest difficulty ratings in surveys, community engagement was described as one of the most unpredictable and resource-intensive parts of delivering community battery projects. A core challenge was managing expectations, the term “community battery” often led residents to assume shared ownership, household storage access, or direct bill savings. Early government announcements sometimes reinforced these assumptions before technical designs were confirmed. Aligning engagement timing with funding certainty was also difficult: engaging too early risked raising expectations, while waiting too long limited opportunities for input. Aligning engagement timing with funding certainty was difficult: engaging too early risked raising expectations, while waiting too long reduced opportunities for genuine input.

Community responses varied. Some sites were positively received, particularly where batteries delivered visible local benefits, such as backup power to a community centre. Others faced opposition over fire risk, noise, or visual impact. One project was cancelled due to sustained local pushback. Proponents noted stronger engagement when backup functionality was included, and greater difficulty justifying value when it was not.

Site selection was another frequent point of confusion. Communities often questioned why their area was chosen (or not), especially when benefits weren’t clearly explained. Some fire authorities raised safety or compliance concerns late in the process, which could have been addressed earlier with more structured engagement. Some residents raised concerns about fire risk, insurance, and safety—particularly in bushfire-prone areas. Even when risks were low, a lack of accessible information allowed fear and misinformation to spread.

Several proponents found that community engagement required both technical credibility and strong communication skills, a challenge for smaller teams. Some recommended developing shared FAQs and simple explanatory materials to support clear, consistent messaging.

2.3 Community engagement

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Potential approaches and solutions

Ongoing relationships: Successful proponents framed engagement as an ongoing relationship grounded in transparency and shared purpose. A clear engagement strategy, developed early, helped set the tone and ensured consistency across messaging, materials, and timelines. Where existing community consultation processes were already developed for other infrastructure projects, these were successfully leveraged to simplify and streamline the engagement process.

Managing expectations: Instead of using on the term “community battery,” many projects used alternatives such as “neighbourhood energy storage” or “shared grid battery” to set clearer expectations and avoid assumptions about ownership or individual access. Early identification of likely community concerns, via desktop research or conversations with local council officers, enabled teams to prepare responses proactively. Several proponents highlighted the value of having credible third parties (e.g. fire services, energy experts) available during drop-in sessions to reassure the public.

Layered communications: Some projects used layered communication strategies: visual explainer materials, animated videos, FAQs, and even site tours of similar installations. These helped demystify the technology and reduce resistance to technical concepts like “network deferral”.

Codesign: Co-design was most effective when it influenced meaningful aspects of the project, such as benefit-sharing, visual design, or use of surplus funds. Reference groups or citizen panels worked well where there was time to build trust, and where the group’s scope was clearly defined.

Engagement equity: To address engagement equity, some teams partnered with local organisations, including multicultural services, social housing managers, and disability advocates, to ensure broader participation. Others held events at varied times and locations or used translated materials and interpreter services.

Reliance is valued: Resilience (back-up power), increased solar hosting capacity and direct bill savings were reported as among the benefits that gained the highest traction with local communities.

Aesthetics: Several projects used local artists, landscape designers, or schools to help integrate the battery into the local environment and shift perception from industrial imposition to community asset.

Engagement continuity: Overall, maintaining community trust required continuity. Some proponents issued regular project newsletters, hosted ongoing “ask us anything” forums, or designated a single contact person to field questions throughout the lifecycle. These efforts helped keep the community informed and reassured, even when timelines shifted or issues arose.

3. Technical design, safety, risk management and procurement

Section 3. Technical design, safety, risk management and procurement

This section focuses on specifying, designing, procuring, and integrating the technical components of a community battery system, while ensuring safety, compliance, and interoperability. Core activities include:

- Determining system sizing, battery chemistry, and configuration based on network needs, land constraints, and value stack goals.
- Designing and integrating energy management systems (EMS), SCADA, and control architecture, including compatibility with DNSP systems and market platforms.
- Conducting risk assessments and implementing fire safety measures in accordance with evolving standards and site-specific hazards.
- Addressing cybersecurity and data governance: telemetry, access protocols, compliance, and incident response.
- Procuring vendors for EPC and O&M through RFP processes, including evaluation, contracting, delivery coordination, and vendor performance management.
- Ensuring end-to-end compliance with Australian Standards, electrical safety regulations, and DNSP connection requirements.



Section 3: Survey results

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Project sub-elements

Challenges and opportunities in this section are reported against the following project sub-elements:

- 3.1 System sizing, chemistry selection, and integration
- 3.2 Energy management system & integration
- 3.3 Risk management including fire safety compliance
- 3.4 Cybersecurity and data management
- 3.5 EPC & O&M contracting & procurement strategy

Difficulty ratings

Proponents were asked to rate their difficulty level for each project sub-element against a 6-point scale:

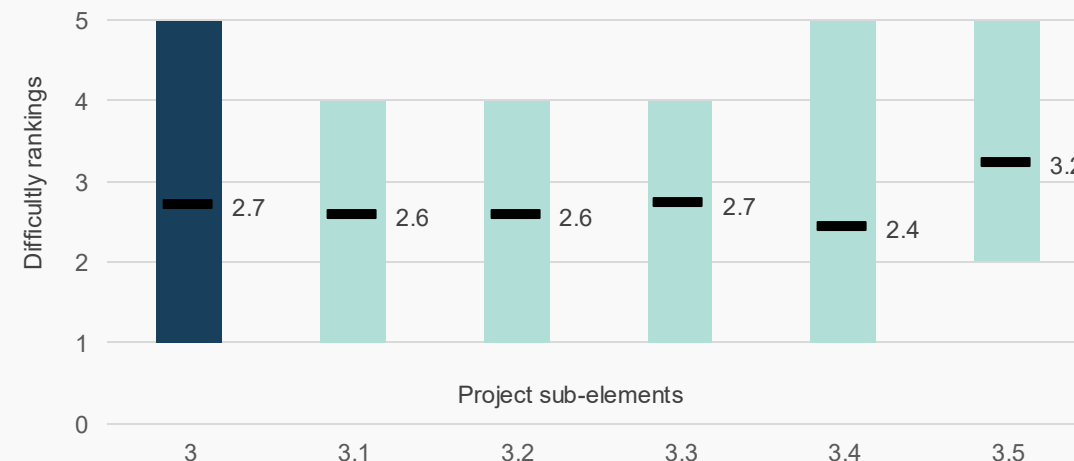


Difficulty survey rating results

Project proponents reported a wide spread of difficulty ratings across the five sub-elements with ratings ranging from highly standardised (1) and up to exceptionally difficult (5) in two cases. The greatest challenges were reported against sub elements 3.4 & 3.5. “N/A” ratings are excluded in this analysis.

More detailed results by sub-elements are reported and discussed on the following pages.

Figure 13: Range and average ratings for section 3 and its sub elements



3.1 System sizing, chemistry selection, and integration

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Activities included in this sub-element

This sub-element focuses on determining the technical specifications and physical characteristics of the battery system, aligned with project objectives and site constraints. Activities typically include:

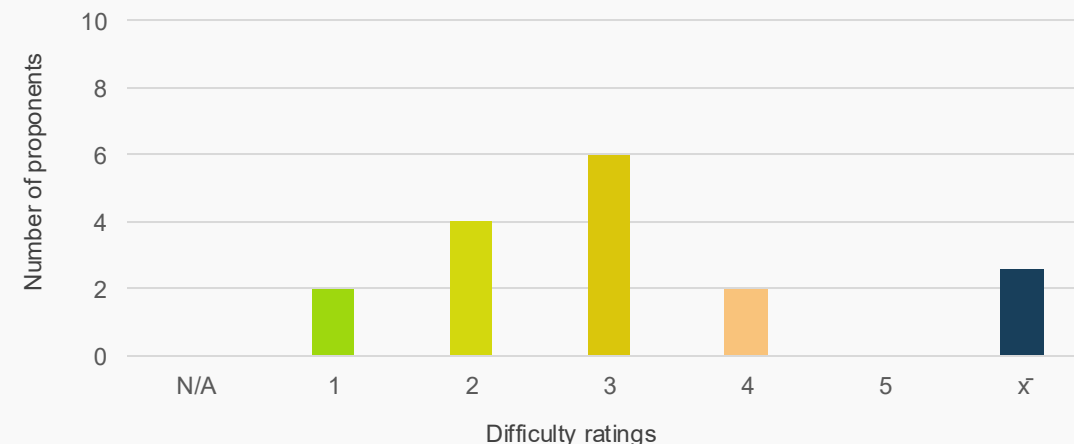
- Defining the optimal battery size (kW and kWh) based on grid needs, customer base, load profiles, or value streams.
- Selecting battery chemistry and configuration, mostly Lithium Nickel Manganese Cobalt Oxide (NMC) or Lithium Iron Phosphate (LFP) considered for specific use cases.
- Considering containerised vs modular vs custom form factors, including housing and cooling systems and ensuring compatibility with site conditions: land footprint, temperature, noise constraints, visual impact.
- Performing load modelling and grid studies.
- Planning for expandability, redundancy, or staged roll-out if future-proofing is desired.
- Coordinating system design with DNSP requirements, EPC specifications, and land use approvals.

Difficulty survey rating results

This project sub-element was moderately challenging for the majority of both DNSP and non DNSP proponents with an average difficulty rating of 2.6 and a median of 3 (moderately complex). Only two proponents rating this as highly complex (4) while six rated it as highly standardised (1) or mostly predictable (2).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 14: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).





3.1 System sizing, chemistry selection, and integration

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Key challenges identified

System sizing was a critical decision point with financial, operational, and stakeholder implications. Overall, projects struggled to balance competing goals such as maximising network and market value, staying within land and budget limits, and avoiding overengineering.

Batteries were typically sized as large as site constraints allowed to maximise economies of scale, though many decisions were driven by network rather than market logic. Several participants suggested that longer-duration systems (2+ hours) would have been more cost-effective, as \$/kWh improves significantly with scale. Where multiple use cases were targeted (e.g. network deferral, arbitrage, FCAS), sizing became more complex. Some batteries were too small for FCAS eligibility; others were too large to fit on viable land parcels.

Proponents reported difficulty sourcing accurate load data at the right spatial and temporal granularity. Without this, sizing was sometimes based on theoretical assumptions or stylised load profiles, which later misaligned with operational realities. In a few cases, batteries ended up underutilised because anticipated network peaks or export curtailment didn't materialise as modelled.

To manage delivery complexity, several proponents prioritised standardisation in design and procurement. Avoiding overengineering, particularly in civil works like foundations, was a key lesson from early deployments.

Battery chemistry choices were discussed by projects as a trade-off between improved fire safety (including lower toxicity of suppression gases and better thermal stability) and energy density. Fire safety was a dominant consideration, especially for DNSPs and councils. Flow batteries were explored but ultimately rejected due to limited standardisation, supply chain maturity, and integration support.

Integration issues arose when components, batteries, inverters, EMS, came from different vendors. Mismatches in protocols and unclear warranty terms created handover risks. Some EPCs found it difficult to assemble cohesive turnkey systems using non-standard parts.

Environmental and visual constraints also influenced sizing and packaging, especially in dense or visible locations. Batteries were often modified to meet noise, height, or aesthetic requirements, sometimes at the cost of technical optimisation.

3.1 System sizing, chemistry selection, and integration

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Potential approaches and solutions

Balanced approaches: Many proponents approached sizing and integration through an iterative, cross-functional design process that balanced engineering, regulatory, commercial, and community considerations.

Clear objectives: Best practice started with clearly defined performance objectives, such as peak shaving, hosting capacity, or FCAS participation, and worked backwards to determine battery size, chemistry, and control requirements. Where market participation was a goal, sizing for revenue, not just network constraints, helped maximise value.

Lack of data: In cases with limited or unreliable data, proponents used conservative sizing bands and tested outcomes of both under- and over-sizing. In community-facing sites, “right-sizing” to meet visual, acoustic, or planning constraints often took precedence over optimal revenue outcomes.

Vendor engagement: Early engagement with battery vendors, before the RFP stage, was recommended to understand emerging chemistries, cooling methods, and fire safety trends. While switching vendors sometimes enabled better site fit, it could introduce integration risks, which some managed by using EPCs or consultants with specific battery expertise.

Modular systems: Modular containerised systems offered benefits in installation speed and scalability but introduced challenges in suburban areas, particularly around noise and heat. Mitigation strategies included acoustic fencing, landscaping, and ventilation upgrades. Some DNSPs noted the need to align design standards with battery lifecycles, cautioning against overengineering 50-year infrastructure for assets lasting 10–15 years.

Future proofing: some teams pre-installed pads, conduits, or EMS capacity for second-stage batteries. This allowed future augmentation without major redesigns or new planning approvals.

