AMERICAN PUBLIC POWER ASSOCIATION

Powering Strong Communities

Public Power Energy Storage Project Plan Guide

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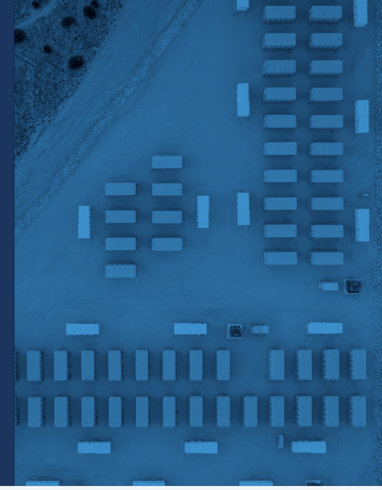

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How to Use This Guide

The American Public Power Association created this guidance document to support members pursuing energy storage solutions in creating a detailed plan for executing an energy storage project. Since creating a thorough project plan can be an arduous task, made even more complex when the project involves new technology like energy storage, this guide provides a step-by-step outline for the information needed to organize, resource, and execute a project effectively.

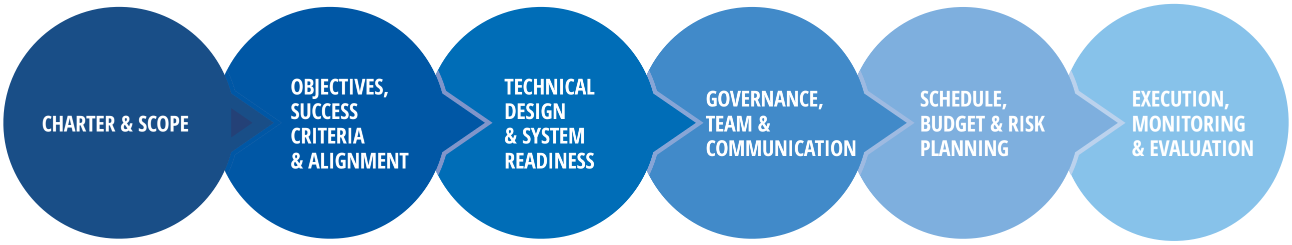
The Public Power Energy Storage Project Plan Guide is intended primarily for project teams responsible for planning, coordinating, and implementing an energy storage project. While the guide is written with project managers in mind, engineering, operations, finance, and customer programs staff can take part in the project planning process to ensure alignment across departments. Teams at utilities of all sizes can use the practical and adaptable guidance to develop a plan that matches their project scale.

Once a utility has developed a project plan, or portions of it, sharing plan details with utility leadership, boards, or governing bodies can help in communicating project readiness, resource needs, and expected outcomes.

This guide builds on the Public Power Energy Storage Business Case Guide, published in December 2024, which focused on helping utilities establish the rationale, benefits, and feasibility of an energy storage project. The business case guide also helps utility leaders present energy storage as a recommended course of action to decision-makers to secure necessary approvals or budgeting.

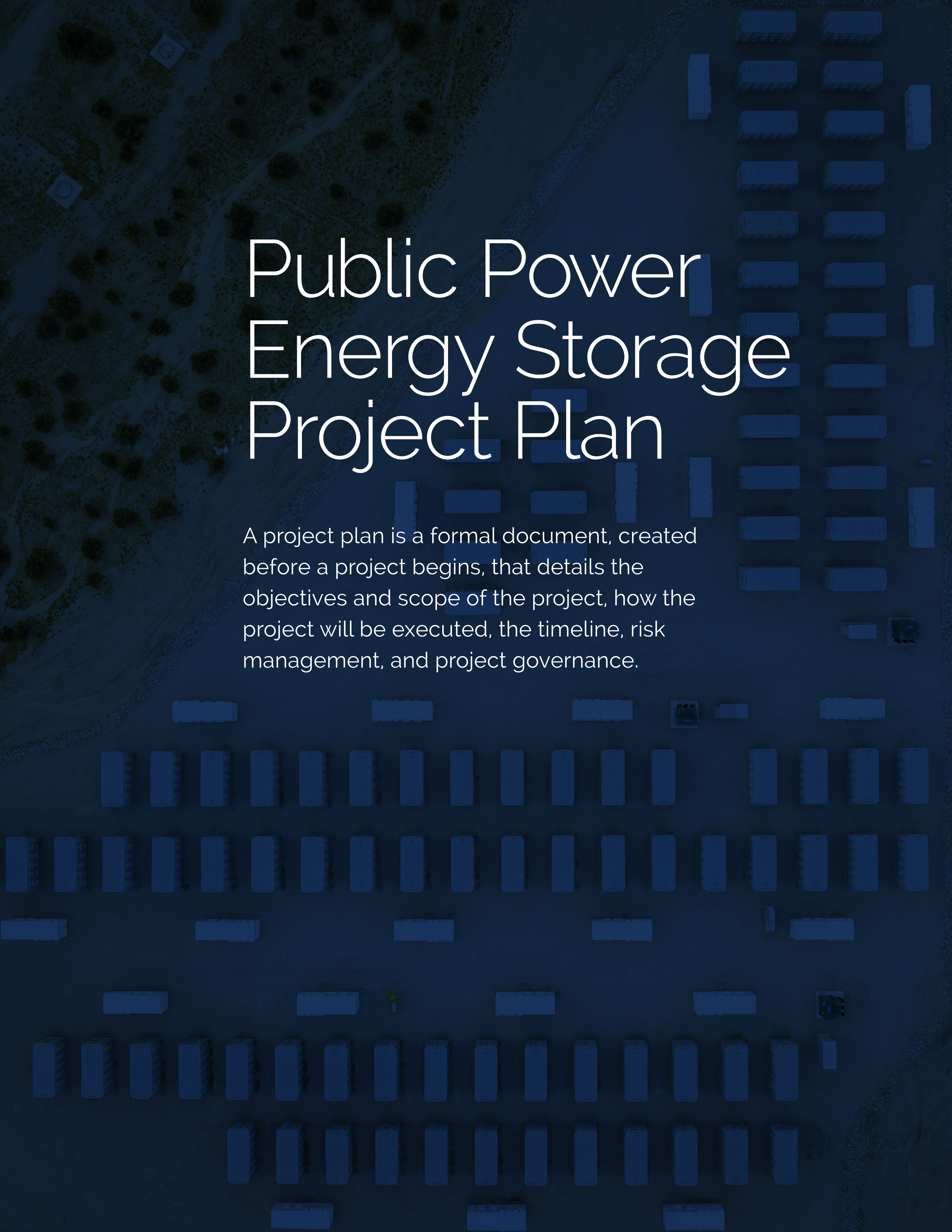
Navigate the Energy Storage Project Plan Guide

Explore the guide step-by-step or click on any of the "I'd like to…" prompts below to jump straight to the activity you're ready to work on.



I'D LIKE TO…

- Define clear project objectives.
- Clarify my project's scope and develop a charter.
- Identify key stakeholders and confirm their roles.
- Select the best site and confirm permitting needs.
- Ensure the project aligns with our utility's system plans.
- Develop the technical and regulatory readiness plan.
- Plan project tasks, schedule, and milestones.
- Identify and manage project risks.
- Plan for procurement of the system.
- Determine system ownership models.
- Define governance, decision-making, and team structure.
- Develop a budget and resource plan.
- Plan how we'll communicate with leadership and the community.
- Monitor progress and prepare for implementation.



Public Power Energy Storage Project Plan

A project plan is a formal document, created before a project begins, that details the objectives and scope of the project, how the project will be executed, the timeline, risk management, and project governance.

Project Overview

A project plan should begin with a concise overview that establishes a shared understanding of what the project entails. Because team members will engage at different stages and with varying familiarity, this summary:

- Provides essential background.
- Connects immediate tasks to long-term plans.
- Aligns the team from the start.

The overview should define the problem the project aims to solve (e.g., managing peak load, improving reliability and resilience, or reducing costs) and briefly describe the broader context in which the project is being pursued.

A strong project overview typically includes the following elements:

- **External factors:** Conditions influencing the project, such as policy mandates, regulatory requirements, social or political pressures, community expectations, or industry trends.
- **History:** Any relevant experience, including prior pilots, feasibility studies, or related utility initiatives.
- **Motivators or Enablers**: Key drivers that make the project viable, such as grant opportunities, available funding, incentives, or examples from peer utilities.
- **Purpose:** How the project supports the utility's broader mission, goals, or strategic priorities.

Project Objectives

Many utility energy storage initiatives share common goals, such as improving grid reliability and resilience, integrating renewable generation more effectively, reducing energy costs through peak shaving or demand response, enhancing operational flexibility to adapt to changes in demand, and meeting clean energy targets. An objective demonstrates where a project sits in achieving these broad goals by tying the project to a specific operating context and measurable performance targets.

Objectives describe what the project intends to achieve and give the project team and stakeholders a shared understanding of the project's purpose and desired outcomes. They provide a benchmark for measuring progress, a basis for making decisions, and a reference point when priorities or circumstances change.

Defining clear, well-structured objectives is one of the most important steps in creating an effective project plan.

When developing objectives for an energy storage project, it can be helpful to consider a few guiding questions:

- How does the project support the utility's mission, vision, and compliance requirements?
- Who will benefit from this project, and in what ways?
- What criteria will determine if the objective has been achieved, and which metrics will we use to track success?
- Are there limitations in budget, technology, or policy that will constrain what is possible?
- Does success depend on other projects or initiatives being completed?

A useful approach to developing strong objectives is to apply the SMART framework, which calls for each objective to be specific, measurable, achievable, relevant, and time-bound. This ensures objectives are clear enough to guide action, practical enough to be delivered with the resources available, connected to the utility's overarching goals, and set within a realistic timeline.

It is critical to engage all key players early in setting objectives. Objectives developed collaboratively with engineering, operations, customer programs, finance, and regulatory teams will be more robust, realistic, and widely supported. Before moving into detailed planning, the project manager should share final objectives with the full project team and review with leadership to confirm alignment. Adjustments may be needed as conditions change, but a strong set of objectives will serve as the foundation for every subsequent step in the project planning process.

