# BESS Maintenance Checklist: The Key to Lowering LCOE and Ensuring Project Success

2024-03-21 16:27

## The Unsung Hero of Your BESS Project: Why Your Maintenance Checklist Isn't Just Paperwork

Honestly, if I had a dollar for every time I've walked onto a project site and seen a brand-new, million-dollar Battery Energy Storage System (BESS) sitting idle because of something a simple, regular check could have caught well, let's just say I wouldn't be writing this blog. I'd be on a beach. We in the industry love to talk about cell chemistry, inverter efficiency, and the latest in AI-driven energy management. But the real story of a project's 20-year success? It's written in the margins of a well-thumbed, coffee-stained maintenance checklist. And I've seen this firsthand from Texas to Bavaria.

## Jump to Section


- The Real Cost of "Deploy and Forget"
- Beyond the OEM Manual: What a Real-World Checklist Covers
- Case in Point: The Lesson from a California Microgrid
- The Direct Link to Your LCOE
- What's in Our Field-Proven Checklist?


## The Real Cost of "Deploy and Forget"

Here's the common phenomenon: A project gets commissioned. The ribbon is cut. The system is live. The operations team, often stretched thin, receives a 500-page OEM manual and a generic maintenance schedule. Fast forward 18 months. Performance has dipped by 5-8%. No major alarms are firing, but the revenue or expected savings aren't materializing. The culprit? It's rarely one big thing. It's a dozen small thingsa dusty fan filter causing a 2C temperature rise, a slightly loose DC busbar connection adding resistance, an unnoticed moisture ingress in a cable gland.

The National Renewable Energy Lab (NREL) has been clear about this: operational practices are a primary lever for reducing the Levelized Cost of Storage (LCOS). Their data shows that proactive, preventive maintenance can improve system availability by over 15% compared to reactive strategies. That's 15% more energy you're selling or using, and 15% less you're leaving on the table.

## Beyond the OEM Manual: What a Real-World Checklist Covers

Any OEM will give you a list. It'll tell you to check the state of charge and look for alarm codes. A true, site-hardened checklistlike the one we developed and refined over dozens of deployments, including for challenging environments like rural electrification in the Philippinesgoes deeper. It's built for the technician on the ground with a flashlight and a thermal camera, not just an operator in a remote SCADA room.

Let me give you an expert insight on thermal management, for instance. The manual says "ensure cooling system is operational." Our checklist says: "Check ambient air intake temperature vs. internal container temperature differential. Inspect condenser coils for debris. Manually test each fan stage. Listen for bearing wear. Verify thermal camera shows no >5C hotspots on any cell module or busbar." Why? Because consistent thermal performance is the single biggest factor in slowing battery degradation. A 10C sustained increase above spec can halve cycle life. That's not a gradual costthat's a capital cliff.





## Case in Point: The Lesson from a California Microgrid

We worked with a community microgrid developer in Northern California. Their 2 MWh containerized system, critical for fire-season resilience, started showing erratic state-of-health readings after its first year. The OEM's remote diagnostics found "no fault." Our team went on-site with our checklist. Within an hour, we found it: corrosion on the communication board terminals connecting the Battery Management System (BMS) slaves. The salt-laden coastal air, combined with a minor condensation issue from a specific door seal, had created a perfect storm. It wasn't in the main power path, so it didn't trip safety alarms, but it was scrambling the data the BMS relied on to balance the packs.

The fix was a $200 part and resealing a gasket. Without that checklist-driven, physical inspection, the next step would have been a costly and unnecessary replacement of entire battery modules. More importantly, the system's reliability during a potential Public Safety Power Shutoff event was compromised. That's the agitating truth: a missed check isn't just an operational issue; it's a business continuity and safety risk.

## The Direct Link to Your LCOE

Every investor and owner talks about Levelized Cost of Energy (LCOE). We engineer for it. And the biggest lever you have after the system is built is extending its useful life and maximizing its availability. Think of your maintenance checklist as the primary tool for LCOE optimization. A rigorous regimen directly impacts the two variables in the LCOE denominator: total energy output over life and system lifespan.

At Highjoule, when we design a systemwhether it's a UL 9540-certified container for an industrial park in Ohio or a customized solution for a German Mittelstand manufacturerwe don't just ship hardware. We co-develop the operational playbook. Our safety-first design, with clear access points, integrated monitoring sensors, and component layouts that simplify inspection, exists for one reason: to make comprehensive maintenance not just possible, but efficient and foolproof. Compliance with UL, IEC, and IEEE standards isn't a checkbox for us; it's the baseline framework we build our service models upon.

## What's in Our Field-Proven Checklist?

So, what does this actionable document look like? It's structured, but it's not a novel. Here's a snapshot of the critical categories that go beyond the basics:

## 1. Safety & Compliance Integrity (The First and Last Item Every Time)

- Verify all safety signage, arc-flash boundaries, and lock-out/tag-out points are clear and legible.
- Physical inspection of fire suppression system pressure gauges and agent expiry dates.
- Check for any new local code amendments or utility interconnect requirements that may have taken effect.

## 2. Envelope & Environmental Security

This is huge, especially for containerized systems. A tiny leak or seal failure can lead to massive problems.

- Detailed seal inspection on all doors, cable entry glands, and roof penetrations.
- Check and clean HVAC/condenser units (the #1 cause of thermal issues isn't the AC failing, it's it struggling because it's clogged).
- Monitor and document ambient humidity levels inside vs. outside the container.

## 3. Electrical & Thermal Performance (The Core Diagnostics)

- DC Side: Torque-check on a sample of critical busbar connections (thermal cycling can loosen them). Infrared imaging of all major DC connections and fuses.
- AC Side: Check inverter heat sink temperatures and cooling fans. Log any harmonic distortion readings from the meter.
- Battery Core: Review full BMS data log for any voltage or temperature outliers across all 1,000+ data points, not just pack-level summaries. Verify calibration of current sensors.

## 4. Data & Communication Health

- Confirm data continuity from every BMS slave and inverter to the local gateway and to the cloud SCADA.
- Validate timestamp synchronization across all devices. A 5-second drift can cause major analytics errors.
- Perform a test alarm generation and response procedure to ensure the monitoring service is live.

The goal isn't to create a 4-hour inspection for every weekly check. It's about having a graduated system: daily remote checks, monthly visual inspections, and comprehensive quarterly or bi-annual deep-dives that follow this disciplined approach. This is how you catch the loose connection before it becomes a hot spot, and the slight performance drift before it becomes a warranty claim.

So, I'll leave you with this: When you're evaluating your next BESS solution or auditing your current one, what questions are you asking about the maintenance protocol? Is it an afterthought document, or is it the living, breathing blueprint for your project's profitability and resilience?

Author: Thomas Han

12+ years agricultural energy storage engineer / Highjoule CTO

URL: https://glenproperty.co.za/articles/maintenance-checklist-for-20ft-high-cube-solar-container-for-rural-electrification-in-philippines