Battery chemistries: Lithium iron phosphate (LFP) was reported as the preferred chemistry for ground-mounted systems due to its lower fire risk, especially in residential or sensitive areas. One project switched from nickel manganese cobalt (NMC) to LFP to meet UL 9540A compliance. Pole-mounted batteries often used NMC chemistries for their smaller size and lighter weight, though standardising these formats took significant effort.

Standardisation: Several proponents suggested the creation of shared sizing templates or design case studies (e.g. “battery sizing for a rural 500-customer feeder”) to reduce duplication and support less experienced teams. Others recommended aligning battery mounts with standard transformer installations to streamline crew training and avoid site-by-site customisation. Standardised, modular designs also reduced costs and avoided unnecessary engineering.

3.2 Energy management system & integration

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Activities included in this sub-element

This sub-element focuses on selecting, designing, and integrating the software and control systems that manage battery operation. Core activities include:

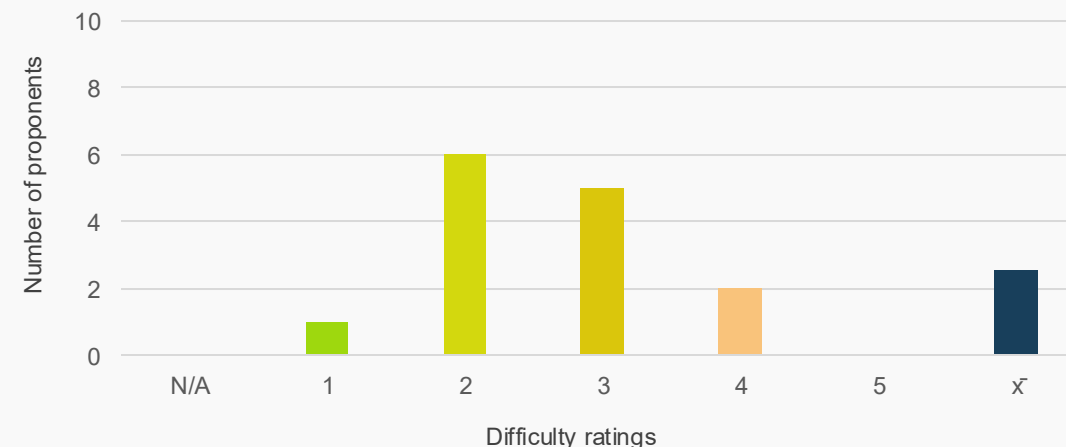
- Specifying the energy management system (EMS) functions: charge/discharge logic, grid compliance, market dispatch, safety protocols, and data logging.
- Integrating EMS with inverter controls, battery management system (BMS), and site SCADA as well as cyber security
- Ensuring compatibility with DNSP operational requirements, including Dynamic Operating Envelopes (DOEs), export constraints, and connection agreements.
- Enabling interoperability with third-party platforms (e.g. VPP aggregators, AEMO market interfaces).
- Designing alerting and fault handling protocols (local and remote).
- Coordinating between software vendors, battery OEMs, EPCs, and DNSPs during commissioning and operation.

Difficulty survey rating results

This project sub-element was moderately challenging for the majority of both DNSP and non DNSP proponents with an average difficulty rating of 2.6 and a median of 3 (moderately complex). Two proponents rating this as highly complex (4) while eleven rated it as mostly predictable (2) to moderately complex (3).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 15: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



3.2 Energy management system & integration

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Key challenges identified

EMS and control system integration was widely seen as one of the most complex and underestimated aspects of deploying community batteries. Unlike traditional infrastructure, batteries require continuous, multi-use control, often involving coordination across several proprietary platforms and stakeholder systems.

A major challenge was fragmentation. Battery vendors, inverter suppliers, and EMS providers were often separate, with incompatible systems and limited integration experience. In some cases, EMS vendors lacked even basic fleet management tools. One DNSP had to bring in a third-party integrator to bridge gaps between its SCADA system and the battery vendor.

Third-party EMS platforms, used for VPP participation or market trading, introduced further complexity. Some operated in parallel with site EMS systems, creating risks of control conflicts or non-compliance. Even basic coordination, such as prioritising network support over market dispatch, required careful logic and negotiation.

Integration with DNSP SCADA systems posed additional friction. Battery integrators often lacked expertise with utility protocols (e.g. DNP3, Modbus), while DNSPs were not always prepared to ingest high-speed data from external devices. One network noted that current backend systems are not yet ready for advanced operational models like real-time DOEs or retailer control, though investment is underway.

Telemetry and data handling were also pain points. Some EMS platforms lacked adequate granularity, storage, or historical logs to meet ARENA or regulatory reporting needs. Others stored data offshore, triggering cybersecurity concerns as discussed under [sub-element 3.4](#).

Finally, few EMS platforms were truly “plug and play.” Most required significant time and effort to test, configure, and validate, often under time pressure due to grant milestones.

3.2 Energy management system & integration

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Potential approaches and solutions

Energy management systems: Successful projects treated EMS design as a major workstream, allocating dedicated time and resourcing from the outset rather than leaving it to late-stage procurement.

A key lesson was to embed detailed EMS specifications in tenders, covering control logic, data protocols, cybersecurity, storage location, reporting formats, and interface expectations. Projects that took this approach saw fewer integration issues. Many adopted a “systems integrator” model, assigning responsibility for end-to-end compatibility across BMS, inverter, EMS, and SCADA.

SCADA integration: DNSP-led projects benefited from early collaboration between internal SCADA/IT teams and EMS vendors. In some cases, they co-developed configurations or built custom interfaces to align telemetry streams. For multi-party control (e.g. DNSP + retailer), some teams defined layered hierarchies, giving DNSPs override rights under network constraint events. These were built into commissioning and compliance processes.

Low touch designs: Some proponents emphasised the need for autonomous, low-touch designs, particularly valued by control room teams.

Data security: To manage data and security, projects defined API formats, granularity, and cloud sovereignty, with some mandating onshore data storage or ISO 27001 compliance. One DNSP required firmware updates via a controlled, air-gapped interface.

Third party aggregators: Several used existing VPP platforms to avoid bespoke EMS builds. Teams also stressed the importance of defining allowable charge/discharge behaviours early to protect network integrity, and avoiding late integration by involving SCADA and ops teams from the start.

Third party integrators: Where internal or vendor capability was limited, third-party EMS integrators bridged technical gaps. Independent communications architecture was used where internal systems required isolation.

Reference architectures: Several participants suggested shared EMS reference architectures or one-page integration guides could help non-technical stakeholders better understand design needs and risks, particularly during early planning or procurement.

EMS commissioning: This was most effective when treated as a separate milestone, with time for staged testing, fault injection, and operational validation before handover. Bundling EMS into final construction often introduced avoidable risk.

3.3 Risk management including fire safety compliance

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Activities included in this sub-element

This sub-element deals with identifying, mitigating, and managing risks across the lifecycle of the battery project, with particular attention to fire safety, regulatory compliance, and operational hazards. Activities include:

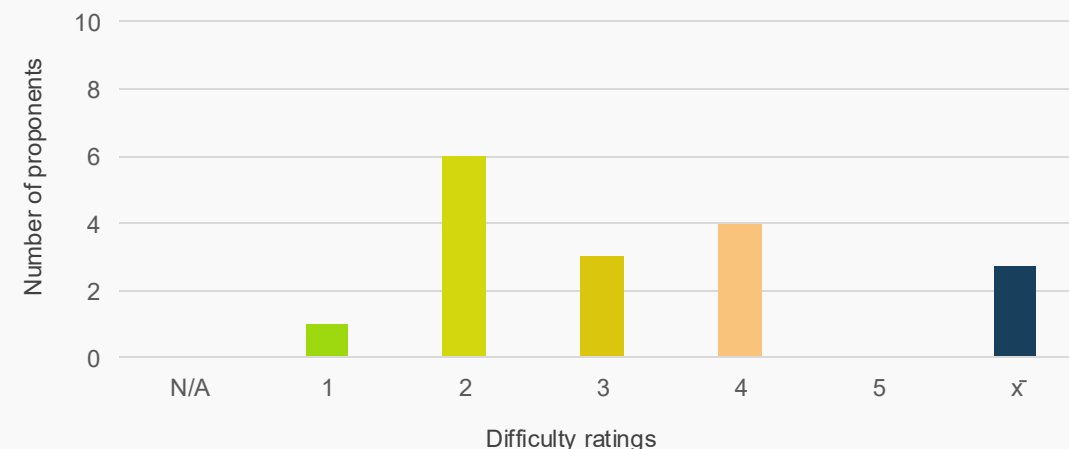
- Conducting formal risk assessments (e.g. HAZID, HAZOP, FMEA) during design and construction.
- Developing fire safety plans in accordance with Australian Standards (e.g. AS 5139, AS 5381) and local fire authority requirements.
- Designing for physical separation, blast radius, and exclusion zones and implementing fire detection, suppression, and containment systems appropriate to the battery chemistry and site.
- Ensuring compliance with Work Health and Safety (WHS), environmental, and electrical safety regulations.
- Establishing emergency response plans, including first responder training and signage.
- Mitigating other risks such as vandalism, cyber intrusion, supply chain issues, and environmental impacts.

Difficulty survey rating results

This project sub-element was significantly challenging for many proponents with an average difficulty rating of 2.7 and a median of 3 (moderately complex). Four proponents rating this as highly complex (4) while only three rated it as highly standardised (1) or mostly predictable (2).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 16: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



3.3 Risk management including fire safety compliance

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Key challenges identified

Risk management, especially fire safety, was a critical concern for both project proponents and stakeholders, with heightened public and regulatory scrutiny following high-profile battery incidents in Australia and overseas.

Proponents reported wide variation in how fire risk was assessed and managed. One project undertook a detailed internal review and warned that many operators may significantly underestimate their true fire liability exposure. Larger organisations were sometimes able to leverage existing emergency response capabilities. There was concern about smaller or less-resourced proponents keeping pace with evolving best practice.

The regulatory landscape itself was a challenge. The interpretation of fire safety standards is “evolving”, creating some uncertainty about how they should be applied. Conflicting interpretations from fire authorities and certifiers compounded the confusion. Several projects expressed support for more fit-for-purpose fire safety standards for community-scale batteries.

Site-specific requirements, including separation distances, fire-rated enclosures, and suppression systems, often introduced significant design rework. Projects located near public areas or dwellings had to revise layouts or container types to meet emerging safety expectations.

In many cases, vendor fire risk data was difficult to obtain early. Some proponents found key information missing, such as thermal runaway behaviour or hydrogen fluoride (HF) emission modelling. However, vendor transparency has improved over time, with some now offering detailed documentation and video evidence of fire testing.

Fire authorities were generally supportive but varied in capacity and familiarity with battery systems. Some required detailed Fire Engineering Reports (FERs) or third-party modelling to validate safety claims, creating delays and additional cost, particularly where standards were ambiguous or inconsistently applied across jurisdictions.

Insurance and liability concerns further complicated delivery. Coverage was often unavailable or unaffordable until detailed risk mitigation plans were approved. Several projects discovered late in the process that their specified systems lacked compliant fire detection or suppression hardware.

Other risks, such as vandalism, noise complaints, or software faults, were often overlooked in early design phases and only addressed reactively. Proponents noted the absence of a comprehensive, standardised risk framework tailored specifically to community battery deployments.

3.3 Risk management including fire safety compliance

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Potential approaches and solutions

Early engagement: Effective risk management started with embedding safety and compliance into early design. Proponents who engaged WHS and fire engineers from the outset were better able to design for compliance, avoiding costly redesigns post-procurement. To manage fire risk, leading projects conducted assessments and engaged local fire authorities early. Some commissioned independent reviews or Fire Engineering Reports to pre-empt insurer or regulator concerns, an upfront investment that reduced delays later.

Safety by design: Systems with integrated fire suppression, thermal runaway detection, and fire-rated containers were increasingly favoured, even at higher cost, for their clearer compliance pathways and reassurance to stakeholders. LFP chemistries were often chosen for their lower fire risk, especially on community or council land. Some projects mandated these features through procurement.

Fire & insurance: Smaller proponents were advised to assess fire liability exposure carefully and ensure insurance and emergency response plans were in place. Several suggested minimum safety and insurance standards could help level the playing field for non-DNSP-led projects.

Vendor documentation: Documentation quality from vendors was variable. Proponents called for earlier access to detailed fire risk data, such as HF emissions, suppression performance, and thermal event modelling, to inform procurement and design decisions.

Safety documentation: Some projects developed pre-approved safety design templates to streamline approvals, covering fencing, signage, blast zones, and emergency access. Others created SOPs and training materials for local first responders.

Enhancing standards: Several projects recommended strengthening Australian standards (particularly AS 5139) to better reflect commercial-scale risks and called for a national community battery safety guide to consolidate lessons, clarify responsibilities, and support less-resourced proponents.

Risk assignment: Multi-vendor projects used structured risk assignment and handover matrices to clarify responsibilities across civil, electrical, and software scopes. This helped avoid gaps and confusion during commissioning or fault response.