WORKSHEET: DEFINING SMART OBJECTIVES

Use this worksheet to define energy storage project objectives that are Specific, Measurable, Achievable, Relevant, and Time-bound (SMART).

Each objective should clearly link to your utility's goals and be realistic within available resources.

Use the following prompts to determine which of your project's objectives are considered SMART:

1. How does each objective support your utility's mission or strategic priorities?
2. What potential barriers (budget, staffing, technology) could limit achieving these objectives?
3. How will progress toward each objective be reviewed and reported?
4. Which objectives provide the strongest business case for investment?

Objective Description	Metric/Indicator of Success	Target Value or Outcome	Time Frame	Responsible Department/	Notes

Project Scope

A well-defined project scope sets the boundaries of what the project will and will not deliver. It translates high-level objectives into actionable steps and ensures stakeholders share a common understanding of what the project will deliver and the limits within which it will operate.

Without a clear scope defined, projects risk drifting off course, expanding beyond available resources, or failing to meet key objectives.

In energy storage projects, scope definition is particularly important because of the complex interplay between technology, regulatory requirements, operations, and community expectations.

Project Charter: Linking the Business Case and Project Plan

A project charter is a foundational tool for defining scope and serves as a formal bridge between the approved business case and the detailed project plan.

The project charter is a concise but comprehensive document that formally authorizes the project, names the project manager or lead, and outlines the critical parameters for success. It provides enough definition for leadership to authorize resources and for the project team to begin detailed planning with a shared understanding of purpose, scope, and success criteria.

In addition to confirming the project's existence, the charter promotes transparency and helps avoid misunderstandings and scope creep during project execution. Identifying constraints and clearly stating items that are out of scope sets realistic expectations up front and prevents confusion among stakeholders or the project team down the line.

The project charter serves as a living reference throughout the project that the team can revisit if circumstances change.

Developing the charter is most effective as a collaborative process, bringing together technical, financial, regulatory, and community engagement perspectives. This can be accomplished through facilitated workshops, targeted stakeholder interviews, or a combination of these types of efforts.

Project managers should circulate a first draft widely for review. Build in time for likely required revisions to account for all considerations and prevent unrealistic expectations. The charter should be finalized and approved before significant resources are committed to detailed design or procurement.

While some utilities integrate the charter into their broader project plan, others treat it as a standalone document completed before detailed planning begins. Either approach is acceptable, as long as the core elements are clearly defined and approved before the project plan is developed.

A strong project charter for a utility energy storage project should include:

- **Project purpose and alignment:** Clear statement of why the project is being undertaken and how it supports broader utility goals, regulatory mandates, or strategic initiatives.
- **Objectives:** Agreed-upon SMART objectives that will guide decision-making and measure success.
- **Scope definition:** High-level description of the deliverables, including technology type (e.g., lithium-ion, flow battery), capacity, location, and intended use cases.
- **Scope limits:** Activities, technologies, or functions that are intentionally excluded from the project.
- **Constraints:** Known or anticipated limitations that will affect how the project can be executed, such as funding caps, staffing limits, permitting requirements, or schedule dependencies.
- **Assumptions:** The conditions or factors considered to be true for planning purposes, even if not yet confirmed, such as anticipated grant funding, expected equipment availability, or stable regulatory conditions.
- **Stakeholders:** Individuals or groups who have a direct role in, or significant influence over, the project's success. For energy storage projects, this typically includes:
    - Internal project sponsors (such as utility leadership).
    - Department leads from engineering, operations, finance, and communications.
    - Key external partners, such as regulators, technology vendors, and major customers or community representatives.
    - For public power utilities, joint action agencies (JAAs) can be helpful partners in technology deployment and may offer specialized knowledge or project execution support.
- Success criteria: The measurable indicators and conditions used to confirm that project objectives have been achieved. These could be:
    - Quantitative performance thresholds (e.g., system availability >98%, cost within ±5% of budget).
    - Key milestone completions.
    - Qualitative indicators, such as stakeholder satisfaction or compliance approvals.

WORKSHEET: DEVELOP AN ENERGY STORAGE PROJECT CHARTER

Use this worksheet to outline the foundational elements of your energy storage project. This section can serve as a high-level charter for internal alignment, leadership approval, and early-stage project planning.

Charter Element	Guidance & Examples	Your Entry
Project Title	Concise, descriptive name.	
Project Purpose & Alignment	Why the project is being undertaken and how it supports broader utility goals, regulatory mandates, or strategic initiatives.	
SMART Objectives	SMART objectives that guide decision-making and measure success	
Scope Definition	Major deliverables: • Technology • Capacity • Location, and • Use cases	
Out-of-Scope Items	Explicitly excluded items: • Future phases • Unrelated upgrades	
Constraints	Known limitations: • Budget • Staffing • Permitting Schedule	
Assumptions	Planning assumptions: • Expected grant funding • Equipment availability • Policy stability	

WORKSHEET: DEVELOP AN ENERGY STORAGE PROJECT CHARTER

Charter Element	Guidance & Examples	Your Entry
Primary Stakeholders	Key individuals/groups: • Internal: CFO, Engineering, Ops • External: EPC, Vendor, ISO, Community • Advisory: Board, Environmental Groups, or JAAs	
Success Criteria	Measurable verification: • Performance metrics • Budget adherence • Approvals	

CHARTER APPROVAL

Approval Authority

Approval Date

Signature/Digital Authorization

Technical Approach and Energy Storage–Specific Scoping

Once the project's objectives, scope, and charter have been defined, the next step is to translate those elements into a clear technical approach that addresses the technical realities of implementing an energy storage system (ESS).

The technical approach section of the project plan provides decision-makers and stakeholders with confidence that the proposed project configuration is technically sound, feasible, and aligned with the project's objectives. It should describe what type of system is being planned, how it will operate, and how it supports the utility's strategic, operational, and financial goals. It should also explain the plan for system design, ownership structure, and integration with existing infrastructure.

Energy storage projects often involve balancing competing technical and operational priorities. Project teams should acknowledge the trade-offs between cost, duration, technology maturity, and long-term performance. These early scoping decisions influence system flexibility, lifecycle cost, and future expandability.

Technology and System Design

The technical approach should begin by describing:

- The type of energy storage technology being proposed and why it was selected.
- The system's intended use cases (e.g., peak shaving, resilience, frequency regulation, or renewable integration) and how the technology choice supports those functions.

When defining the system architecture, utilities should revisit assumptions from the business case with greater technical specificity.

Storage technology choices, such as lithium-ion versus flow batteries, carry different implications for duration, cost, and lifecycle performance. Lithium-ion batteries are typically the most commercially mature and cost effective, though they require careful consideration of degradation and thermal management. Flow batteries or hybrid configurations may offer longer duration and easier scalability at higher upfront cost. Documenting the rationale for these trade-offs within the project plan promotes transparency and helps prevent scope changes later.

It is also important to consider how the system could evolve over time. Designing for modular expansion, open communication protocols, and equipment interchangeability can prevent expensive retrofits and support future resilience or renewable integration needs. This section should provide enough technical detail to demonstrate feasibility and alignment with project goals, but utilities should avoid excessive design details that belong in engineering specifications.

Key details to include:

- **Technology type and characteristics:** Whether the project will use lithium-ion batteries, flow batteries, or another storage medium. The duration, capacity, round-trip efficiency, response time, and any performance considerations relevant to the objectives.
- **System configuration:** How the system will be designed, including whether it is centralized, distributed, or modular. If the system includes multiple sites or technologies, how they work together.
- **Location and interconnection:** Proposed site(s) and the factors influencing location decisions (e.g., proximity to load centers, land availability, or existing electrical infrastructure). Include information about planned interconnection voltage, substation tie-ins, or transformer configurations, if available.
- **Permitting and compliance considerations:** Any known or anticipated permitting requirements, fire code compliance issues, or other regulatory obligations that could influence system design or timeline.

Ownership and Delivery Model

Once the system is described, the technical approach should explain how the system will be owned, financed, and delivered. Energy storage ownership and delivery structures vary widely across public power utilities and documenting this early helps clarify project roles and responsibilities.

Most utilities will depend on vendors for detailed design, procurement, or integration support. While this reliance is common, it is important to determine and document how the utility will maintain oversight — for example, through defined deliverables, documentation requirements, and performance guarantees — while cultivating a partnership mindset that encourages shared problem-solving and transparency.

Include:

- **Ownership model:** Whether the system will be utility-owned, third-party owned, or hybrid (shared ownership or lease arrangement) and the rationale for the chosen model, particularly how it aligns with the utility's financial, operational, or policy environment.
- **Delivery structure:** How the project will be delivered (e.g., design-bid-build, design-build, energy-as-a-service, or public-private partnership) and who will be responsible for procurement, construction, operation, and maintenance.
- **Regulatory or policy considerations:** Any statutory, contractual, or regulatory factors that influence ownership or delivery (e.g., power purchase agreements, federal funding requirements, or interconnection policies).
- **Lifecycle implications:** How ownership and delivery decisions affect long-term operations, maintenance, and asset management responsibilities.

By addressing ownership and delivery early in the plan, project teams can anticipate decision points that may require leadership approval or legal review later in the process.

Controls and Integration

It is also important to include how the storage system will integrate technically and operationally within existing utility systems.

Early coordination between engineering, operations, and IT teams is essential to ensure interoperability and cybersecurity readiness. Integration considerations include compatibility with SCADA or DERMS platforms, telemetry and redundancy for reliable monitoring, and adherence to cybersecurity practices consistent with organizational standards.

When describing plans for controls and integration, utilities should include:

- **Control systems and interoperability:** How the storage system will interact with existing DERMS, SCADA, energy management systems (EMS), or distribution management systems (DMS).
- **Operational coordination:** How the project will be operated (e.g., by utility dispatch, automated control, or through an aggregator).
- **Cybersecurity and data management:** How data generated by the system will be collected, secured, and used for performance tracking.
- **Testing and commissioning:** How the utility will validate system performance before operational launch, including plans for testing and verification, such as factory or site acceptance testing, to ensure functionality and security before commissioning.

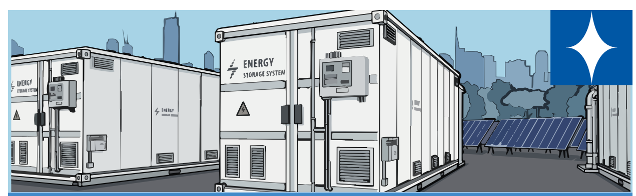
This section should give both technical and nontechnical readers confidence that the storage system will operate safely, reliably, and in concert with existing assets.

Site Readiness and Supporting Infrastructure

For projects involving new construction or significant physical infrastructure, describe the site preparation and supporting systems required, including:

- Site access, grading, and environmental conditions.
- Availability of interconnection equipment (e.g., switches, relays, communication links).
- Proximity to substations, feeders, or control facilities.
- Any anticipated civil or structural improvements.

Where uncertainty exists, utilities should note whether preliminary engineering or feasibility studies will be used to refine these details.



ENERGY STORAGE PLANNING TIP

- Energy storage projects succeed when engineering, IT, and operations teams collaborate early.
- Establishing structured design reviews at key milestones helps maintain alignment and utility oversight throughout.

WORKSHEET: DEFINE YOUR TECHNICAL APPROACH

Use this worksheet to summarize key technical and delivery details for your energy storage project. This section can serve as an outline for the corresponding section in your project plan or as a standalone summary for internal review.

Technical Element	Guidance & Example	Your Details
Technology Type & Architecture	Storage technology and design rationale **Ex:** *lithium-ion, flow, hybrid*	Click or tap here to enter text.
System Capacity & Duration	Rated capacity (MW/MWh) and discharge duration **Ex:** *50MW / 100MWh, 2-hour continuous discharge at rated power*	Click or tap here to enter text.
Intended Use Cases	Primary and secondary applications **Ex:** *Primary: Peak shaving, resilience, renewables integration*	Click or tap here to enter text.
Location & Interconnection	Site characteristics and grid connection details **Ex:** *Adjacent to Main St. substation, 138kV interconnection, 2-acre brownfield site*	Click or tap here to enter text.
Ownership Model	Utility-owned, third-party, or hybrid (Note rationale.) **Ex:** *Utility-owned with 20-year PPA for O&M services*	Click or tap here to enter text.
Delivery Structure	Contracting/procurement approach **Ex:** *EPC turnkey contract with performance guarantees*	Click or tap here to enter text.
Regulatory Factors	Key requirements and incentives	Click or tap here to enter text.
Integration & Security	SCADA/DERMS integration, cybersecurity frameworks consistent with NIST CSF or your organization's selected framework	Click or tap here to enter text.
Site Preparation	Environmental, permitting, civil requirements **Ex:** *Phase 1 ESA complete, CUP pending, minimal grading required*	Click or tap here to enter text.
Key Technical Risks/ Unknowns	Remaining uncertainties or dependencies **Ex:** *Grid study pending, battery supply chain constraints, augmentation strategy*	Click or tap here to enter text.

System Planning and Grid Integration

Energy storage system planning connects the individual project to broader grid and organizational goals. Effective system planning helps utilities answer three key questions:

1. How does this project support current operational needs?
2. How will it integrate with the grid and other distributed energy resources (DER)?
3. How does it position the utility to address future system requirements and regulatory expectations?

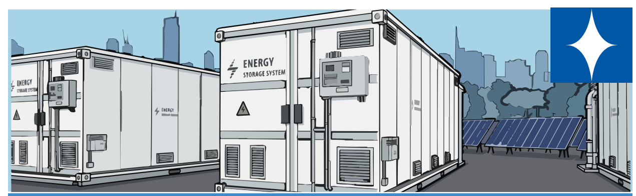
By aligning project-level design with long-term system strategies, utilities can maximize grid value, reduce future retrofit costs, and ensure projects serve as a stepping-stone toward a more resilient and flexible power system.

Integrating Storage into the Utility System

A storage project should be viewed as part of a coordinated resource portfolio, not as a standalone installation. System-level integration involves confirming how the project interacts with distribution circuits, substations, and control systems to deliver the desired outcomes, whether for peak shaving, frequency regulation, voltage support, or resilience.

When planning integration, utilities should:

- Validate assumptions from the business case using power-flow or hosting-capacity modeling to confirm circuit suitability and identify constraints.
- Coordinate across engineering, operations, and IT teams to ensure compatibility with SCADA, DERMS, or outage management systems.
- Consider impacts on protection coordination and power quality performance.
- Evaluate whether additional infrastructure upgrades (e.g., transformers, communications, switchgear) are required to enable safe and reliable operation of the energy storage system.



ENERGY STORAGE PLANNING TIP

Storage often changes power flow direction and can affect system protection schemes. Early collaboration between planning and operations teams avoids costly rework later.

Aligning with Long-Term System Plans

Energy storage can play multiple roles over its lifespan. Today's peak-shaving system could later support resilience or renewable energy integration. System planning should anticipate these potential evolutions and align the project with long-term utility or regional energy plans.

Key alignment steps include:

- Reviewing resource or resilience plans to ensure the storage project supports broader capacity and reliability objectives.
- Assessing distribution planning data to target areas with high growth, hosting-capacity limits, or outage frequency.
- Considering how policy and regulatory trends, such as decarbonization goals or resilience mandates, could shape future uses.
- Coordinating with regional or ISO planning entities when storage affects transmission interfaces or market participation.

BEST PRACTICE

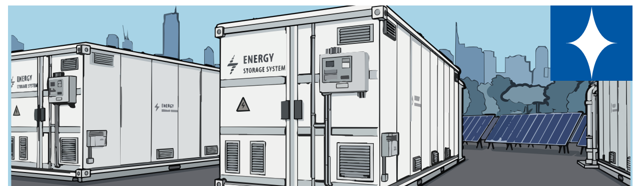
Documenting how the project contributes to system-level outcomes — reliability, emissions reduction, renewable integration — helps leadership communicate its value across the organization.

Scenario Planning and Modeling

Scenario-based analyses help utilities evaluate how the system will perform under varying grid conditions or policy environments.

For energy storage projects, this may include:

- Evaluating different dispatch strategies (e.g., peak reduction vs. resilience support).
- Modeling changes in load or distributed generation over time.
- Analyzing battery degradation and augmentation needs in future scenarios.
- Testing the impact of outages or islanding on local resilience.



ENERGY STORAGE PLANNING TIP

Incorporating degradation and augmentation into long-term models helps utilities plan for mid-life upgrades and capacity restoration.

Data and Performance Feedback

System planning does not stop once the system is operational. Monitoring, analysis, and performance data should inform planning processes to refine future projects.

Utilities can strengthen feedback loops by:

- Collecting operational performance data (efficiency, throughput, cycle life) to compare against modeled assumptions.
- Updating planning models with real data to improve forecasting accuracy.
- Sharing lessons learned internally and through APPA or Department of Energy (DOE) programs to benefit peer utilities.

WORKSHEET: CONNECTING SYSTEM PLANNING TO PROJECT DESIGN

Use this worksheet to align your project with broader system plans and confirm that technical decisions support long-term goals.

Use the prompts below to ensure your storage project is positioned within the broader system context:

1. How does this project strengthen the overall grid (resilience, flexibility, upgrade deferral)?
2. What studies or data confirm that system impacts, positive and negative, are well understood?
3. How will lessons learned from this project inform future storage or DER deployments?
4. Are planning, operations, and IT teams aligned on long-term use cases and data management?

Topic	Key Questions	Your Response
Grid Integration	How will the system connect to the grid, and what studies confirm its suitability?	
Operational Objectives	What specific system functions will the ESS serve? **Ex:** *Peak shaving, voltage support, resilience*	
Long-Term Alignment	How does the project support future system plans, resilience goals, or renewable integration? **Ex:** *Enables 40% renewable target*	
Scenario Planning	Have alternative use cases or grid scenarios been modeled? What were the results?	
Data Feedback	How will operational data be captured and used for future planning? **Ex:** *Monthly reports*	

Site Selection and Permitting

Selecting the right site for an energy storage system is one of the most consequential decisions in project planning. The site determines not only technical feasibility but also project cost, risk, schedule, and community acceptance.

For energy storage projects, where safety, visibility, flexibility, and modularity matter as much as grid impact, early site diligence is an investment in both technical feasibility and public trust.

Key Factors for Site Selection

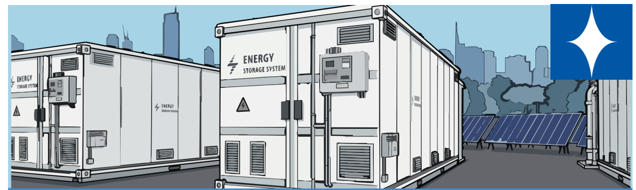
When evaluating potential sites, utilities should consider both technical and contextual factors:

Category	Key Considerations
Grid Access	• Proximity to substations or feeders with adequate capacity • Interconnection voltage level • Potential congestion relief value
Physical Space & Layout	• Footprint requirements for containers, inverters, and clearances • Access for installation and maintenance • Space accommodation for future energy storage growth
Security & Safety	• Controlled access, fencing, surveillance, fire separation distances (NFPA 855) • Emergency response access
Environmental & Land Use	• Zoning compatibility • Wetlands or floodplains • Cultural or historical sites • Noise or visual impact
Infrastructure & Logistics	• Road access • Drainage • Soil stability • Proximity to communication networks
Future Flexibility	• Potential to expand storage capacity or integrate renewables in later phases • Load growth plans and related energy storage capacity growth requirements

Environmental Review

Environmental review processes vary widely across jurisdictions. Typical steps include:

- Local zoning and land-use approvals (conditional use or special exceptions).
- Building and electrical permits.
- Environmental assessments or categorical exclusions (e.g., NEPA for federally funded projects).
- Fire code compliance (e.g., NFPA 855, UL 9540A testing documentation).
- Noise, stormwater, and erosion-control permits.



ENERGY STORAGE PLANNING TIP

Unlike conventional substations, storage facilities often sit within or adjacent to populated areas, requiring careful attention to fire code setbacks and community safety expectations.

BEST PRACTICE

Engage regulatory and permitting authorities early, ideally during site screening, to clarify timelines and required studies. This reduces the risk of delays later in design or construction.