Risk narratives: Finally, clear public communication, in accessible, non-technical language, was seen as critical to securing social licence. Projects that proactively explained safety measures and emergency protocols tended to receive stronger community support, even in sensitive or high-visibility areas.

3.4 Cybersecurity and data management

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Activities included in this sub-element

This sub-element covers the systems, protocols, and governance arrangements used to manage data and protect the community battery from cyber threats. Key activities include:

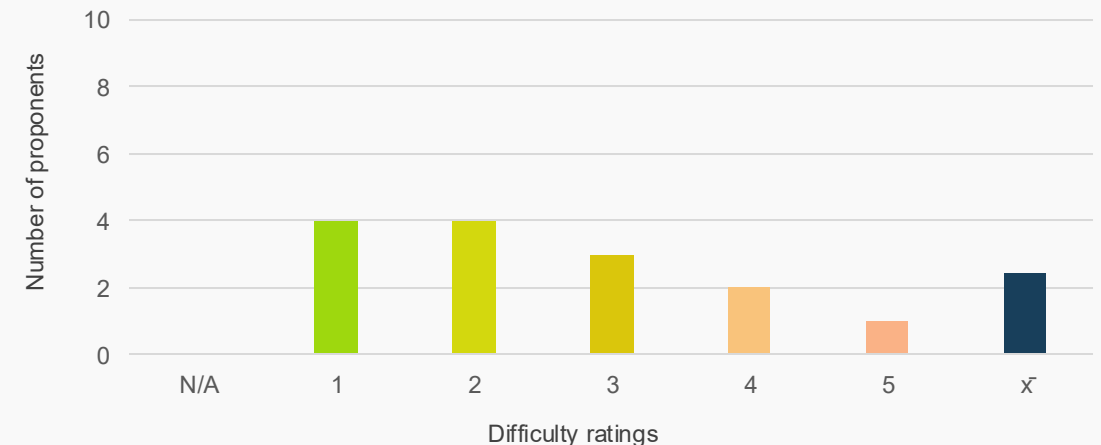
- Implementing cybersecurity protocols for all connected systems (EMS, SCADA, telemetry, remote access).
- Ensuring compliance with relevant standards (e.g. ISO 27001, Australian Government Information Security Manual).
- Managing authentication, encryption, and access controls across contractors, DNSPs, and platform providers
- Configuring secure communications (e.g. VPNs, firewalls) between site hardware, control centres, and cloud platforms.
- Addressing data sovereignty (e.g. ensuring data is stored in Australia or on trusted platforms).
- Designing dashboards and interfaces for internal use, community reporting, or knowledge sharing.
- Planning for fault or breach response in case of cybersecurity incidents.

Difficulty survey rating results

This project sub-element was relatively straightforward for most proponents with an average difficulty rating of 2.4 and a median of 2 (mostly predictable). Four proponents provided ratings of highly standardised (1) or mostly predictable (2). However, two proponents rating this as highly complex (4) and one DNSP found it exceptionally challenging (5).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 18: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



3.4 Cybersecurity and data management

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Key challenges identified

Cybersecurity and data management were often under-scoped in early-stage planning, particularly in projects led by non-DNSPs with limited internal IT infrastructure. Many proponents assumed vendors would “bring their own” cybersecurity protocols, only to discover late in the process that integration, compliance, and ownership issues were unresolved.

A recurring challenge was fragmented responsibility. With battery OEMs, EMS vendors, DNSPs, and aggregators all involved, it was often unclear who controlled what data, who had remote access, and how systems would interface securely. In some cases, systems were deployed with outdated firmware, default passwords, or no formal governance over remote access, exposing projects to real cyber risks.

Projects integrating third-party vendor systems into DNSP operational environments encountered additional complexity. DNSPs typically operate air-gapped or highly secure SCADA networks, and many IT and risk teams pushed back when proposals required persistent internet connections or vendor-operated control layers. This triggered additional risk assessments, procurement controls, and delays.

One DNSP described significant internal debate over allowing external vendor access to real-time control systems, a departure from their traditional operational model. However, they found secure, internet-connected access could be feasible if actively risk-managed.

Another DNSP noted challenges arising from internal IT/OT integration requirements tied to their role as the regulated asset owner and operator. Cybersecurity planning needed to accommodate not just technology choices, but also organisational and compliance constraints.

Data sovereignty requirements also created friction. Several government-led projects required all data to be stored onshore, while many EMS and telemetry vendors relied on offshore cloud infrastructure by default. Resolving these conflicts often required contract renegotiation or re-platforming to meet compliance.

Telemetry data itself varied widely in quality and format. Some systems lacked sufficient granularity or historical logging to support ARENA reporting or internal performance evaluation. Others delivered detailed data but in unstructured or proprietary formats, making it difficult to process or integrate into DNSP systems.

Very few projects had established breach response protocols, run cybersecurity drills, or clarified liability in the event of a cyber incident. While individual battery sites may not pose significant risk, several stakeholders cautioned that a growing fleet of distributed assets across jurisdictions could create systemic vulnerabilities if best practices aren’t standardised early.

3.4 Cybersecurity and data management

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Potential approaches and solutions

Proactive approach: Proactive cybersecurity and data governance required treating these elements as integral to system design, not secondary IT considerations. Projects that addressed security early embedded clear requirements into their RFPs, including standards for encryption, access control, remote access protocols, and patch management. Vendors were expected to align with DNSP cybersecurity policies and demonstrate their security capabilities during the procurement process.

Air-gapping: Some projects deliberately isolated EMS architecture from their own systems, using independent 4G/5G networks to avoid interaction with sensitive operations. Others used secure communication channels such as encrypted VPNs or private APNs for telemetry and remote monitoring. DNSPs with mature security frameworks mandated these by default, while others required EMS vendors to provide cybersecurity plans at commissioning.

Clear protocols: For DNSPs shifting from air-gapped to internet-connected architectures, standardised risk assessment templates and vendor access protocols were recommended. These help balance operational flexibility with strong cybersecurity safeguards and reduce the need for bespoke reviews on every project.

Data sovereignty: To meet data sovereignty and retention requirements, some contracts specified that operational data must be stored on Australian servers and companies be certified ISO 27001. In remote areas, local data backups were used to reduce reliance on cloud services and improve resilience.

Telemetry schemas: Data management can be improved by aligning on common telemetry schemas early. Where multiple parties were involved, data access matrices were used to clarify who could view, modify, or export data, and under what conditions. These were supported by credential management protocols, including multi-factor authentication (MFA) and access revocation for departing contractors.

Specialist consultants: Where internal IT teams lacked capacity or battery-specific experience, some proponents brought in third-party cybersecurity consultants to conduct system reviews, penetration tests, or risk assessments, especially before handover or public commissioning. These reviews often identified configuration errors or insecure integrations that could be quickly corrected.

Cybersecurity guidelines: Several proponents recommended government or industry develop baseline cybersecurity and data governance guidelines specific to community batteries. This would help standardise expectations across vendors, reduce risk for government and DNSP proponents, and build a consistent security foundation as the sector scales.

3.5 EPC & O&M contracting

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Activities included in this sub-element

This sub-element covers the process of selecting and managing contractors for engineering, procurement, and construction (EPC) as well as ongoing operations and maintenance (O&M). It includes:

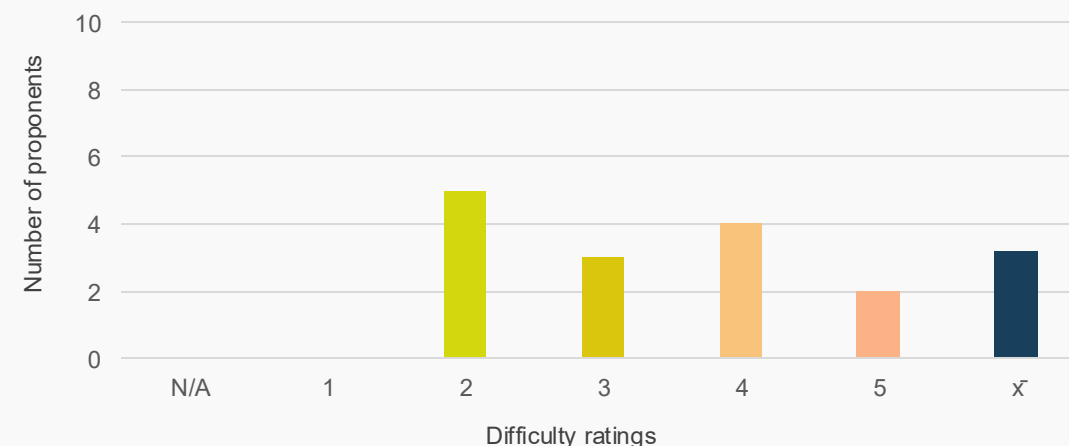
- Developing RFPs and tender documentation, including functional specifications and compliance requirements.
- Shortlisting and evaluating vendors based on technical, commercial, delivery, and safety criteria.
- Negotiating EPC and/or O&M contracts: performance guarantees, warranties, risk allocations, defect liability, service levels.
- Ensuring vendors understand and comply with relevant standards.
- Managing interfaces between battery OEMs, EMS vendors, civil/electrical contractors, and SCADA/IT providers.
- Setting clear construction timelines, milestone conditions and handover criteria.
- Planning for asset lifecycle support: spare parts, remote monitoring, service contracts, and vendor viability.

Difficulty survey rating results

This project sub-element was one of the most challenging more many proponents with an average difficulty rating of 3.5 and a median of 3 (moderately complex). Four proponents provided ratings of highly complex (4) and two found it exceptionally challenging (5).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 20: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



3.5 EPC & O&M contracting

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Key challenges identified

EPC and O&M procurement presented significant difficulties due to the immature state of the community battery supply chain and limited experience among both vendors and proponents. A common issue was vendor misalignment with project scale. Many battery OEMs and EPCs were geared toward utility-scale deployments and either priced smaller systems uncompetitively or proposed off-the-shelf solutions ill-suited to suburban or spatially constrained sites.

A limited pool of capable suppliers further constrained timelines. With some vendors supporting multiple projects simultaneously, procurement and delivery delays were common. Internal processes, especially for proponents subject to public procurement rules, added complexity through open tendering and local content requirements.

Procurement teams often struggled to develop clear, fit-for-purpose RFPs. In the absence of standard templates or internal technical expertise, specifications were either too vague, creating room for risky assumptions, or overly rigid, excluding viable alternatives.

Battery vendor maturity varied, with reported software bugs, undocumented firmware, and inconsistent operational discipline.

Integration risk was another key issue. When different vendors supplied the EMS, inverter, and battery, it was often unclear who was responsible for interface failures. In one case, a major commissioning delay resulted from miscommunication between the EMS and inverter providers, each blaming the other. One proponent restricted vendor access to live systems and stressed the need for stronger technical due diligence.

Compliance with Australian standards was inconsistent. Some international OEMs offered products that did not meet local fire safety or grid connection codes, requiring costly redesigns. Others were slow or unable to provide the documentation required by DNSPs and certifiers, such as single-line diagrams or compliance certificates.

O&M arrangements were often underdeveloped. Several batteries were commissioned without clear responsibilities for servicing, software updates, or remote diagnostics. When faults occurred, unclear roles and slow vendor response times led to extended outages.

Ensuring long-term vendor viability, including access to spare parts, warranty support, and reliable servicing, was particularly challenging in a fast-moving supplier landscape. This was especially difficult in regional and remote areas, where fewer local service providers and higher logistics costs increased the complexity and expense of maintenance. Proponents in these areas highlighted the need to assess vendor presence, logistics capability, and long-term support arrangements during procurement to mitigate future operational risks.

3.5 EPC & O&M contracting

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Potential approaches and solutions

Functional requirements: Successful proponents improved procurement outcomes by focusing on clarity, accountability, and local suitability throughout the tendering process. Effective RFPs were structured around functional outcomes, such as throughput, uptime, and dispatchability, rather than prescribing specific brands or form factors. This gave vendors flexibility while ensuring core requirements were met. Several proponents have shared their RFP templates with ARENA to support sector-wide learning.

Market testing: Early market sounding, EOIs, and pre-tender briefings helped refine specifications and screen out unsuitable vendors. Some proponents used these sessions to clarify site-specific constraints, delivery expectations, and local compliance requirements. Verifying vendor experience with relevant voltage levels and system configurations was critical to avoiding costly custom engineering.

Vendor capacity: To avoid vendor overload, proponents checked that suppliers had sufficient capacity to support multiple projects concurrently. Contracts often included enforceable compliance requirements, along with clear deliverables such as test reports, inspection records, and certifications.

Turnkey solutions: To manage integration risk, several projects adopted turnkey EPC models. Fully in-house or fully outsourced delivery models were generally more efficient than hybrid approaches.

Standardisation: Standardising mounting systems and aligning with existing DNSP installation practices helped streamline delivery. Factory integration and pre-testing, particularly for remote sites, reduced the risk of on-site troubleshooting. Clear technical specifications, mandatory compliance testing, and tight control of live system access were key to managing immature or IT-focused vendor behaviour.

Full cost contracting: Best-practice O&M arrangements bundled multiyear service contracts with the supply agreement, covering KPIs for response times, software updates, spare parts, and remote diagnostics. Some included availability guarantees linked to payment retention. In regional areas, where logistics and servicing costs are higher, budgeting for increased O&M and confirming post-installation support capacity was essential.

Industry resources: Several stakeholders recommended vendor guidance packs or preferred supplier lists, identifying companies with proven compliance, local presence, and successful delivery, to help proponents avoid poor-quality bids and accelerate vendor maturity across the sector. Standardised national procurement templates and specifications for community batteries were also suggested to reduce duplication and provide clearer expectations across projects.

4. Network connection and working with the DNSP

Section 4. Network connection and working with the DNSP

This section encompasses all tasks required to connect the battery to the distribution network and align its operation with DNSP systems and protocols. Core activities include:

- Engaging DNSPs to determine connection feasibility and process pathways (negotiated or standard).
- Submitting technical documentation, protection studies, and grid compliance applications.
- Integrating with DNSP SCADA systems and meeting telemetry requirements.
- Implementing Dynamic Operating Envelopes (DOEs) and/or fixed export limits.
- Ensuring Common Smart Inverter Profile compliance (CSIP-AUS), where required.
- Testing and commissioning the battery with DNSP oversight and controls.
- Exploring and, where possible, operationalising network support services (NSS) as a value stream.



*Fitzroy north community battery, Melbourne.
Image credit: Matt Krumins*

Section 4: Survey results

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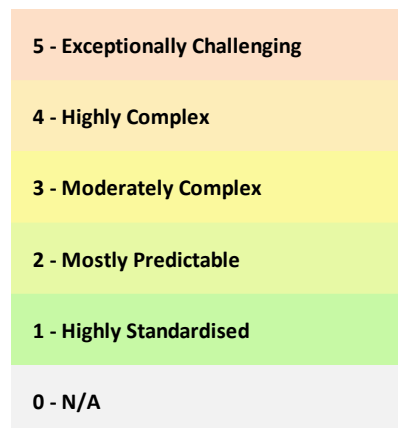
Project sub-elements

Challenges and opportunities in this section are reported against the following project sub-elements:

- 4.1 Connection and approval process
- 4.2 SCADA, DOEs & DNSP operational requirements
- 4.3 Network support service opportunities & settlement

Difficulty ratings

Proponents were asked to rate their difficulty level for each project sub-element against a 6-point scale:



Difficulty survey rating results

Project proponents reported a wide spread of difficulty ratings across the five sub-elements with ratings ranging from highly standardised (1) and up to to exceptionally difficult (5) in one case. The greatest challenges were reported against sub elements 4.2 (network support service opportunities and settlement). “N/A” ratings are excluded in this analysis.

More detailed results by sub-elements are reported and discussed on the following pages.

Figure 21: Range and average ratings for section 4 and its sub elements



4.1 Connection and approval process

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Activities included in this sub-element

This section encompasses all tasks required to connect the battery to the distribution network and align its operation with DNSP systems and protocols. Core activities include:

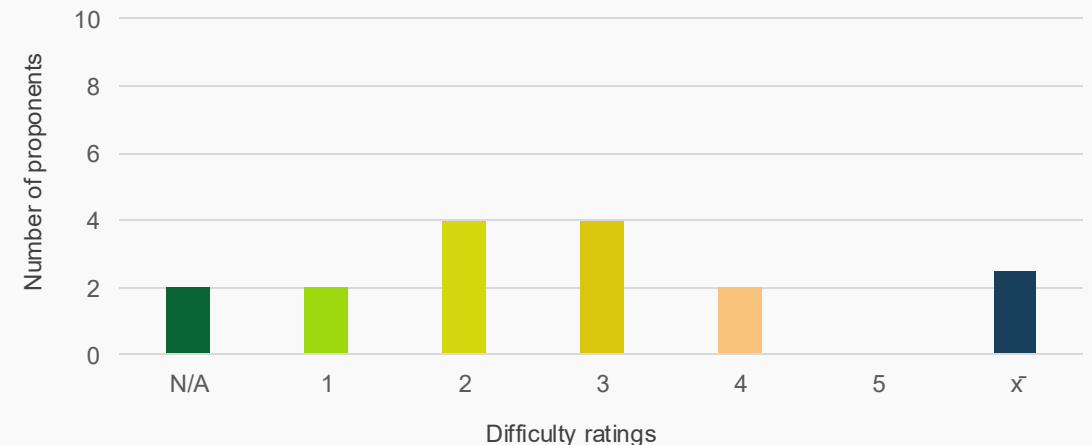
- Engaging DNSPs to determine connection feasibility and process pathways (negotiated or standard).
- Submitting technical documentation, protection studies, and grid compliance applications.
- Integrating with DNSP SCADA systems and meeting telemetry requirements.
- Implementing Dynamic Operating Envelopes (DOEs) or fixed export limits.
- Ensuring Common Smart Inverter Profile compliance (CSIP-AUS), where required.
- Testing and commissioning the battery with DNSP oversight and controls.
- Exploring and, where possible, operationalising network support services (NSS) as a value stream.

Difficulty survey rating results

This project sub-element was somewhat complex for many proponents with an average difficulty rating of 2.5 and median of 3 (moderately complex). Two proponents provided ratings of highly complex (4) and none found it exceptionally challenging (5).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 22: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



4.1 Connection and approval process

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Key challenges identified

Network connection processes were a major bottleneck for some projects, often delaying commissioning and adding unanticipated cost or complexity. Batteries in the 100 kW to 1 MW range didn't neatly fit some existing DNSP frameworks, too large for solar-like treatment, and too small for high-voltage processes, which led to inconsistent handling.

Proponents frequently reported long delays in obtaining connection offers. Even when early engagement occurred, internal DNSP handovers (e.g. between planning, SCADA, protection, and regulatory teams) introduced rework or changed requirements mid-process. Non-DNSPs often lacked visibility into these workflows, compounding uncertainty.

Customer service experiences varied. Some DNSPs offered clear, coordinated processes with a single point of contact and transparent fees. Others had fragmented procedures, unclear requirements, or duplicative steps, creating delays and confusion. DNSP approaches also differed internally: in some cases, batteries deployed by the DNSP were treated as internal assets with no formal connection agreement, while other DNSPs required full approval processes for similar systems.

Projects using behind-the-meter (BTM) configurations were often able to avoid formal network connection approval processes, significantly reducing complexity and delays. In at least one case, a project originally designed as front-of-meter was intentionally shifted to a BTM model to bypass lengthy DNSP approvals and meet deployment timelines. This approach proved particularly advantageous in constrained or rural areas, where even modest capacity thresholds could otherwise trigger costly network upgrades and extended review periods.

In rural areas, transformer capacity was a key constraint, connections under 50–60 kVA were typically straightforward, while larger ones (100 kVA and above) often triggered costly upgrades. Some projects deliberately shifted from front-of-meter to BTM models to meet timelines or reduce connection risk.

Simplified siting strategies, such as installing batteries at the end of a transformer or in electrically isolated areas, were used to reduce DNSP involvement and streamline approvals.

SCADA integration introduced further complexity. Many EMS and battery vendors lacked compatibility with DNSP telemetry standards, requiring costly customisation. DNSPs were also cautious about allowing third-party-controlled assets onto their networks without robust override, visibility, and fault response capabilities.

4.1 Connection and approval process

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Potential approaches and solutions

Effective engagement: Projects that navigated the connection process effectively engaged DNSPs early and maintained structured communication across connection, planning, and regulatory teams. Early alignment on connection pathways, documentation requirements, and timelines helped avoid surprises. A single point of contact within the DNSP, or improved visibility into internal workflows, was seen as helpful in reducing delays and confusion.

Connection templates: Several DNSPs began developing pre-approved connection templates, covering standardised system sizes, inverter types, and protection schemes, to streamline assessment and reduce back-and-forth with proponents. A national community battery connection guide, with shared templates, timelines, and technical standards, was widely recommended to improve consistency and reduce duplication across jurisdictions.

Clearer DNSP requirements: Standardising preliminary enquiry and application processes across DNSPs would help clarify expectations and shorten approval timeframes. Some proponents also suggested standardising SCADA and telemetry integration protocols in connection requirements documentation to reduce bespoke configurations.

Below the network radar: Behind-the-meter (BTM) configurations were used in several projects to bypass formal connection approvals. This approach was particularly useful in rural areas, where keeping connections below local transformer limits (e.g. under 60 kVA) avoided costly upgrades. Some projects shifted from front-of-meter to BTM designs specifically to reduce complexity and meet tight deployment timelines. Strategic site selection (such as areas with simple network topologies) also helped avoid augmentation requirements and reduce DNSP involvement.

Regulatory guidance: Clearer national guidance is needed on when formal connection agreements are required for DNSP-owned batteries. Inconsistent treatment across jurisdictions created legal uncertainty and added administrative overhead.

Control schemas: Although primarily an integration issue, early planning for SCADA and telemetry requirements proved critical to smooth deployment. Projects that engaged DNSPs early on technical protocols and enabled shared data access reported better alignment with operational controls. CSIP-AUS compliance was approached pragmatically with proponents confirming vendor capability early, testing compliance during commissioning, and, where necessary, adopting simplified configurations focused on core telemetry and curtailment functions.

4.2 SCADA, DOEs & DNSP operational requirements

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Activities included in this sub-element

This sub-element covers the integration of the community battery into the DNSP's operational and control environment. Key activities include:

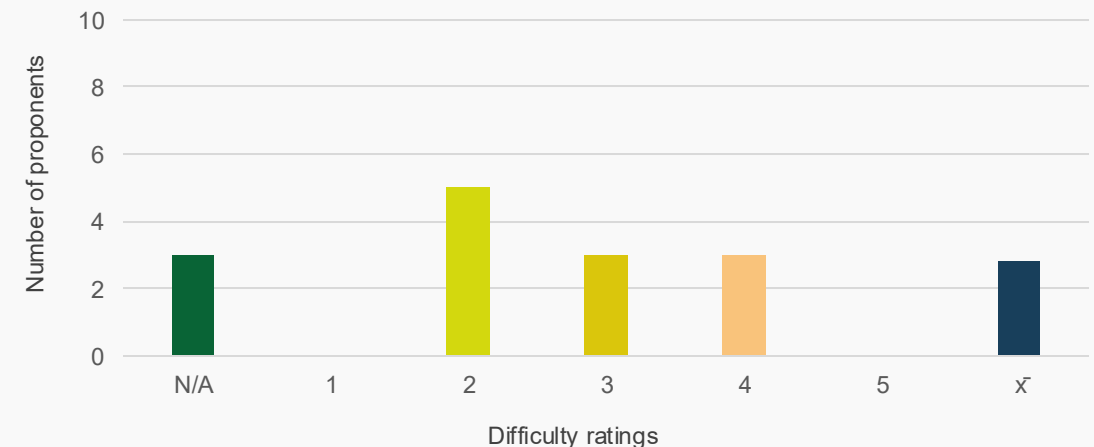
- Configuring SCADA systems to allow real-time monitoring and control of the battery by the DNSP or other operators.
- Implementing Dynamic Operating Envelopes (DOEs) to enable flexible export/import limits based on network conditions.
- Ensuring communications protocols align with DNSP expectations, including secure, time-synchronised telemetry.
- Achieving compliance with CSIP-AUS (Common Smart Inverter Profile – Australia), where required.
- Testing and commissioning control logic, fail-safes, alerts, and override functions.
- Documenting operational handover procedures and response protocols.
- Coordinating between EMS providers, DNSP control centres, and third-party platforms (e.g. aggregators, retailers).

Difficulty survey rating results

This project sub-element was substantially challenging for many proponents with an average difficulty rating of 2.8 and median of 3 (moderately complex). Three proponents provided ratings of highly complex (4) and none found it highly standardised (1)

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 23: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



4.2 SCADA, DOEs & DNSP operational requirements

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Key challenges identified

Integrating community batteries into DNSP systems, particularly for larger batteries, can increase network visibility and avoid negative network impacts but was often under-scoped early on. A common issue was EMS and battery vendors' limited familiarity with DNSP-specific SCADA protocols (e.g. DNP3, IEC 61850), leading to delays and miscommunications. SCADA standards varied across DNSPs, requiring bespoke configurations even for basic real-time visibility. Customisation of signal mapping, naming, and polling was often needed. Inconsistent telemetry formats across vendors added further complexity, with integration costs reaching hundreds of thousands. Cybersecurity restrictions typically locked vendors out of live systems, increasing the workload on DNSPs.