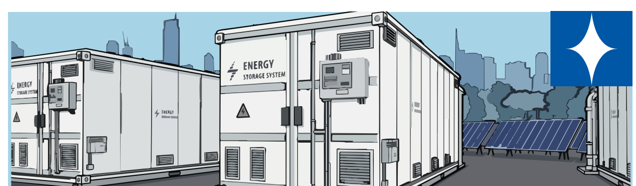
Community Engagement and Public Input

For public power utilities, where community trust and transparency are paramount, site selection should balance engineering practicality, regulatory compliance, and public engagement.

By communicating early and often with the community, utilities can build trust, minimize opposition, and improve project outcomes.

Effective strategies include:

- Public meetings or open houses before site selection.
- Sharing visual renderings and safety information.
- Collaborating with local emergency responders on safety and response plans.
- Documenting and responding to community feedback within the project plan.



ENERGY STORAGE PLANNING TIP

Concerns about battery safety, noise, or visual impacts can often be mitigated through early dialogue and clear communication about design safeguards.

WORKSHEET: SITE EVALUATION MATRIX

Use this worksheet to compare potential sites based on technical, regulatory, and community criteria. Assign qualitative ratings (e.g., high/medium/low suitability) or numerical scores as appropriate.

Use the prompts below to ensure site selection and permitting are fully integrated with the rest of the plan:

1. Have you confirmed that the proposed site aligns with grid needs and project objectives?
2. What permits and reviews are on the critical path, and how will they influence the schedule?
3. How has community engagement been incorporated into siting decisions?
4. Are there site-specific environmental or safety risks that need early mitigation?

Criteria	Description/Notes	Site A	Site B	Site C
Grid capacity/ Proximity		Low Suitability	Low Suitability	Low Suitability
Land availability/ Ownership		Low Suitability	Low Suitability	Low Suitability
Zoning compatibility		Low Suitability	Low Suitability	Low Suitability
Environmental/ Permitting complexity		Low Suitability	High Suitability	Low Suitability
Community support/ Visibility		Low Suitability	Low Suitability	Low Suitability
Access/ Infrastructure		Low Suitability	Low Suitability	Low Suitability
Security/ Emergency access		Low Suitability	Low Suitability	Low Suitability
Overall Assessment		Low Suitability	Low Suitability	Low Suitability

Regulatory, Interconnection, and IT Readiness

Once the project's technical approach and delivery structure are defined, the next step is to confirm the regulatory, interconnection, and IT requirements that must be satisfied before construction or operation can begin.

These activities often occur in parallel with detailed design and procurement. Early planning and coordination across departments — engineering, legal, environmental, and IT — can significantly reduce schedule risk and prevent costly rework.

This section of the project plan should describe the steps the utility will take to secure regulatory approvals, complete interconnection studies, and prepare IT and operational technology (OT) systems for integration with the new storage asset. Together, these actions ensure the project is both compliant and ready for reliable operation.

Permitting and Regulatory Approvals

Early engagement with permitting authorities, safety officials, and environmental agencies helps prevent schedule delays and unexpected design changes later in the project.

The project plan should identify all permits, codes, and regulatory requirements relevant to the energy storage project. These may exist at the local, state, or federal level. Examples include:

- Environmental reviews
- Land-use or building permits
- Fire safety compliance
- Hazardous materials handling
- Air-quality permits for hybrid projects

For each approval required, the project plan should specify:

- **Responsible parties and authorities:** Departments or external agencies that will oversee each approval (e.g., city permitting, state energy office, fire marshal).
- **Timeline and sequencing:** Estimate of when each approval must be obtained relative to design or construction milestones.
- **Stakeholder coordination:** The responsible party within the utility who will manage each permit or regulatory filing.

Presenting this information in a table makes this an easy resource to refer back to and to share with the relevant stakeholders.

Interconnection Studies and Approval

The project plan should document the interconnection process needed to safely and reliably connect the energy storage system to the grid. Documenting these processes demonstrates that the project plan accounts for both technical and administrative readiness.

This section of the project plan should specify:

- **Study requirements:** Whether the project will require distribution-level load-flow or protection studies, or transmission-level analyses managed by an ISO/RTO.
- **Study scope and timing:** When these studies will occur and who is responsible for completing them.
- **Parallel processing:** Phases where it is possible to conduct regulatory and interconnection reviews simultaneously to save time.
- **Key deliverables:** Documents such as the signed interconnection agreement, protection settings, or study reports that must be complete before commissioning.

IT and OT Integration

Energy storage projects increasingly rely on complex communication and control systems. By addressing IT and OT readiness early, utilities reduce integration risk and ensure secure, reliable operation from day one.

The project plan should describe how the utility will prepare its IT and OT environments to support safe, secure, and effective integration. This includes:

- **System interfaces:** All systems that must communicate with the energy storage controller (e.g., SCADA, DERMS, EMS, AMI).
- **Interoperability standards:** Protocols such as IEEE 2030.5, DNP3, or Modbus to demonstrate commitment to open standards and vendor flexibility.
- **Cybersecurity and data governance:** How the project will align with the utility's cybersecurity practices and who owns, stores, and manages operational data.
- **Testing and validation:** Plan for staged integration testing such as factory acceptance testing (FAT), site acceptance testing (SAT), or sandbox simulations before system launch.

WORKSHEET: REGULATORY, INTERCONNECTION, AND IT READINESS

Use this worksheet to capture the key approvals, studies, and system preparations your utility must complete before construction or commissioning. It can serve as both a planning checklist and a communication tool, helping project teams track responsibilities, timelines, and integration readiness across departments.

As your team develops this section of the project plan, consider:

1. Which local, state, or federal approvals are required, and what are their expected timelines?
2. Can regulatory and interconnection processes occur in parallel to shorten the schedule?
3. What cybersecurity and data management standards will govern system operation?
4. Who within your organization is responsible for regulatory compliance, interconnection studies, and IT readiness?
5. What testing or validation steps will confirm successful integration before commissioning?

Readiness Area	Guidance Example	Your Response
Regulatory Approvals	Permits, reviews, or codes applicable to your project (e.g., NFPA 855, environmental, fire).	
Responsible Parties	Internal and external leads for each approval or study.	
Key Milestones	When each approval or interconnection step must occur.	
Interconnection Studies	Studies required and the responsible utility/agency.	
Cybersecurity Framework	Standards followed (e.g., NIST CSF) and responsible team.	
Interoperability Protocols	Communication standards (e.g., DNP3, IEEE 2030.5).	
Data Ownership & Storage	Who owns and manages system performance data.	
Testing & Validation Plan	Planned FAT/SAT or simulation testing before launch.	

Project Timeline and Milestones

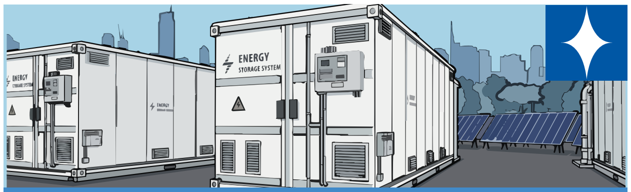
Energy storage projects progress through distinct but interdependent stages: scoping, design, procurement, construction, and commissioning. Each stage has its own dependencies and risks. A clear, realistic timeline helps the project team know what steps to expect and allows the project leader to allocate resources efficiently.

While it can be tempting to jump directly to the timeline, doing so before defining the technical approach often leads to unrealistic expectations. A good schedule builds on the scoping and readiness work completed in earlier sections of the plan.

Building a Realistic Timeline

The project plan should outline all major project steps in sequential order, estimate the duration of each, and identify milestones that mark progress, including:

- **Pre-project approvals:** Business-case approval, funding confirmation, and initial leadership authorization.
- **Engineering and design:** Feasibility analysis, system sizing, interconnection studies, and detailed design reviews.
- **Procurement and contracting:** RFP development, vendor selection, contract award, and long-lead equipment ordering.
- **Site preparation and construction:** Permitting, civil works, equipment installation, interconnection, and testing.
- **Commissioning and operations:** Performance validation, training, and turnover to operations or vendor O&M.



ENERGY STORAGE PLANNING TIP

Battery systems, inverters, and transformers often have lead times exceeding six months, and interconnection studies or approvals can similarly delay construction. Utilities should build these dependencies into their schedules, knowing that delivery delays could affect project completion deadlines.

Energy storage projects come with additional considerations due to the complexity of coordinating installation. When developing the schedule for an energy storage project, utilities will also need to consider:

- **Equipment lead times and factory acceptance testing (FAT):** Particularly lead times for customized or utility-scale battery systems.
- **Seasonal constraints:** Weather or grid conditions that might restrict installation windows.
- **Permitting and interconnection overlap:** Opportunities for parallel processing to shorten total duration.
- **Performance testing sequence:** Plans for stepwise testing (component, system, and operational modes).
- **Vendor dependencies:** When vendor deliverables are on the critical path (e.g., control-system integration).
- **Training and readiness:** Time for staff upskilling and procedural dry runs before energization.

By incorporating these considerations early, utilities can anticipate potential delays, align teams across departments, and maintain flexibility as the project evolves from design to operation.

Establishing Milestones for an Energy Storage Project

While not exhaustive, the milestones and associated project phases shown below are a useful start for most utilities in developing project schedules for an energy storage project.

Project Phase or Activity	Milestone or Deliverable
Project Authorization	• Leadership approval • Funding confirmed
Engineering and Design	Final system design completed
Procurement	• Vendor contracts executed • Long-lead equipment ordered
Construction and Installation	Major equipment installed and connected
Testing and Commissioning	System commissioning complete and performance verified
Operations Readiness	• Staff trained • O&M handoff completed

WORKSHEET: PROJECT SCHEDULE CHECKLIST

Use this worksheet as a checklist to develop a realistic timeline. The following practices draw on established infrastructure and utility project management practices. They are especially relevant for energy storage because of complex equipment supply chains, interconnection dependencies, and commissioning requirements.

Consider the following questions as you develop your energy storage project schedule:

1. Which dependencies are most likely to affect your project's critical path (e.g., permitting, interconnection, procurement)?
2. How will your team track progress and communicate milestone completion?
3. Are there opportunities to overlap activities (e.g., detailed design and early procurement)?
4. What assumptions drive your schedule, and how will you revisit them if conditions change?
5. How will external partners (vendors, contractors, agencies) align to your project schedule?

Practice	Benefit	Checklist Entry
Use a Gantt or milestone chart aligned to quarters or months	Helps visualize dependencies and communicate progress to leadership	☐
Define a critical path (the shortest duration in which the project can be completed)	Focuses attention on high-impact activities	☐
Include contingency time (10%–20%) for high-uncertainty tasks	Reduces schedule pressure from supply or permitting delays	☐
Tie milestones to decision gates (e.g., "Proceed to Procurement")	Ensures leadership oversight and readiness checks	☐
Update the schedule after each phase or contract award	Keeps assumptions aligned with actual progress	☐
Add commissioning and performance-testing milestones (FAT/SAT)	Ensures technical validation before energization and turnover	☐
Plan for seasonal or operational constraints	Accounts for temperature limits, load conditions, or outage windows during installation	☐
Coordinate vendor and utility workstreams	Prevents idle time between equipment delivery, installation, and testing	☐

Procurement Planning

Procurement planning builds on the project's objectives, scope, and technical requirements by defining how goods and services will be acquired to achieve those goals.

In practical terms, this means identifying what must be purchased, why it is needed, and what performance or integration requirements each procurement must meet.

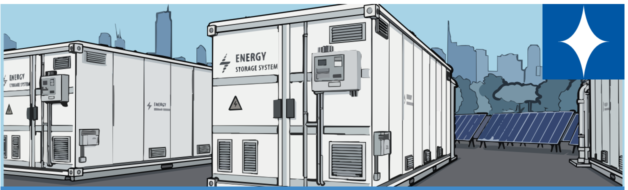
An effective procurement plan corresponds with the project's schedule, risk profile, and operational needs. For example, knowing when goods and services will be available for the energy storage project and limiting the impact that their delivery will have on ongoing utility services are important parts of the procurement plan.

Aligning the procurement approach with both internal policies and recognized external standards ensures transparency, improves vendor understanding, and strengthens compliance.

Technical Specifications

For energy storage projects, procurement may include specialized equipment — battery modules, inverters, control systems — as well as engineering, installation, commissioning, and long-term maintenance services.

Considering and documenting the technical specifications before the project begins prevents delays during the procurement process or, worse, procuring equipment that is unsuitable for the project.



ENERGY STORAGE PLANNING TIP

Energy storage projects benefit from parallel processing (beginning procurement documentation while interconnection or permitting steps are underway) to reduce total project duration.

A procurement plan for an energy storage project should include:

- Technical specifications that reflect the project's performance targets (e.g., round-trip efficiency, degradation rates) and compliance with relevant standards (e.g., UL 9540, IEEE 1547).
- Integration requirements to ensure compatibility with SCADA, DERMS, or other control systems.
- Service expectations for installation, commissioning, and training.
- Performance guarantees that address long-term degradation and warranty periods, particularly for lithium-ion systems.
- Safety and permitting requirements (e.g., fire safety, hazardous materials handling).
- End-of-life and recycling provisions for battery components.
- Vendor qualifications and experience with projects of similar size and complexity.

The procurement plan should explain how those requirements will be communicated to vendors. Utilities may do this through specifications, bid documents, or contract language.

BEST PRACTICE
Key procurement requirements should be presented in a summary table along with the list of items to be procured, procurement method, responsible department, and expected contract type. The table can then reference supporting documents, such as the RFP or technical specifications. This simplifies the information contained within the project plan.

Sequencing and Risk Management

Energy storage projects often face long lead times, especially for batteries, inverters, and transformers. Those dependencies can significantly affect the overall schedule.

The procurement plan should show how activities will be sequenced to minimize idle time and align with design, construction, and commissioning phases.

When creating the procurement plan, utilities should answer the following questions:

- **Equipment and service sequencing:** When will major procurements occur relative to site readiness and permitting?
- **Critical path identification:** Which procurement activities have the greatest schedule impact (e.g., transformer delivery, interconnection approval)?
- **Risk mitigation:** How will supply chain disruptions or price fluctuations be addressed?
- **Contingency planning:** Are there buffer periods or alternative suppliers for critical components?

Procurement Methods and Decision Framework

In this section, utilities should outline the decision framework the project team will use to determine procurement methods.

Energy storage projects introduce unique procurement challenges including specialized equipment, evolving technology, and varied ownership or service models. A thoughtful procurement strategy helps balance cost, performance guarantees, and long-term operability.

To manage technical and financial risk while ensuring compliance with public-sector requirements, utilities should determine and document:

- **Procurement approach:** Anticipated methods for procurement, such as RFP, RFQ, design-build, or cooperative purchasing.
- **Evaluation criteria:** High-level factors/requirements for evaluating vendors (e.g., cost, performance, experience, warranty, service) and weighting approach
- **Decision gates:** When leadership approval will be required (e.g., before contract award or major purchases).
- **Stakeholder roles:** Departments or individuals involved in procurement, evaluation, and approval.

WORKSHEET: CREATING A PROCUREMENT PLAN

Use this worksheet to outline procurement needs, timing, roles, and risk considerations for your energy storage project. These prompts support alignment with organizational procurement standards and sector best practices.

Consider the following questions as you plan for procurement and vendor engagement for your energy storage project:

1. Which goods and services are critical to project success, and what are their expected lead times?
2. How will procurement activities align with your project's overall schedule and key decision points?
3. What risks could impact procurement timing or pricing, and what contingencies are in place?
4. What internal and external policies govern procurement for your utility?
5. Who will be responsible for managing and approving procurement activities at each stage?

Tools, Frameworks, and Standards

Procurement planning can draw from established frameworks that promote consistency, compliance, and completeness.

In addition to your organization's procurement standards, guides, and practices, relevant resources include:

- Battery Energy Storage System Procurement Considerations (DOE): Guidance for federal agencies and utility-scale storage procurement
- Cybersecurity Procurement Language for Energy Delivery Systems (DOE): Useful for grid-interactive storage systems
- Battery Energy Storage Procurement Framework and Best Practices (National Rural Electric Cooperative Association): Specifically addresses procurement for battery energy storage systems
- Energy Storage Procurement Study (California Public Utilities Commission): Provides utilities and regulators market and legal procurement context for energy storage

Project Resources and Staffing

The project resources and staffing section complements procurement planning by focusing on internal capacity: the personnel, expertise, and tools that will be engaged to manage and oversee project activities.

This section documents how the utility's internal resources will support planning, procurement, construction, and operation of the energy storage system.

A well-defined staffing and resource plan gives leadership confidence that the project can be delivered safely, efficiently, and with sufficient internal control.

For energy storage projects, documenting internal capacity is especially important because of the interdisciplinary nature of the work, spanning engineering, IT, finance, and operations.

Public power utilities often leverage support from vendors, JAAs, or other partners in executing energy storage projects. Staffing and resource planning should account for both internal resources and external support.

Assessing Internal Capabilities

Utilities should start resource and staffing planning by evaluating their internal readiness.

This evaluation should determine:

1. What can be accomplished by existing staff with current tools?
2. Where will external support be needed?

Identifying capability gaps early allows utilities to plan for supplemental consultant or vendor support and to ensure staff are trained before critical project phases.

Some of the internal capabilities that should be assessed include:

- Engineering and design capacity (e.g., interconnection studies, design review)
- Project management and scheduling tools
- Procurement and contracting expertise
- Safety and compliance (e.g., fire safety, hazardous materials)
- IT/cybersecurity support for grid integration
- Legal or regulatory affairs counsel

Defining Project Roles and Responsibilities

Once internal capabilities are assessed, utilities can identify the key roles in managing or supporting the project and their respective responsibilities.

A clear delineation of who does what and when helps avoid redundancy, clarify authority, ensure accountability throughout project delivery, and supports long-term operational readiness.

Typical roles include:

- **Project Manager:** Oversees the entire project, ensuring coordination between departments and vendors, tracking progress, and managing scope and budget.
- **Technical Lead/Engineer:** Provides technical oversight, reviews design deliverables, and ensures compliance with standards and interconnection requirements.
- **Procurement Specialist:** Coordinates bidding, contracting, and vendor communication in alignment with utility policies.
- **Finance/Grants Administrator:** Manages budgets, invoicing, cost tracking, and reporting, particularly when grant funds or cost-share agreements are involved.
- **IT/OT Lead:** Oversees integration with SCADA, DERMS, cybersecurity systems, and ensures IT readiness.
- **Communications/Stakeholder Lead:** Coordinates internal and external messaging, community engagement, and stakeholder updates.

BEST PRACTICE
A simple RACI chart (Responsible, Accountable, Consulted, Informed) should be included in the project plan or appendix to document key roles and their decision authority.

WORKSHEET: RACI CHART

Develop a RACI chart for all major project activities. The RACI framework clarifies decision-making authority and communication pathways. The example RACI chart below is for the project initiation and planning phase, and can be expanded to cover all project phases and activities. Update the specific deliverables, roles, and assignments based on each individual project's needs.

R **Responsible –** Person(s) who perform the work

A **Accountable –** Person ultimately answerable (only one per task)

C **Consulted –** Those whose opinions are sought (two-way communication)

I **Informed –** Those kept up to date on progress (one-way communication)

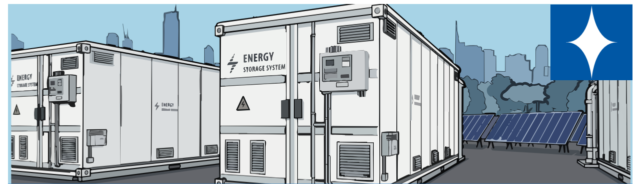
Deliverable	Project Manager	Technical Lead	Procurement	Finance/Grants	IT/OT Lead	Communications
Define project scope and objectives	R	R	R	R	R	R
Develop project charter	R	R	R	R	R	R
Establish project governance	R	R	R	R	R	R
Create project schedule	R	R	R	R	R	R
Develop risk management plan	R	R	R	R	R	R

Training and Knowledge Transfer

Because energy storage is a rapidly evolving field, many utilities benefit from including professional development or vendor-supported training in their project plans.