SCADA control arrangements varied. Some DNSPs retained emergency override rights while retailers managed routine dispatch, but negotiating these layered responsibilities was complex. Expectations differed: some DNSPs required full remote dispatch capability, while others only sought monitoring. Internal misalignment between planning, IT, and operations teams made it difficult to define requirements early. Commissioning protocols for SCADA were often out of sync with construction timelines, leaving some batteries installed but inoperable, or live without full DNSP visibility, raising operational risk.

Dynamic Operating Envelopes (DOEs), designed to improve hosting capacity and manage load/export limits, remained challenging to implement. Projects encountered inconsistent DNSP requirements and limited internal capability, with some DNSPs still developing DOE tools or policies, making integration a moving target. Even minor DOE constraints could disproportionately impact retailer revenues, if they coincided with high market prices.

For one project, this was the first live DOE trial on a large battery. Coordinating 24-hour DOE forecasts with FCAS participation proved technically complex but was seen as necessary to align retailer bids with capacity availability. Another project opted to avoid DOEs, instead offering firm load shapes to simplify financial modelling. Across many projects, dispatch predictability was considered essential for building viable commercial models.

Inverter CSIP-AUS compliance was another area of ambiguity. While some DNSPs began requiring CSIP-AUS capability for batteries, others had not formalised adoption. Some proponents reported confusion over which version to implement, or whether their existing APIs could be adapted. This uncertainty increased delivery risk and made inverter OEMs hesitant to proceed.

4.2 SCADA, DOEs & DNSP operational requirements

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Potential approaches and solutions

Effective engagement: Projects that succeeded in operational integration typically engaged DNSP SCADA and operational teams early in the design process. A collaboratively developed control interface specification, outlining signal lists, protocols, update frequencies, and override logic, was key to aligning expectations and avoiding delays at commissioning.

SCADA support: Standardised SCADA templates and integration checklists provided by some DNSPs helped vendors meet requirements efficiently. In some cases, DNSPs offered dedicated support through remote testing environments or on-site validation, reducing friction during commissioning.

DOE ready: Where Dynamic Operating Envelopes (DOEs) were still in development, projects aimed to “future-proof” their systems by including capabilities in EMS and inverter configurations that could be activated later via firmware updates.

SCADA-lite: Several proponents saw value in developing simplified “SCADA-lite” models, an alternative to direct SCADA integrations to networks, currently being developed by AEMO as part of the Integrating Price Responsive Resources reform. These could reduce integration cost and complexity for small-scale assets without compromising network oversight.

Layered control logic: In some cases, role clarity was reportedly achieved by establishing layered control logic. For example, DNSPs retained emergency curtailment or constraint authority, while commercial operators handled market dispatch and optimisation. This hierarchy was embedded in some EMS configurations so override paths could be tested as part of pre-commissioning protocols.

Joint test planning: To ensure commissioning alignment, some teams developed joint test plans, involving DNSP control staff, vendor engineers, and third-party aggregators. These covered signal verification, fault scenarios, fallback modes, and recovery procedures. Deliberate fault injection (e.g. network dropout, overvoltage) helped validate robustness.

Industry guidelines: Many proponents recommended that DNSPs publish formal community battery integration guidelines, covering SCADA, CSIP-AUS, DOEs, cybersecurity, and operational responsibilities, to improve consistency, clarify expectations, and streamline future deployments.

4.3 Network support service opportunities & settlement

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Activities included in this sub-element

This sub-element relates to the provision of network support services (NSS) by community batteries, helping the DNSP manage constraints, defer upgrades, or improve power quality. Key activities include:

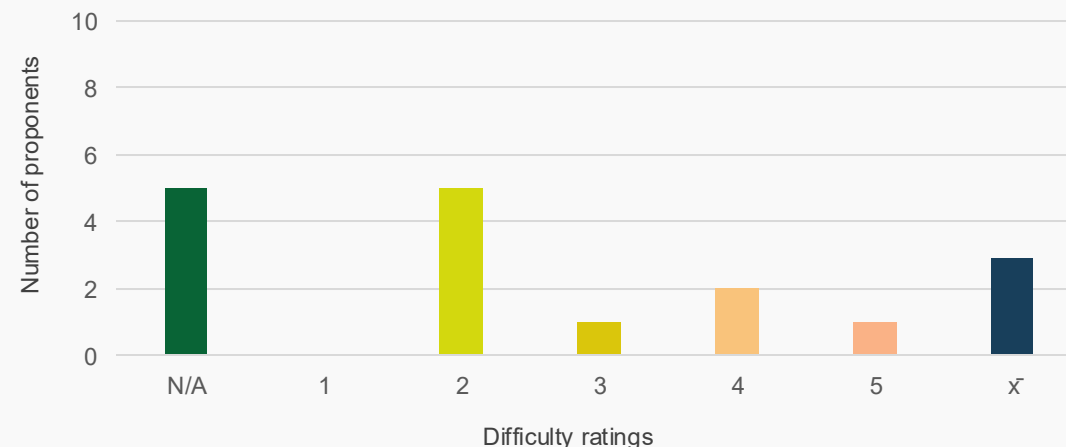
- Identifying network needs that a battery could support (e.g. peak shaving, voltage control, congestion relief).
- Quantifying the value of those services in economic or regulatory terms (e.g. deferral of capital expenditure, improved hosting capacity).
- Designing control logic or dispatch for network support.
- Defining how the battery's performance will be measured and validated against those services.
- Establishing contracts and agreements for non-DNSPs, or internal cost recovery mechanisms for DNSP-owned batteries.
- Seeking regulatory or ring-fencing exemptions where NSS provision overlaps with contestable services.
- Determining whether and how payment will flow to battery operators or owners for providing NSS.

Difficulty survey rating results

This project sub-element was highly challenging for many proponents with an average difficulty rating of 2.9 and median of 2 (moderately complex). Two proponents provided ratings of highly complex (4) and one found it exceptionally challenging (5). Five proponents reported this sub-element as not applicable (N/A).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 24: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



4.3 Network support service opportunities & settlement

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Key challenges identified

Despite widespread interest in using community batteries to deliver network support services (NSS), most projects found it difficult to operationalise or monetise this value in practice.

A major barrier was the absence of standardised methodologies for quantifying the benefits batteries provide to the network, such as peak reduction, voltage support, or deferred investment. DNSPs also lacked established processes for engaging third parties to deliver NSS, which limited opportunities for non-network proponents.

In most cases, batteries were deployed in locations that lacked a strong, monetisable NSS case. Non-DNSP proponents tended to choose sites based on ease of connection or solar export potential, rather than specific network needs. Only one DNSP used this program to place a battery where a network constraint already existed.

Some projects noted that DNSP batteries in high PV-export areas could help with voltage control, but the cost of alternatives (e.g. tap changes, line upgrades) was low, making it hard to justify significant expenditure on a battery.

The integration of behind-the-meter (BTM) assets presented additional complexity. Key difficulties included DNSPs' lack of direct control over customer-sited systems, the inherent unpredictability of customer load profiles and battery behaviour, and the need for advanced forecasting and control algorithms to deliver predictable network support.

Operational verification was another challenge. Demonstrating that a battery has delivered NSS, for example, by reducing peak demand on a particular feeder, typically requires high-resolution telemetry, detailed modelling, and agreed baselines, all of which are difficult to establish in advance. Without this evidence, structuring performance-based payments was seen as risky by both DNSPs and proponents.

Digital flexibility platforms (such as Piclo) were not yet well suited for community-scale batteries, which often have lower capacity and more variable availability than traditional assets.

Many projects ultimately defaulted to “in-principle” NSS objectives, relying on grant funding to support the business case, with no formal performance verification or payment mechanism. Some non-DNSP proponents instead relied on avoided network demand charges as a proxy for value, though this did not always align battery operations with real-time network needs.

4.3 Network support service opportunities & settlement

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Potential approaches and solutions

Site selection: To deliver network support services (NSS), successful projects began by identifying specific, measurable network issues, such as constrained feeders, seasonal peaks, or voltage excursions. Some chose technically challenging sites (e.g. weak radial lines) to test whether batteries could meaningfully contribute to NSS when such services were actually required.

Start friendly: Proponents emphasised the need to trial NSS participation under “friendly” conditions, where DNSPs and project partners were already aligned, before scaling to more complex market-based models. In the absence of formal valuation methods, some projects adopted simple workarounds, for example, providing retailers with discounted access in exchange for operating batteries to support the network, or allowing DNSPs limited dispatch rights during peak events.

Building DNSP confidence: Data sharing and baselining were critical enablers. Projects with real-time telemetry and shared dashboards between DNSPs and operators were better able to verify performance. Embedding flexible NSS capabilities, such as APIs or curtailment controls, into battery systems from the outset also created options for future service delivery, even if not monetised initially.

NSS valuation: Several stakeholders recommended developing formal valuation frameworks for NSS at the community battery scale, similar to Non-Network Options Reports (NNORs). These would clarify how avoided costs are calculated, how performance is reported, and how DNSPs can obtain approval.

Right sized solutions: Existing platforms like Piclo, a UK-based flexibility marketplace for grid services, were seen having challenges when applied to small, variable-output assets like smaller community batteries. Adapting these systems or developing alternatives that accommodate community-scale services could help lower NSS participation barriers.

Capacity partitioning: Using behind-the-meter (BTM) batteries for NSS presents additional challenges due to lack of DNSP control and customer variability. One model mentioned by one of the projects was to reserve a fixed portion (e.g. 20%) of BTM capacity for NSS, while allowing customers to use the remainder.

NSS contracting: Embedding simple NSS obligations into offtake or lease agreements, such as defined response windows or export limits, may be the easiest way to align battery operations with network needs without complex new ownership or operational structures.

5. Commercial revenue models and benefits sharing

Section 5. Commercial revenue models

This section involves the design, negotiation, and implementation of commercial and financial arrangements that underpin the viability of the battery and deliver benefits to stakeholders. Key activities include:

- Structuring ownership and operational roles (DNSP, council, retailer, aggregator, or joint models).
- Developing commercial models that stack revenues from arbitrage, FCAS, network support, and customer participation.
- Designing retail or customer-facing tariffs, or creating pooled community benefit models.
- Navigating network charges such as LUOS/NUOS that can erode battery economics.
- Negotiating offtake or lease agreements with third parties to manage control, revenue, and liability.
- Allocating and communicating benefits (financial or non-financial) to communities in fair, transparent ways.



Section 5: Survey results

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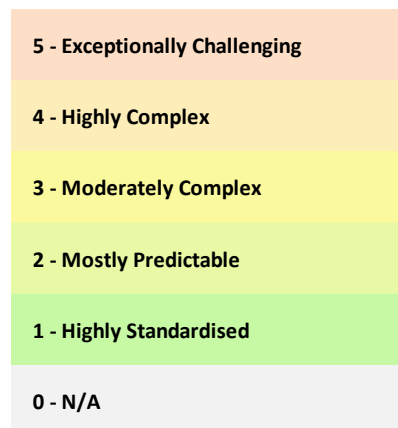
Project sub-elements

Challenges and opportunities in this section are reported against the following project sub-elements:

- 5.1 Commercial revenue models
- 5.2 Financial and non-financial benefits sharing
- 5.3 Third party offtake agreements and leasing

Difficulty ratings

Proponents were asked to rate their difficulty level for each project sub-element against a 6-point scale:

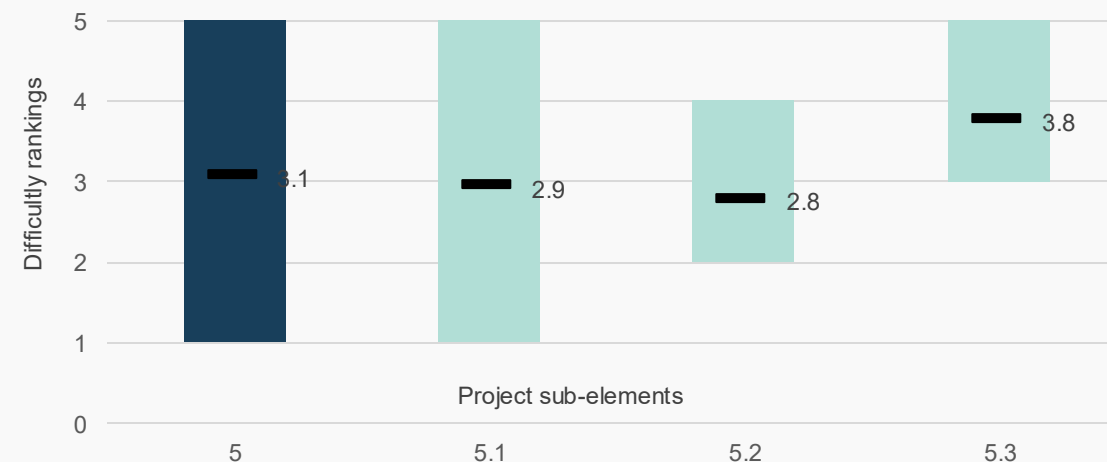


Difficulty survey rating results

Project proponents reported a spread of difficulty ratings across the three sub-elements with ratings ranging from highly standardised (1) and up to to exceptionally difficult (5) in one case. The greatest challenges were reported against sub elements 5.3 (third party offtake agreements and leasing). “N/A” ratings are excluded in this analysis.