Common areas for training include:

- System operation and maintenance.
- Battery management and safety procedures.
- Data analytics and performance monitoring.
- Cybersecurity and IT system integration.
- Emergency response and hazard management.



ENERGY STORAGE PLANNING TIP
If vendors or integrators provide training, the schedule, participants, and deliverables (e.g., manuals, videos) should be documented as part of project closeout requirements.

Coordination with Vendors and Partners

Because energy storage projects often involve multiple specialized vendors, coordination can quickly become complex. Defining how these partners will communicate, share information, and resolve issues helps maintain alignment and prevent delays during construction and commissioning. Clear documentation on how internal teams and external partners will work together may include:

- Coordination meetings and communication protocols.
- Shared document repositories (e.g., Microsoft SharePoint or OneDrive, Google Drive, or other secure cloud storage).
- Review and approval processes for design and deliverables.
- Points of contact for decision-making.

Defining these processes up front ensures smooth collaboration and reduces confusion during fast-moving project stages like commissioning or testing.

In addition to vendor support, many public power utilities work actively with their JAA when considering new technology deployment projects. JAAs may offer insights based on past project experience or vendor relationships. Some JAA representatives may contribute to project execution as an extension to utility staffing. It is important to engage early with JAA representatives to determine their interest, experience, and desired level of involvement in member energy storage projects.

Resource Constraints and Contingencies

Energy storage projects often push the limits of available staff expertise, budgets, and vendor capacity. Recognizing these constraints up front and planning contingencies for critical areas like delivery delays, commissioning support, or technical troubleshooting helps ensure that the project remains achievable even under pressure.

In this part of the project plan, a utility should identify internal constraints that could affect project timing, such as staff availability, competing priorities, or limited expertise.

When possible, utilities should include contingency strategies, such as:

- Cross-training staff or designating backups for critical roles.
- Scheduling key activities during off-peak operational periods.
- Using consultants or on-call support for specialized tasks.

WORKSHEET: IDENTIFYING PROJECT RESOURCES

Update this example worksheet to document internal and external resources that will support the project and identify any areas where additional support may be needed.

As you complete this section, consider these questions to test whether your project has the right people, skills, and structures in place to succeed:

1. Which internal departments or roles are critical to project success?
2. What internal expertise already exists, and where will external support be needed?
3. How will knowledge transfer from vendors or consultants be captured for long-term operations?
4. What staff constraints could affect schedule or quality?
5. How will internal and external teams coordinate effectively during peak activity periods?

Role/Resource	Function/ Responsibility	Internal or External	Availability/ Timing	Training or Support Needed	Notes

Project Governance and Oversight

Project governance establishes how the project will be monitored and controlled and clarifies decision rights, approval processes, and escalation pathways.

Strong project governance ensures that a project is managed transparently, decisions are made efficiently, and accountability is clearly defined. Most importantly, it creates pathways for oversight to determine that technical and financial decisions reflect the organization’s strategic priorities.

In the case of public power energy storage projects — which often involve multiple departments, city officials, and boards — effective governance keeps efforts on track, on budget, and in alignment with community and organizational priorities. Moreover, good governance builds confidence among internal teams and external stakeholders.

Governance Structure and Roles

Projects inevitably face decisions about design changes, cost adjustments, and schedule trade-offs. Establishing decision authority and escalation procedures before these issues arise helps maintain momentum and avoid misunderstandings.

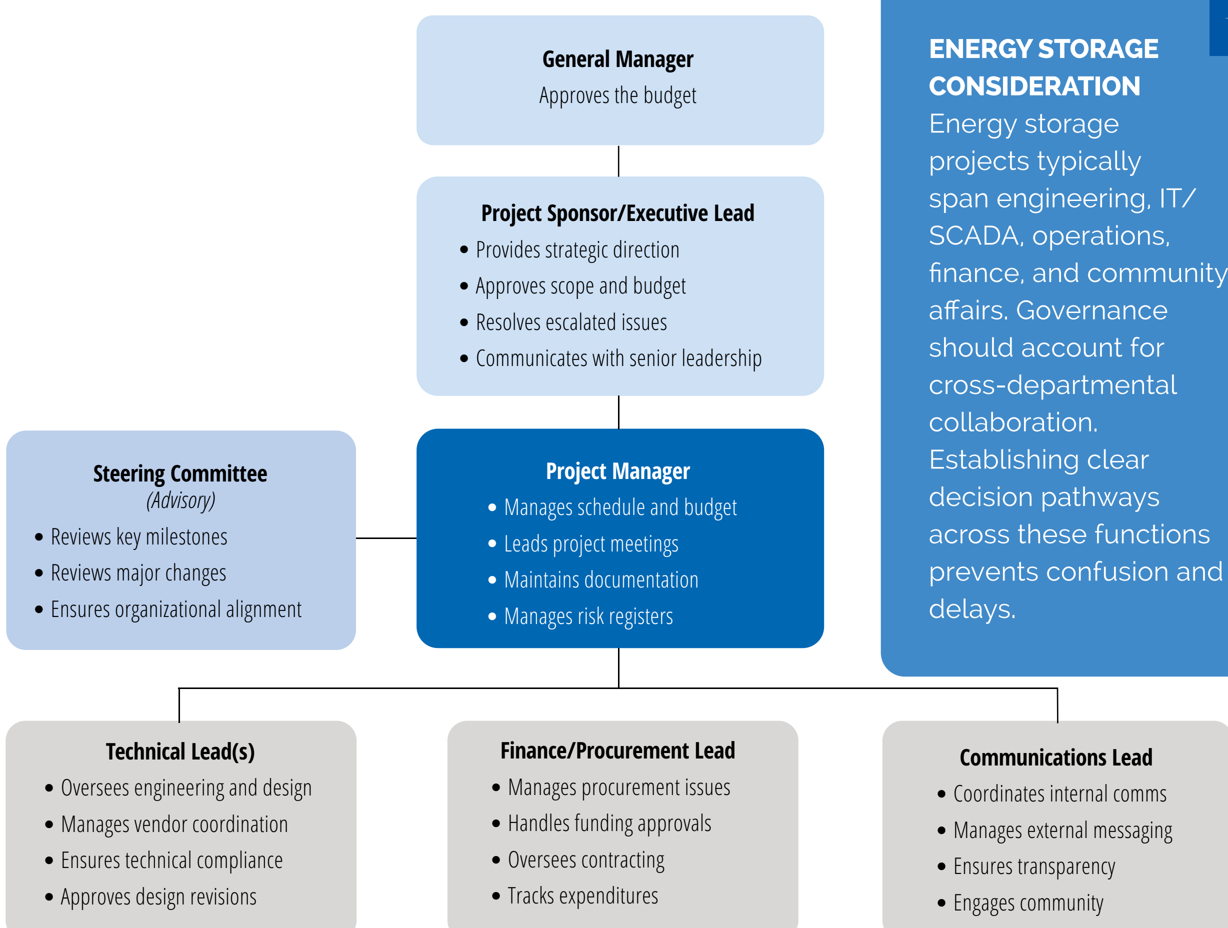
A clear governance structure defines who has the authority to make decisions, approve changes, and oversee project progress. The governance structure should also have an element that guides escalation procedures.

A common structure for energy storage projects will likely include the following levels of command:

Role/Group	Typical Responsibilities
General Manager	Approves the budget.
Project Sponsor/ Executive Lead	Provides strategic direction, approves scope and budget, resolves escalated issues, and communicates with senior leadership/the governing board.
Project Manager/ Day-to-Day Lead	Manages schedule, budget, and coordination; leads project meetings; maintains documentation and risk registers.
Steering Committee or Oversight Team	Reviews key milestones and major changes; ensures project remains aligned with organizational objectives.
Technical Lead(s)	Oversees engineering, design, and vendor coordination; ensures technical compliance with standards; approves technical design revisions.
Finance/Procurement Lead	Manages procurement issues, funding approvals, contracting, and tracks expenditures.
Stakeholder Liaison or Communications Lead	Coordinates internal and external communication; ensures transparency with leadership and the community.

ENERGY STORAGE CONSIDERATION

Energy storage projects typically span engineering, IT/SCADA, operations, finance, and community affairs. Governance should account for cross-departmental collaboration. Establishing clear decision pathways across these functions prevents confusion and delays.



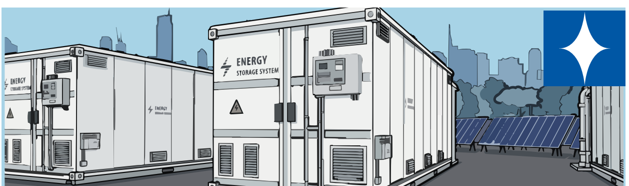
Oversight, Monitoring, and Reporting Cadence

Governance also includes approaches for oversight and transparency. These ensure that leadership and stakeholders remain informed about project progress, risks, and outcomes.

Plans for how and when reporting will occur should be documented to align expectations and maintain accountability throughout the duration of the project.

Recommended reporting mechanisms include:

- Regular internal meetings (weekly or biweekly) to review progress, issues, and next steps.
- Monthly or quarterly status reports summarizing schedule, budget, risks, and milestones.
- Leadership briefings at key decision points (e.g., before procurement release, construction start, or commissioning).
- Board or council updates when major milestones are achieved or decisions are required.
- Documentation of key decisions in meeting minutes, issue logs, or dashboard tools.



ENERGY STORAGE PLANNING TIP

Because storage projects can attract public interest, utilities should align governance reporting with communication strategies, ensuring consistent messaging to leadership, staff, and the community.

WORKSHEET: PROJECT GOVERNANCE MATRIX

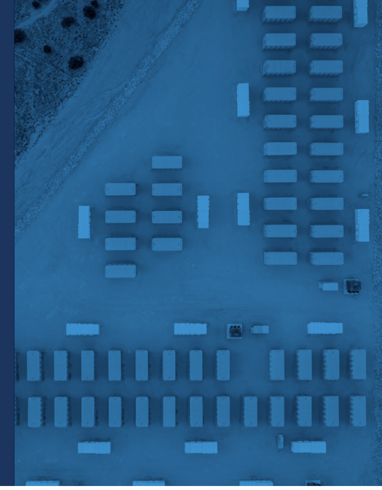
Use this worksheet to define who holds decision authority, how often oversight occurs, and what mechanisms ensure accountability. Modify as needed to match your utility's policies.