More detailed results by sub-elements are reported and discussed on the following pages.

Figure 25: Range and average ratings for section 5 and its sub elements



5.1 Commercial revenue models

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Activities included in this sub-element

This section involves the design, negotiation, and implementation of commercial and financial arrangements that underpin the viability of the battery and deliver benefits to stakeholders. Key activities include:

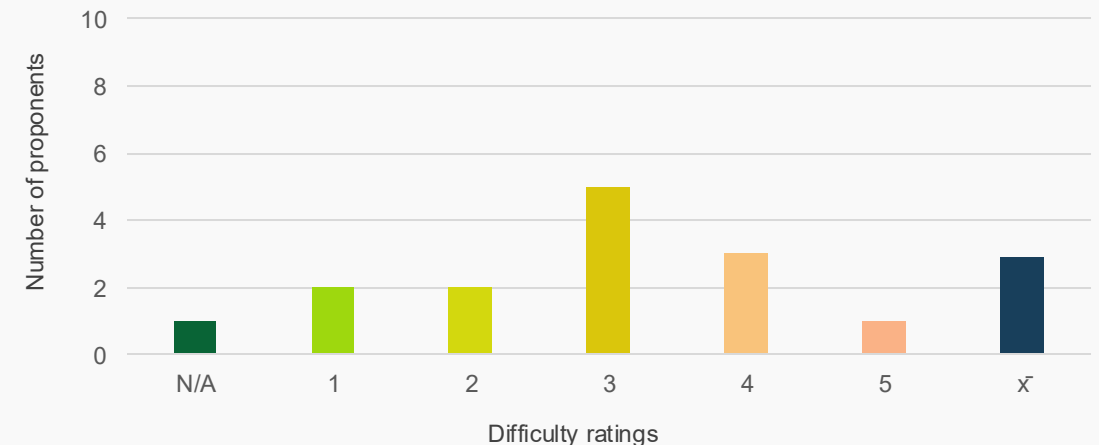
- Structuring ownership and operational roles (DNSP, government, retailer, aggregator, or joint models).
- Developing commercial models that stack revenues from energy arbitrage, FCAS, network support or network tariff arbitrage, and customer participation.
- Designing retail or customer-facing tariffs, or creating pooled community benefit models.
- Navigating network charges such as LUOS/NUOS that can erode battery economics.
- Negotiating offtake or lease agreements with third parties to manage control, revenue, and liability.
- Allocating and communicating financial benefits to communities in fair, transparent ways.

Difficulty survey rating results

This project sub-element was significantly challenging for most proponents with an average difficulty rating of 2.9 and median of 3 (moderately complex). Three proponents provided ratings of highly complex (4) and one found it exceptionally challenging (5). One DNSP proponent reported this sub-element as not applicable (N/A).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 26: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



5.1 Commercial revenue models

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Key challenges identified

Community-scale batteries rarely stacked enough value to be financially viable without grant support, making commercial design highly sensitive to assumptions and trade-offs.

Stacking value from arbitrage, FCAS, and network services was theoretically possible but practically complex. Several projects struggled to model reliable FCAS or network support revenue, weakening the business case. Arbitrage returns were often eroded by distribution charges or flat retail tariffs, while FCAS was limited by size thresholds, technology compatibility, and growing compliance requirements. Some concluded FCAS was not viable at community scale, especially below 1 MW.

Retail partnerships were also often challenging for projects. Some retailers lacked familiarity with shared revenue or hybrid dispatch arrangements and preferred conventional lease or offtake structures. Where offtake arrangements were pursued, negotiations were often slowed by divergent expectations around pricing, control, and risk allocation. A fundamental issue is that market participants want firm, predictable dispatch capacity, while some community battery models involved dynamic or dynamic operating envelope (DOE) linked participation, making commercial forecasting more uncertain.

Tariffs were a particular issue in some jurisdictions (e.g., WA & NT) that have regulated flat tariffs. In other regions, inconsistent network charging arrangements across jurisdictions made planning and forecasting difficult, with no standardised approach for community-scale batteries.

Ring-fencing restrictions complicated arrangements involving DNSPs. Some participants are working with subsidiaries or partnerships to allow contestable market participation. The legal and regulatory lift was significant, particularly for first-time proponents.

Across all of Section 5, lack of standardisation, replicable models, and shared evaluation frameworks meant each project had to develop its own solution, consuming resources and delaying delivery.

5.1 Commercial revenue models

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Potential approaches and solutions

Keep it real: Proponents that made commercial models work focused on clarity, realism, and stakeholder alignment, rather than chasing every possible revenue stream. Successful projects identified one or two primary value drivers and designed battery capacity, EMS, and control logic accordingly. Other revenues (e.g. FCAS) were treated as supplementary.

Managing risk: Projects used scenario-based financial modelling, stress-testing different pricing, usage, and degradation outcomes to support defensible business cases. Financial modelling was most effective when scenario-based. Proponents modelled conservative, base, and optimistic revenue stacks, testing sensitivity to price curves, utilisation rates, and service availability. Projects that used dynamic dispatch simulations (rather than static spreadsheets) better captured the real performance potential. LUOS/NUOS friction was addressed through negotiation with DNSPs or by targeting schedules that avoided demand charge windows.

FCAS ready: Projects highlighted the importance of ensuring procurement specifications include full FCAS compatibility if this is a targeted revenue stream. That includes certified hardware, frequency injection testing, and integration with EMS and SCADA systems. Retrofitting FCAS later was found to be technically difficult and expensive. One project shifted suppliers to better align with FCAS requirements.

Third party aggregators: Several proponents recommended using virtual power plants (VPP) with proven FCAS capability. This simplified compliance, streamlined integration, and strengthened the business case, particularly where VPP operations were internal or managed by experienced partners.

Industry guidance: Several stakeholders recommended industry or government develop guidance materials, including:

- Standard commercial model archetypes
- LUOS/NUOS tariffs across Australian networks
- Retailer engagement playbooks
- Offtake agreement templates
- Community benefit framework options

Such tools would reduce duplication, improve comparability, and accelerate maturity in a sector still inventing its own models one project at a time.

5.2 Benefits sharing

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Activities included in this sub-element

This sub-element focuses on how the benefits generated by a community battery project, both financial and non-financial, are distributed to stakeholders, especially local communities. Activities include:

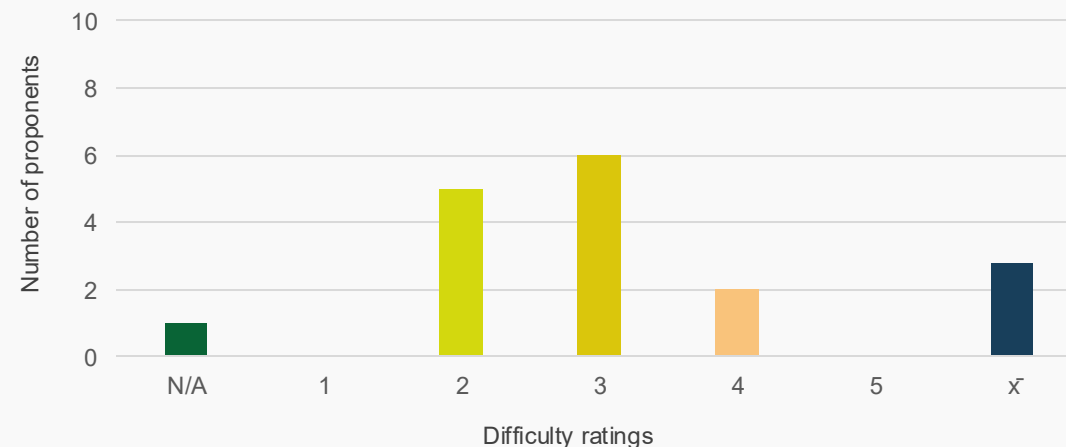
- Designing benefit-sharing mechanisms: direct customer bill reductions, pooled community funds, or infrastructure improvements.
- Determining eligibility criteria: e.g. solar vs non-solar households, renters vs owners, social housing residents.
- Quantifying benefits from arbitrage, FCAS, DNSP payments, or grants, and allocating a share to community-facing uses.
- Tracking and reporting on delivered benefits, monetary and otherwise (e.g. improved hosting capacity, reduced emissions, increased resilience).
- Engaging the community to co-design or prioritise benefit uses.
- Embedding benefit-sharing into governance structures, contracts, or reporting frameworks.

Difficulty survey rating results

This project sub-element was consistently challenging for proponents with an average difficulty rating of 2.8 and median of 3 (moderately complex). Two proponents provided ratings of highly complex (4) and none found it exceptionally challenging (5). One DNSP proponent reported this sub-element as not applicable (N/A).

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 27: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



5.2 Benefits sharing

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Key challenges identified

Benefit sharing was essential to building social licence and attaining local council or site owner support but can be difficult to execute in a way that balances transparency and equity in a scalable way. A key challenge was misaligned expectations. Many communities assumed they would receive direct personal savings on electricity bills. Several projects are investigating direct bill reduction offerings; however, in many cases the economic benefits of batteries are modest and challenging to forecast. Cost savings are more likely to arise from increased solar hosting capacity or avoided network augmentation. As a result, for the projects where immediate bill reductions are generally not offered, those projects instead are aiming to deliver more efficient generation and network outcomes over time.

Some projects with retailer integration offered bill credits or a special tariff to battery participants. Early uptake of the battery tariff product was lower than expected, in part due to customer confusion including incorrect assumptions that rooftop solar was required.

For some projects, there were eligibility criteria (participants with solar and smart meters, for example) which raises equity concerns.

Some projects have implemented pooled community benefit models, such as dedicating a portion of battery revenue to local grant funds. These funds supported community-selected initiatives and were seen as a way to distribute benefits more broadly and transparently.

Non-financial benefits, such as improved power reliability, avoided diesel generator use, or enhanced community amenity, were frequently cited as core motivations. However, these benefits were difficult to quantify and communicate to the public.

Finally, there was no consistent sectoral guidance on what constitutes “fair” or “adequate” benefit sharing. Renters and vulnerable customers, and those without smart meters or solar should not be excluded. As a result, each project had to design its own approach, increasing delivery burden and any associated risks.

5.2 Benefits sharing

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Potential approaches and solutions

Community expectations: To deliver meaningful benefit sharing, successful projects focused on setting clear expectations, engaging communities early, and aligning benefit mechanisms to what could realistically be sustained over time.

Direct bill benefits: These were most effective when tightly scoped, for example, time-limited rebates for a small group of opt-in customers. These worked best where the retailer was a core partner and already had billing integration capacity. Some projects used these pilots to test future retail models or demand response schemes. Where direct customer savings are part of the offer, consider using counterfactual billing analysis to transparently quantify benefits and build trust.

Indirect benefits: if the available value stack is modest, indirect benefit models, such as pooled grant funds, may be more scalable and appealing. For one project, a community ownership structure has strengthened local buy-in and contributed to ongoing support. Pooled community funds offered broader reach but required strong governance. Proponents established steering committees or reference groups to oversee fund use, often with predefined criteria (e.g. local energy upgrades, school programs, social housing support). Transparent decision-making, clear metrics, and periodic reviews helped sustain legitimacy.

Non-financial benefits: Communicating non-financial benefits required careful framing. Rather than technical metrics, some projects used relatable analogies (e.g. “enough capacity to power 200 homes at peak”) or mapped outcomes to council sustainability goals. Visual dashboards, infographics, or physical signage at battery sites we proposed to help keep benefits visible over time.

Benefit certainty: Where revenue uncertainty was a concern, some projects decoupled community benefits from market performance. For example, they allocated fixed annual grants funded from project savings, not directly from volatile arbitrage earnings. Others directed grant funding (e.g. ARENA) to front-load community investments early in the project.

Targeting benefits: Some projects mapped local demographics and designed benefits accordingly (e.g., public space improvements in renter-heavy areas, translated engagement materials, or targeting programs at households with low digital access). Partnerships with community organisations helped reach underrepresented groups.

Benefits tracking: Performance tracking was embedded in several projects via KPIs, such as uptime, emissions impact, hosting capacity gains, linked to public reporting or community newsletters. This reinforced transparency and accountability.

Early consideration: Overall, proponents recommended that benefit-sharing, whether with communities or project partners should be defined and embedded early. Additionally, it should be part of an ongoing engagement strategy, adaptable over time as revenue, needs, and relationships evolve.

5.3 Offtake agreements and leasing

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Activities included in this sub-element

This sub-element relates to commercial and legal arrangements between asset owners and third parties who operate or monetise the battery. It includes:

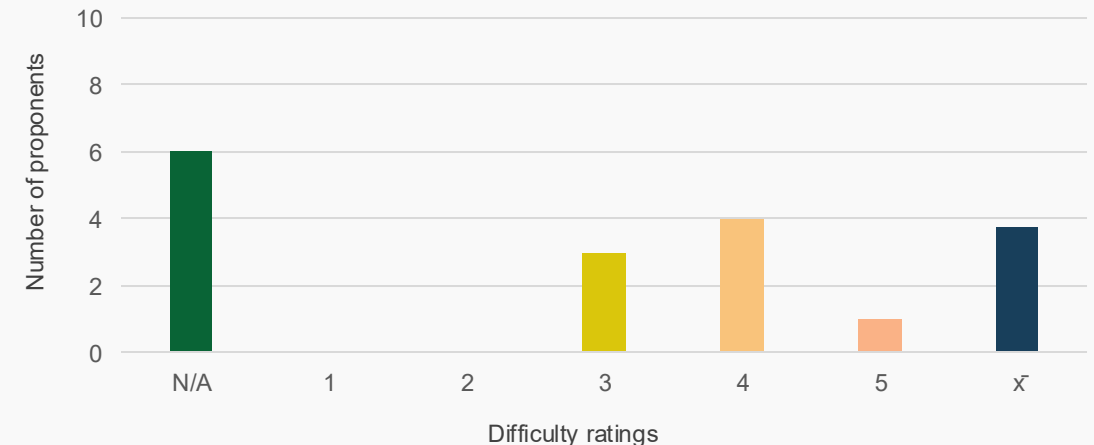
- Negotiating offtake agreements, where a third party (usually a retailer or aggregator) pays for the right to control or use the battery for market participation (e.g. arbitrage, FCAS).
- Structuring leasing arrangements, where the battery is physically hosted on land owned by councils, DNSPs, or other partners.
- Clarifying rights and responsibilities, including control access, data sharing, maintenance obligations, and liability.
- Defining commercial terms: payment structures (fixed fee, revenue share, hybrid), performance expectations, and settlement processes.
- Managing legal and regulatory compliance: ring-fencing, licensing, insurance, and tax considerations.
- Coordinating with grant terms (e.g. ARENA milestones) to ensure agreements align funding requirements.

Difficulty survey rating results

This project sub-element was reported as the most challenging for proponents with an average difficulty rating of 3.8 and median of 4 (highly complex). Four proponents provided ratings of highly complex (4) and one found it exceptionally challenging (5). Six proponents reported this sub-element as not applicable (N/A) reflecting limited engagement with this sub-element, for these projects, to date.

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 28: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



5.3 Offtake agreements and leasing

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Key challenges identified

Offtake and battery lease arrangements were among the most legally and commercially complex elements of many community battery projects. The novelty of the asset class, combined with regulatory ambiguity and multi-party involvement, made it difficult to reach timely and bankable agreements.

For offtake, a common challenge was misalignment of expectations between asset owners and potential offtakers (typically retailers or aggregators). Owners wanted guaranteed revenue, long-term commitment, and control over community-facing outcomes. Retailers, on the other hand, were cautious, concerned about performance risk, shallow value stacks, and limiting flexibility in control.

Negotiating terms, particularly around battery availability, dispatch priority, and revenue sharing, was resource-intensive. In several cases, offtakers requested exclusivity or curtailment rights that conflicted with other project goals (e.g. network support or social benefit). Proponents reported difficulty balancing these competing priorities without compromising either side.

Lease arrangements added another layer of complexity, especially when land was publicly owned. Councils required robust protections around access, aesthetics, liability, and tenure, often imposing conditions that increased project delivery time and cost. Negotiating lease terms that satisfied both legal risk thresholds and operational needs (e.g. 24/7 site access, remote monitoring) was challenging.

Regulatory issues, particularly ring-fencing, also complicated matters. DNSPs had to ensure that any third-party arrangements did not breach restrictions on contestable services or data sharing.

Overall, a key challenge was that there was no clear industry precedent or standard offtake template for community batteries. Each project effectively had to start from scratch, increasing legal costs and extending timelines.

5.3 Offtake agreements and leasing

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Potential approaches and solutions

Key strategies: Proponents who succeeded in securing workable offtake and lease arrangements adopted a few common strategies: early partner engagement, structured negotiation, and pragmatic risk allocation. Engaging potential offtakers during the design phase, before procurement or funding submission, helped align expectations and surface deal-breakers early. This allowed projects to tailor battery sizing, EMS configuration, and dispatch logic to match offtaker needs, improving the chance of agreement.

Overall, we can say that transparency, specialist expertise and patience were all critical enablers of efficient outcomes. Proponents who built strong, commercially-aligned relationships with offtakers and landowners navigated uncertainty more effectively and were better able to tailor arrangements that stood up over the course of the project.

Simple approaches: Some DNSPs initially approached offtake as a bespoke commercial negotiation, but found that this created complexity and delay. Over time, they shifted to simpler, standardised contracts, in one case offering retailers a fixed set of terms and conditions on a “take it or leave it” basis. This approach reduced legal overhead and helped clarify expectations early in the process.

Layered control logic: To manage performance and control concerns, some projects used layered operating logic, giving offtakers market dispatch rights within agreed envelopes, while retaining DNSP override for safety or network constraints.

Specialist expertise: Strong internal legal and commercial capability was consistently cited as a success factor. Teams with in-house expertise, or access to advisors familiar with DER and hybrid asset arrangements, were better equipped to identify regulatory constraints (e.g. ring-fencing) and structure agreements that complied with them.

Adapting templates: Several projects found that large-scale battery offtake templates were poorly suited to smaller community batteries. Adapting or replacing these templates with simpler, scale-appropriate agreements improved alignment with retailer needs and accelerated negotiations.

Contract templates: Several proponents advocated for shared offtake templates or contract guides, ideally hosted by government or a peak body, to reduce duplication and accelerate deal-making. These would include options for pricing, risk allocation, dispute resolution, and third-party rights, reflecting lessons from early projects.

6. Construction and commissioning, monitoring and evaluation

Section 6. Construction and commissioning, monitoring and evaluation

This section involves the practical execution and operationalisation of the battery project, including physical build, system commissioning, and ongoing performance tracking. Activities include:

- Site works: civil (earthworks, slab, drainage), electrical (trenching, cabling, earthing), and mechanical installation of the battery and associated infrastructure.
- Coordinating multiple contractors: battery OEMs, EMS vendors, EPC firms, electrical contractors, and local utilities.
- Performing pre-commissioning checks: safety systems, terminations, grounding, communication links.
- Integrated testing: validating SCADA, EMS, inverter operation, alarms, telemetry, fault response.
- Monitoring and tracking technical performance: usage, battery health, uptime, network impact, and emissions reductions.
- Tracking and reporting community outcomes: acceptance, participation, perception, and benefit delivery.
- Maintaining the asset: O&M handovers, remote monitoring, service contracts, and warranty management.



Section 6: Survey results

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Project sub-elements

Challenges and opportunities in this section are reported against the following project sub-elements:

- 6.1 Site planning, battery supply and pre-commissioning
- 6.2 Technical performance tracking
- 6.3 Community benefit & acceptance tracking

Difficulty ratings

Proponents were asked to rate their difficulty level for each project sub-element against a 6-point scale:



Difficulty survey rating results

Project proponents reported a consistent spread of difficulty ratings across the three sub-elements with ratings ranging from highly standardised (1) and up to highly complex (4) in one case. “N/A” ratings are excluded in this analysis. Technical performance tracking (6.2) was considered somewhat less complex, on average than the other two project sub elements.

More detailed results by sub-elements are reported and discussed on the following pages.

Figure 29: Range and average ratings for section 5 and its sub elements



6.1 Site planning, battery supply and pre-commissioning

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Activities included in this sub-element

This sub-element focuses on the planning and coordination required to physically prepare the site and commission the battery system. Key activities include:

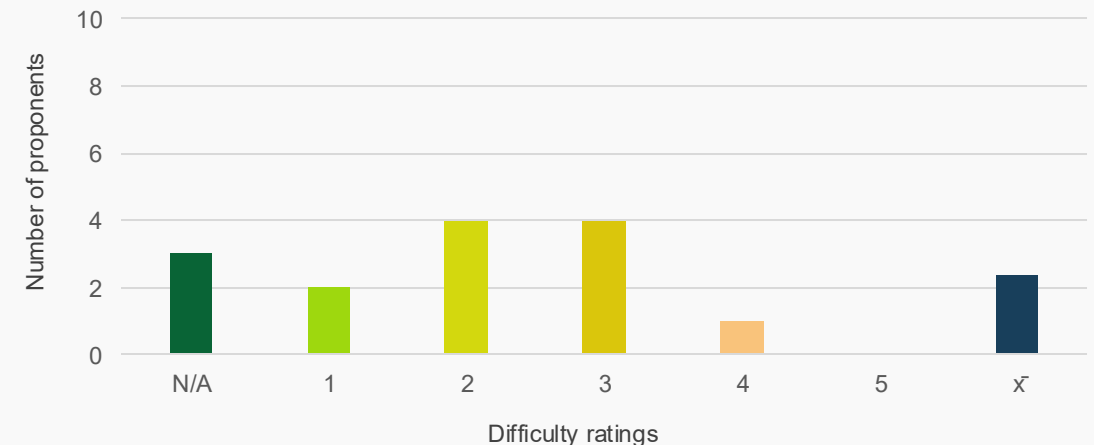
- Designing and approving site layout: fencing, access, clearances, noise mitigation, and aesthetics.
- Civil works: site clearing, pad construction, trenching, stormwater management, bollards, and physical security.
- Electrical works: transformer installation, cabling, earthing, metering, and grid tie-in.
- Battery delivery and installation: scheduling delivery with road permits if needed, craning into place, anchoring, and connecting.
- Coordination of multiple trades: civil, electrical, SCADA, OEM engineers, and testing crews.
- Pre-commissioning checks: verifying hardware installation, terminations, alarms, and safety systems.
- Integrated testing: validating system performance under normal and fault scenarios, confirming SCADA and EMS operation.
- Final inspections, certifications, and safety signoff.

Difficulty survey rating results

This project sub-element was reported as the moderately challenging for proponents with an average difficulty rating of 2.4 and median of 2 (mostly predictable). Only one proponent provided a rating of highly complex (4) and none found it exceptionally challenging (5). Three proponents reported this sub-element as not applicable (N/A) typically reflecting limited engagement with this sub-element in the project to date.

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 30: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



6.1 Site planning, battery supply and pre-commissioning

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Key challenges identified

Site planning and commissioning presented a range of coordination and execution challenges, particularly where unfamiliar technologies intersected with constrained urban environments, multiple contractors, and internal engineering procedures that were not yet adapted for batteries.

Urban and suburban locations introduced spatial and logistical constraints. Some projects encountered limited site access for trucks and cranes, or unexpected constraints like tree protection zones, which required redesigns or schedule changes. Managing noise, visual impact, and vandalism risk, especially near homes, parks, or schools, often led to non-standard fencing, late-stage landscaping, or added acoustic treatments that increased costs and complexity.

A significant internal culture shift was required for some network businesses, with some noting that traditional substation design standards, based on 50+ year lifespans, were not well suited to 10–15 year battery assets. Adjusting internal processes to support more modular, flexible designs proved challenging but necessary.

Several projects (e.g. Shell, Mondo) emphasised the value of full factory integration and testing before site delivery. For remote or rural locations, this helped reduce on-site troubleshooting and supported smoother commissioning.

Vendor familiarity with Australian site compliance varied. A number of projects reported that imported battery systems lacked required certifications or came with incompatible components, triggering redesign or retrofitting. In some cases, local installers lacked relevant training, slowing installation and increasing quality assurance needs.

Projects in regional settings (e.g. PowerWater, Mondo) also highlighted the benefits of engaging local contractors familiar with site conditions and logistics. This supported more responsive issue resolution and strengthened long-term servicing capability.

Some projects reported integration issues between EMS, SCADA, and inverter systems during commissioning. These included misconfigured alarms and telemetry gaps that had to be resolved post-installation. While full system testing was planned, milestone pressures sometimes constrained the window for pre-commissioning validation.

Coordination with DNSP, safety, and fire authorities required careful sequencing. Although inspection delays were not a major theme, proponents noted that satisfying certification and compliance requirements could add complexity to the commissioning process.

6.1 Site planning, battery supply and pre-commissioning

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Potential approaches and solutions

Early consideration: Projects that succeeded in site planning and commissioning emphasised early coordination, experienced contractors, and standardised design approaches. Early site inspections were also recommended.

Integration readiness: Several projects highlighted the value of full factory pre-integration and testing prior to site delivery. This approach significantly reduced on-site commissioning risks, especially for rural or remote deployments where delays could be costly and troubleshooting support limited.

Remote areas: In regional and remote areas, factoring in remoteness when selecting suppliers is critical. Using local contractors familiar with site conditions will help ensure timely installation and reliable long-term service, particularly when post-installation support was needed.