Use these prompts to assess whether your governance framework supports effective oversight and accountability:

1. Have decision-making roles and escalation paths been clearly defined and communicated to all participants?
2. Does the oversight structure ensure timely review of risks, finances, and technical milestones?
3. Are leadership and governance bodies receiving the right level of information to make informed decisions?
4. How will decisions and approvals be documented for transparency and auditability?

Governance Area	Description/Example	Your Project Entry
Executive Sponsor	Senior leader responsible for final approvals	
Project Manager	Day-to-day project lead	
Oversight Body	Steering committee, board, or council	
Reporting Cadence	Frequency of updates (weekly, monthly, quarterly)	
Change Control Process	How changes to scope, cost, or schedule are proposed and approved	
Escalation Procedure	How disputes or urgent issues are elevated	
Decision Documentation	Tools used (meeting minutes, dashboards, logs)	

Project Communication



A communication plan is designed to get the right people the right information at the right time. For example, the procurement team does not require the same level of technical detail as the engineers, and the construction contractor needs to know as soon as permits get approved.

Establishing a plan for communication from the outset of a project avoids confusion across team members and stakeholders and decreases the risk of errors, delays, and redundancies.

For energy storage projects, stakeholder communication is especially critical. These projects often involve new technologies, complex permitting, and public interest in safety, cost, and community impact. A deliberate communication approach supports both project success and public trust.

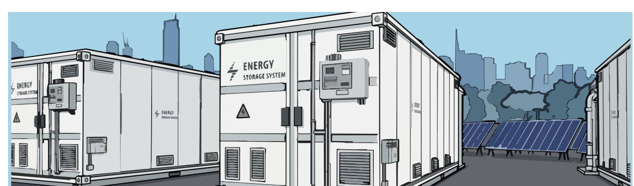
Internal Communication and Coordination

Effective internal communication ensures that all project team members (across engineering, finance, operations, IT, and communications) remain aligned on objectives, schedule, and issues.

The methods by which this communication will happen should be codified in the project plan so that team members understand where and when they can get information and what communication is expected of them in return.

Recommended methods include:

- **Defined meeting cadence:** Scheduling standing weekly or biweekly team meetings to review progress, risks, and upcoming milestones.
- **Clear information channels:** Letting team members know to expect to receive information via email, message boards, or communication platforms (e.g., Microsoft Teams, Slack, Google Chat), and encouraging team members to use these platforms to communicate synchronously and asynchronously.



ENERGY STORAGE PLANNING TIP
Because energy storage projects involve both IT and engineering disciplines, utilities should ensure communication channels bridge these groups early in planning. Misalignment between IT/OT integration teams is a common source of project delays.

- **Shared workspaces:** Using platforms that allow real-time collaboration and shared access to documents (e.g., Microsoft SharePoint, Google Workspace, project dashboards).
- **Cross-functional communication:** Promoting the exchange of ideas across departments to solve problems and accomplish goals collaboratively.
- **Collective report development:** Coordinating between technical and communications staff to develop leadership briefings that are technically accurate, use proper terminology, and effectively communicate project status.

Leadership and Board Communication

Utility leadership, governing boards, and city officials are key stakeholders. Keeping them informed through structured updates promotes transparency, builds confidence, and facilitates timely approvals.

Detailing a plan for communicating with these stakeholders prevents unmet expectations and helps minimize requests for ad hoc briefings or reports.

Effective strategies for communicating with leadership include:

- Circulating monthly or quarterly status reports summarizing schedule, budget, risk, and community engagement activities.
- Providing executive briefings at key decision points (e.g., procurement award, construction start, commissioning).
- Creating dashboards or summaries that visualize project health (traffic-light or milestone charts).
- Distributing agendas and relevant reports before major meetings to level set.
- Preparing slides to make it easy for stakeholders to follow presentations.
- Distributing notes after meetings to attendees, anyone who missed the meeting, and other key stakeholders as appropriate to review important points and action items.

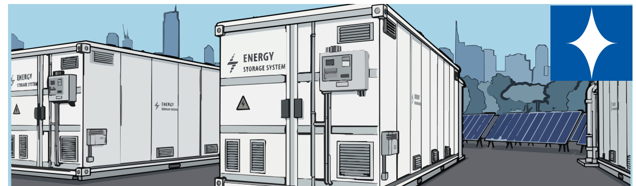
BEST PRACTICE
Create concise visuals and clear summaries of technical issues. Leaders often need actionable insights more than detailed data.

External Communication and Community Engagement

Public power utilities operate in service to their communities. Clear, proactive communication with customers, local officials, and emergency responders can strengthen project acceptance and understanding.

Key components include:

- Holding public information sessions or open houses during early planning or site selection.
- Creating and distributing fact sheets and FAQ to customers explaining project benefits, safety measures, and timelines.
- Preparing press releases and designating a media contact to ensure accurate reporting.
- Developing social media content that highlights community benefits and dispels misinformation.
- Engaging with regional utilities, agencies, or funding partners.
- Briefing emergency responders on site safety and fire protocols.



ENERGY STORAGE PLANNING TIP

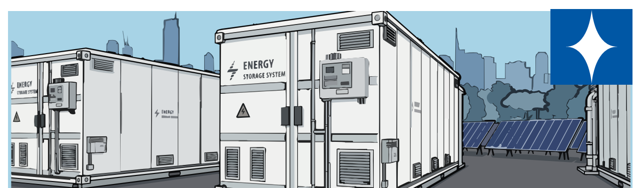
Addressing community concerns (e.g., fire safety, noise, aesthetics) early in the project builds trust and prevents misinformation from shaping perceptions.

Crisis and Incident Communication

Energy storage projects must include plans for communicating during unexpected events, such as equipment failures, construction incidents, or safety risks.

Utilities should:

- Base the plan on the utility's existing crisis communication plan.
- Name a lead who will manage the response and establish roles and responsibilities (who speaks to media, who informs leadership, who notifies regulators).
- Prepare template statements that can be adapted for specific incidents.
- Document the plan, store it on a shared drive where it can be readily accessed, and familiarize staff with the plan in advance of a potential crisis.
- Advise the entire project team that in case of an incident or emergency, they should wait for direction before speaking with the media or external stakeholders.



ENERGY STORAGE PLANNING TIP

Include the communications lead in project risk discussions. The communications lead can advise on the impact of risks on stakeholder and public sentiment and subsequently align messaging and communication plans with identified risks and mitigation measures.

WORKSHEET: PROJECT COMMUNICATION PLAN

Use this worksheet to define your communication framework. Adapt frequency and methods to match your utility's size and governance structure.

Use the prompts below to evaluate the completeness and effectiveness of your communication approach:

1. Have you identified all key internal and external stakeholders and their information needs?
2. Is there a consistent process for sharing updates and addressing issues across departments?
3. How will you ensure leadership receives clear, actionable summaries of project progress?
4. Have you planned for community communication around safety, benefits, and timelines?
5. Is there a protocol for communication during incidents or emergencies?

Audience/ Stakeholder	Purpose of Communication	Format/ Method	Frequency	Responsible Party	Notes

Budget and Financial Planning

The budget and financial planning section complements the procurement planning and risk management sections by identifying key cost elements, funding considerations, and strategies for maintaining financial control throughout the project lifecycle.

Budgeting for an energy storage project is complex and requires many considerations, including:

- Total ownership costs
- Technical, operational, and regulatory realities
- Contingency planning
- Lifecycle
- Funding sources

Effective planning ensures that the costs of an energy storage project are understood, tracked, and justified from conception through operation.

Failing to account for costs in advance can lead to project overruns or even prevent a project from being completed. A realistic and transparent budget provides a foundation for sound decision-making and long-term sustainability of the project.

Linking the Budget to the Business Case

The project budget should align directly with the objectives and assumptions established in the original business case. (See the Public Power Energy Storage Business Case Guide for guidance on developing a business case).

As planning progresses, utilities should revisit those assumptions to confirm that cost estimates, financing mechanisms, and projected benefits still hold true.

Key links that should be confirmed:

- Does the project's total estimated cost still support the expected value proposition (e.g., avoided demand charges, resilience, deferred upgrades)?
- Have capital, operating, and maintenance costs been updated to reflect current market conditions?
- Are funding and financing assumptions (e.g., grants, rebates, tax credits) still valid and secured?

BEST PRACTICE
Treat the business case and project plan as living documents, and update cost and benefit assumptions when new information emerges from design, procurement, or interconnection studies.

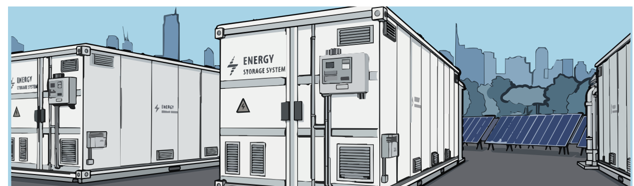
Typical Cost Categories for Energy Storage Projects

Energy storage budgets may differ from other capital projects in that they combine elements of both infrastructure and IT systems. A comprehensive cost plan should account for the following categories:

Category	Examples/Notes
Project Development	Feasibility studies Site assessment Permitting Environmental and fire reviews Community engagement
Engineering and Design	Preliminary and final design Interconnection studies Protection coordination Civil/site design
Equipment Procurement	Battery modules Racks Inverters, Transformers Switchgear Controls HVAC Fire suppression
Software and Controls	EMS/BMS licenses Integration with SCADA or DERMS Cybersecurity tools Communications infrastructure
Construction and Installation	Civil works Foundations Conduit Wiring Labor Inspection
Commissioning and Testing	Factory acceptance testing (FAT) Site acceptance testing (SAT) Third-party verification
Owner's Costs	Project management Legal insurance Project controls Training Contingency

Category	Examples/Notes
Operations and Maintenance (O&M)	Routine maintenance Performance monitoring Spare parts Warranty management
End-of-Life/ Decommissioning	Battery removal Recycling or disposal Site restoration
Financing/Carrying Costs	Debt service Interest during construction Grant management or reporting costs

Cost categories and benchmark values for energy storage systems are well-documented through multiple public databases, including DOE's Global Energy Storage Database (Sandia National Laboratories) and the Energy Storage Cost and Performance Database developed by Pacific Northwest National Laboratory. These sources provide detailed data on component costs, operating assumptions, and lifecycle considerations for storage technologies.