Shorter-term planning: Some DNSPs saw merit in supporting internal engineering teams to shift away from traditional substation design standards, such as assuming 50+ year asset lifespans, towards more modular, flexible approaches that reflect the shorter economic life of battery systems. This may help to deliver faster, more cost-effective deployments.

Role clarity: Several projects suggested conducting thorough interface testing between EMS, SCADA, and inverter systems, with clear role definition between vendors and internal IT/OT teams. It was also recommended to ensure battery suppliers are familiar with Australian compliance and integration requirements.

Vendor engineering support: Projects that included vendor engineering support during commissioning were better equipped to resolve non-compliance issues quickly. This included ensuring battery OEMs meet local standards and include contractual requirements for engineering support during commissioning.

6.2 Technical performance tracking

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Activities included in this sub-element

This sub-element covers the ongoing monitoring and evaluation of the battery's technical performance. Key activities include:

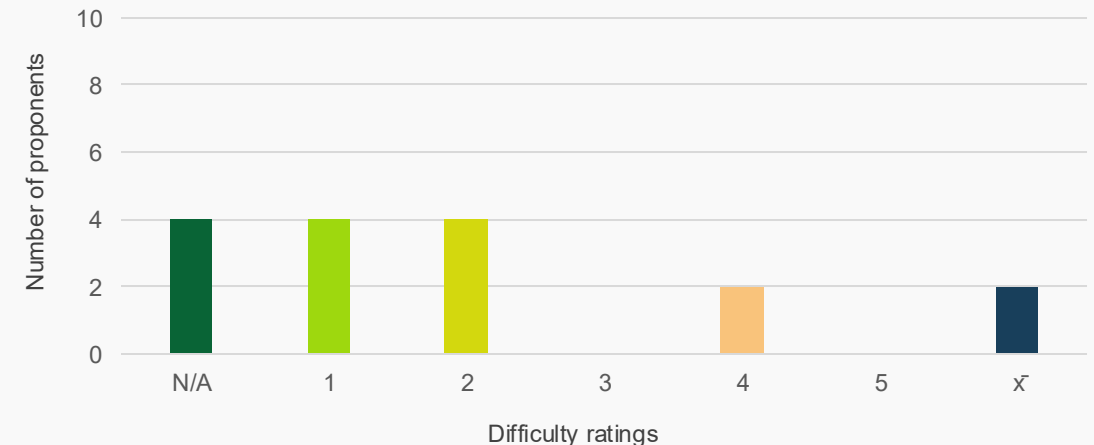
- Tracking usage metrics: charge/discharge cycles, daily throughput, duration and timing of dispatch events.
- Monitoring system availability and uptime, including outage causes and mean time to repair.
- Assessing battery health indicators: state of charge (SOC), depth of discharge (DoD), temperature profiles, degradation rates.
- Measuring network benefits: peak demand reduction, voltage regulation, improvement in hosting capacity.
- Estimating avoided emissions by comparing dispatch activity against grid carbon intensity.
- Validating control performance against design specifications (e.g. FCAS compliance, DOE response).
- Aggregating and reporting performance data to stakeholders: ARENA, DNSPs, community members, and internal boards.
- Using dashboards or data platforms to visualise real-time and historical trends.

Difficulty survey rating results

This project sub-element was reported as less challenging for proponents with an average difficulty rating and median of 2 (mostly predictable). Only one proponent provided a rating of highly complex (4) and none found it exceptionally challenging (5). Four proponents reported this sub-element as not applicable (N/A) typically reflecting limited engagement with this sub-element in the project to date.

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 31: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



6.2 Technical performance tracking

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Key challenges identified

While a critical concern for proponents, performance tracking was frequently under-scoped during early project stages and became a pain point during early operations.

EMS platforms sometimes lacked sufficient data granularity or long-term storage. Some proponents discovered that data was not fine grained enough for sufficient analysis. In other cases, vendors stored data offshore or on proprietary platforms, creating access or cybersecurity concerns.

Battery state-of-health was tracked by some projects, but concerns were raised about vendor data reliability, with some batteries underperforming compared to their nominal specifications (e.g. 60 kWh delivering ~50 kWh). This highlighted the importance of independent performance verification.

Valuing network benefits remained one of the most complex challenges. Several projects noted that key benefits, such as avoided outages, only materialise during rare, high-impact events. As a result, upfront valuation was difficult. Some proponents were investigating potential use cases to better understand these scenarios.

Network benefit tracking (e.g. peak shaving, voltage smoothing) was hampered by lack of coordinated data between battery systems and DNSP SCADA. Projects noted they may struggle to attribute observed improvements to the battery alone, especially where other network upgrades or demand-side changes were in play. Some battery OEMs also lacked fleet management interfaces, requiring project owners to invest in additional ICT systems to achieve integrated fleet visibility and control.

Measuring impact on solar hosting capacity, a key rationale for many projects, was considered technically feasible but rarely implemented in a structured way. It required feeder-level, high-resolution voltage profiles before and after battery commissioning, which were not always captured.

Estimating emissions impact also lacked standardisation. Some projects used simple proxies (e.g. average grid intensity at time of dispatch), while others attempted marginal emissions calculations. Without common methods, comparison across projects will be limited.

Finally, data visualisation and reporting were often neglected. While internal teams might access raw telemetry, few projects created dashboards or public updates that were accessible to non-technical audiences, limiting transparency and engagement.

6.2 Technical performance tracking

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Potential approaches and solutions

Early consideration: Successful projects treated performance tracking as a core design pillar, not an afterthought. Key enablers included clear data specifications, robust telemetry infrastructure, and cross-stakeholder alignment on metrics. Performance metrics were defined early and included in EMS and vendor specifications. This covered resolution, retention, format, and access protocols, ensuring that reporting needs could be met without retrofitting systems later.

Performance targets: Targets (e.g., uptime) are suggested to be embedded in O&M contracts or SLAs, giving vendors clear obligations and incentivising proactive maintenance. Regular reviews against these metrics will help track success and flag issues before they escalate.

Network impact tracking: This would benefit from structured coordination with DNSPs. Shared telemetry feeds would allow overlaying of feeder-level voltage, demand, and power factor data with battery activity. Projects could create pre- and post-installation “impact snapshots” to quantify hosting capacity improvements or peak reductions.

Tracking emissions benefits: Emissions estimation was generally planned to be based on time-aligned dispatch data and marginal emissions factors sourced from public databases or internal models.

Improving community visibility: In some cases lightweight online dashboards were proposed to show key statistics like uptime, energy throughput, and environmental impact. Using simplified language and visuals to make the data meaningful for non-experts was considered essential.

Data governance: While not consistently experienced, some proponents highlighted challenges with vendor-managed data systems and the risk of dependency on EMS providers. Establishing clearer data governance, including access rights, API standards, and options for local data storage, was seen as important for long-term performance tracking and evaluation.

Standardised metrics: Finally, proponents advocated for a shared battery performance framework or KPI library, standardising definitions and methods across projects. This would support benchmarking, accelerate learning, and help funders and regulators assess real-world outcomes from different models and contexts.

6.3 Community benefit & acceptance tracking

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Activities included in this sub-element

This sub-element focuses on tracking how well the project delivers benefits to the community, builds trust, and sustains positive engagement over time. Activities include:

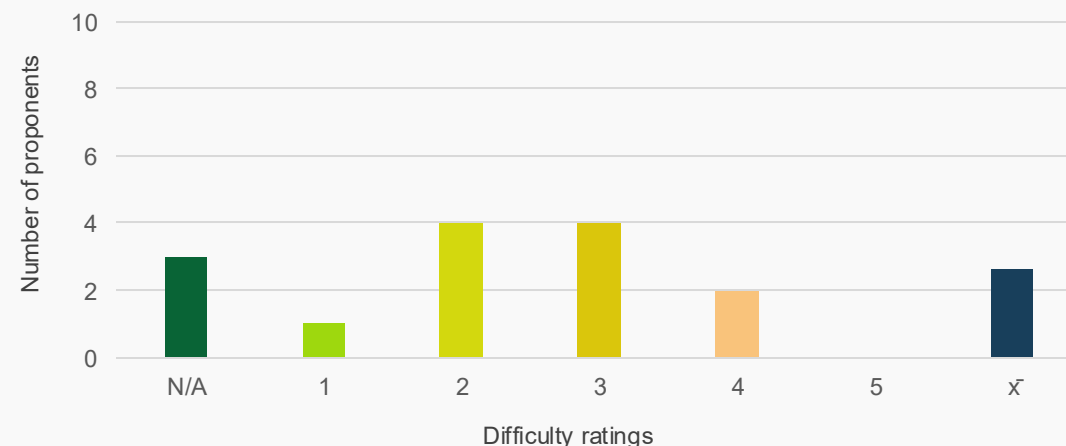
- Measuring perceived and actual community benefits (e.g. awareness, satisfaction, bill savings, local investment).
- Tracking community sentiment before, during, and after deployment (e.g. through surveys, complaints, attendance at events).
- Evaluating effectiveness of engagement efforts: reach, diversity of participation, transparency, responsiveness.
- Monitoring inclusion outcomes: participation of renters, CALD communities, low-income households.
- Documenting and responding to community concerns, misinformation, or emerging issues.
- Reporting benefits and progress back to the community through newsletters, signage, dashboards, or local media.
- Incorporating feedback into project adjustments or future designs.

Difficulty survey rating results

This project sub-element was reported as the moderately challenging for proponents with an average difficulty rating of 2.6 and median of 2 (mostly predictable). Only one proponent provided a rating of highly complex (4) and none found it exceptionally challenging (5). Three proponents reported this sub-element as not applicable (N/A) typically reflecting limited engagement with this sub-element in the project to date.

Further qualitative analysis, based on proponent survey comments and follow-up interviews, is provided on the next two pages.

Figure 32: Number of proponents selecting each difficulty rating, and average rating ($\bar{x}$).



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Key challenges identified

Community benefit and engagement were central to the mission of most projects, though approaches to planning and measurement varied. A common challenge was translating broad aspirations expressed in funding applications into outcomes that could be consistently defined and measured.

In particular, many projects noted the complexity of articulating what ‘community benefit’ means in practice, especially where direct or quantifiable financial impacts were limited. Managing expectations was therefore critical, as communities sometimes anticipated bill reductions or ownership models. Where this was not feasible, proponents sought to deliver value in other forms, such as education programs or local art which contributed to community engagement and awareness

A consistent theme was the strong community interest in backup power. Where backup power was not offered, proponents often found it difficult to communicate the value of other, less visible benefits such as improved solar hosting or emissions reduction.

The measurement of community engagement effectiveness is challenging to assess. A subset of projects are tracking who was reached, which messages resonated, or how feedback was used. As a result, some proponents reported limited ability to improve or communicate their strategies when concerns emerged.

In some cases, proponents began developing internal frameworks to measure broader indirect benefits such as local infrastructure upgrades, fire safety improvements, or sustainability initiatives. However, these efforts were typically bespoke and not yet consistent across the program.

Projects using third-party delivery or retail partners noted that accessing detailed billing or technical data remained difficult, limiting their ability to track who was benefiting and by how much. Several projects also highlighted that estimating environmental impact, such as avoided emissions, remained complex without a standardised national methodology.

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Potential approaches and solutions

Structured planning: Projects that proposing leading approaches to track community benefits adopted structured engagement and evaluation plans from the outset, aligning expectations, monitoring sentiment, and closing feedback loops.

Clear expectations: Some projects found that clearly framing community benefits from the outset helped set realistic expectations and reduce confusion. For example, one project described positioning the battery as a shared community asset enabling more solar, rather than promising direct bill savings. This approach was aimed at ensuring stakeholders, such as councils, understood the system value and didn't expect individual ownership or backup power features that weren't included.

Making benefits visible: Where battery systems lacked visible or tangible household benefits (such as backup power), proponents found it difficult to demonstrate value. To help bridge this, one project placed signage at the battery site to explain its role in supporting local energy reliability. Another suggested using relatable analogies to help residents understand what the battery was doing (e.g., the equivalent number of homes powered).

Comprehensive approaches: One project noted the importance of developing more robust frameworks to track indirect community benefits, including co-benefits such as infrastructure upgrades, fire system improvements, and general site sustainability. Their experience highlighted the potential to go beyond basic operational reporting to demonstrate broader social and environmental outcomes.

Supplier considerations: Some projects reported internal sensitivity around public perception, particularly in relation to procurement and component sourcing. One proponent emphasised the reputational risk of community concerns around overseas manufacturing, especially where batteries or components were sourced from countries that have associated political issues and noted that extensive due diligence had been undertaken to manage this.

Community benefits guidance: A standardised national framework for community battery engagement and benefit measurement, with shared indicators, templates, and evaluation methods, was commonly raised as a way of improving consistency, comparability, and long-term accountability across projects.