ENERGY STORAGE PLANNING TIP

Unlike some traditional capital projects, storage systems require lifecycle costing — estimating not only upfront capital but also future costs tied to performance degradation, augmentation, or replacement.

Funding and Financing Sources

Energy storage projects often rely on a combination of internal capital and external funding.

Public power utilities may have unique opportunities to access grants, cooperative purchasing, or tax-advantaged financing structures through partnerships.

Potential sources include:

- Federal or state grants
- Rebates or incentives
- Tax credit structures
- Cooperative or joint procurements
- Revenue streams from market participation and cost-savings

Contingency and Cost Risk Management

Because energy storage projects often include new technologies and evolving markets, cost uncertainty can be higher than in conventional projects. Common risk factors include long equipment lead times, foreign exchange fluctuations, and evolving safety requirements.

BEST PRACTICE
If project finance practices allow, include a 10%-25% contingency based on project maturity. Track cost risks separately (e.g., materials, labor, regulatory), and revisit forecasts at each major design or procurement milestone. Throughout the process, maintain transparent communication with leadership about any potential changes in total cost of ownership.

Budget Governance and Reporting

Establishing clear budget governance ensures that financial accountability is maintained throughout the project. By defining how funds will be tracked, approved, and reported, utilities can avoid surprises and maintain transparency with leadership, funding partners, and regulators.

Clear roles and processes for budget monitoring and reporting throughout the project include:

- A budget manager or financial lead responsible for monthly or quarterly tracking.
- Change-management procedures for approving scope or cost changes.
- A reporting cadence aligned with leadership meetings or funding agency requirements.
- Documented procedures for audit and closeout, especially when using grant funds.

BEST PRACTICE
Use the same work breakdown structure across schedule, budget, and procurement documents so costs can be tracked consistently by task or phase.

WORKSHEET: BUILDING A PROJECT BUDGET FRAMEWORK

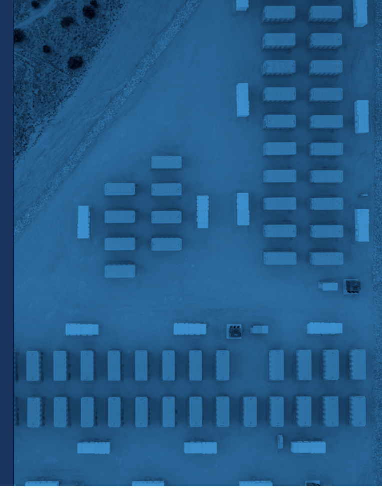
Use this worksheet to organize cost categories, funding sources, and contingencies. Customize it to align with your utility's internal budgeting templates.

Use the following prompts to review the completeness and resilience of your project budget:

1. Does the budget include all project phases, from development through decommissioning?
2. Are contingency allowances appropriate for the project's risk level and technology maturity?
3. Have funding timelines and cash-flow assumptions been validated?
4. Does the budget align with procurement sequencing and the project schedule?
5. Are long-term O&M and augmentation costs reflected in lifecycle planning?

Category	Estimated Cost ($)	Funding Source(s)	Contingency (%)	Responsible Party	Notes
Total					

Risk and Contingency Planning



Even the best-planned projects face uncertainty. Effective risk and contingency planning ensures that when the unexpected happens, the project team is ready to respond with clarity and confidence.

In project management, this process is often formalized through a risk register. A risk register is a centralized document used to record, categorize, assess, and manage identified risks along with their potential impacts, likelihood, ownership, and mitigation strategies. Developing this register early in the planning process, and updating it throughout the project lifecycle, helps maintain alignment and preparedness.

For energy storage projects, where technology, regulation, and market conditions are rapidly evolving, a well-maintained risk register serves as both an operational safeguard and a decision-support tool for leadership.

Identifying Project Risks

Utilities should start by brainstorming potential risks with a diverse cross-section of team members, including leadership, engineers, IT staff, finance, communications, and vendors. Encourage participants to think beyond immediate technical concerns to include financial, operational, and regulatory risks.

For energy storage projects, common risk categories include:

- **Technical risks:** Battery degradation, integration failures, or performance shortfalls
- **Schedule risks:** Equipment delivery delays, permitting bottlenecks, or interconnection study timelines
- **Financial risks:** Cost escalation, interest rate changes, or loss of incentive funding
- **Regulatory and compliance risks:** Fire code changes, environmental reviews, tax-credit guidance, or permitting requirements
- **Operational risks:** Limited internal staff capacity, turnover, maintenance readiness, or training gaps
- **Cybersecurity risks:** Vulnerabilities introduced through SCADA, unauthorized access, or vendor-managed control systems

- **Safety risks:** Fire events, thermal runaway, hazardous materials incidents, or emergency-response readiness
- **Community or stakeholder risks:** Local opposition, public perception concerns, misunderstanding of system purpose, or misalignment with public expectations
- **Supply chain risks:** Battery procurement delays, inverter shortages, or vendor disruptions

BEST PRACTICE
Risk registers are living documents and should be reviewed and updated regularly. Revisit the list of risks at key project milestones, including design completion, procurement, construction, commissioning, and major operational changes, to ensure new risks are captured and outdated risks are retired.

Scoring and Prioritizing Risks

Once the utility project team has identified and documented risks in the risk register, they should then evaluate risks based on their likelihood of occurrence and potential impact on project objectives, including cost, schedule, safety, performance, and regulatory compliance. Evaluating risks consistently helps project teams focus mitigation efforts on the risks most likely to affect successful project delivery. A common approach is to assign likelihood criteria and impact criteria on a five-point scale .

Likelihood Criteria

Score	Description
1	**Rare:** Unlikely to occur, <5% chance
2	**Unlikely:** Could occur occasionally, 5%–20% chance
3	**Possible:** Might occur, 21%–50% chance
4	**Likely:** Will probably occur, 51%–80% chance
5	**Almost Certain:** Expected to occur, > 80% chance

Impact Criteria

Score	Description
1	**Insignificant:** Minimal impact on project cost, schedule, safety, or performance
2	**Minor:** Limited impact, easily manageable
3	**Moderate:** Noticeable impact requiring management attention
4	**Major:** Significant impact to project objectives
5	**Catastrophic:** Severe impact that threatens successful project delivery

Multiply the likelihood rating by the impact rating to get a risk score.

Risk Score = Likelihood × Impact

For example, a risk rated as likely (4) and major (4) would receive a risk score of 16.

Use the resulting scores to prioritize mitigation activities and focus project resources on the most significant risks.

Risk Score	Priority Level	Recommended Action
1–5	Low	Monitor and manage through routine project controls
6–14	Medium	Develop mitigation measures and monitor regularly
15–25	High	Prioritize mitigation actions and ongoing management attention

Teams can use a risk heat map to visualize project risks based on their risk score. This helps project teams and stakeholders identify the most significant risks, prioritize mitigation efforts, and support decision-making throughout project planning, design, construction, commissioning, and operation.

Sample Heat Map

Likelihood

Impact		1 (Very Unlikely)	2 (Unlikely)	3 (Possible)	4 (Likely)	5 (Almost Certain)
	5 (Catastrophic)					Risk 3, Risk 6
	4 (Major)			Risk 2, Risk 5		
	3 (Moderate)					
	2 (Minor)	Risk 1				
	1 (Negligible)		Risk 4			

Risk Mitigation and Contingency Planning

After evaluating and prioritizing risks, identify mitigation strategies for medium- and high-priority risks. Mitigation strategies are actions taken to reduce the likelihood of a risk occurring or lessen its potential impact on the project.

Each risk should be assigned a risk owner who is responsible for monitoring the risk, identifying early warning indicators, and coordinating mitigation or response actions as needed. Documenting planned response actions can help project teams prepare for and manage risk events if they occur.

Examples for energy storage projects:

Risk	Mitigation Strategy	Contingency
Vendor supply chain disruption	Prequalify alternate suppliers and build flexibility in procurement timelines	Adjust equipment delivery sequence and update commissioning schedule
Cybersecurity breach of control system	Require vendors to align with the NIST Cybersecurity Framework (CSF) and conduct penetration testing	Isolate affected systems and activate cybersecurity incident response plan
Battery fire or thermal event	Design and operate the system in accordance with NFPA 855, UL 9540, and applicable local fire codes; Provide required safety training for personnel	Coordinate with local emergency responders and implement site emergency response procedures

BEST PRACTICE

Mitigation strategies should be treated as part of overall project controls, not as one-time checkboxes. Many risks can be reduced simply through ongoing monitoring and communication.

WORKSHEET: DEVELOPING A PROJECT RISK REGISTER

Use this worksheet to document, evaluate, and manage risks that could affect an energy storage project. The risk register should capture identified risks, categorize them, assess their likelihood and impact, assign a risk owner, and document mitigation strategies or response actions. Update the register periodically as project conditions, assumptions, vendors, regulatory requirements, or operational needs change.

Use the following prompts to guide discussion:

1. Which risks have the greatest potential to disrupt project cost, schedule, safety, performance, or regulatory compliance?
2. Are there risks unique to energy storage systems that should be documented (e.g., battery degradation, vendor lock-in, cybersecurity vulnerabilities, fire safety, or emergency response readiness)?
3. Does each medium- or high-priority risk have an assigned risk owner?
4. Are the mitigation strategies realistic based on available staff, budget, authority, and project timeline?
5. How often will the project team review and update the risk register?
6. How can lessons from this project inform future energy storage planning and risk management processes?

Risk Descript	Category	Likelihood (1-5)	Impact (1-5)	Risk Score Likelihood X Impact	Priority Level Low, Medium, or High	Mitigation Strategy	Contingency Plan	Risk Owner	Status/Notes
		1	1	1	Low				
		1	1	1	Low				
		1	1	1	Low				

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