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BATTERY STORAGE SYSTEMS:

WHY STANDARDISED BESS QUALITY MANAGEMENT IS BECOMING A CRITICAL PREREQUISITE FOR SUSTAINABLE AND EFFICIENT BATTERY STORAGE OPERATION

Battery energy storage systems (BESS) are widely regarded as one of the structural pillars of the energy transition. Yet as projects grow in size and complexity, one critical area often remains surprisingly underexposed: quality assurance during installation, commissioning and operation. Unclear requirements, missing standardization and unverified manufacturer specifications frequently jeopardize performance, safety and liability - and, ultimately, the economic viability of entire projects. Practical experience consistently shows: a large-scale storage system is only as good as its quality management.

Specified Components Are Not the Same as Guaranteed Performance

Long before a storage system is built, significant attention is paid to selecting the right components. Operators and investors rightly ask:

- Which manufacturer has a verified track record and references?
- How realistic are the promised efficiencies (Round Trip Efficiency, RTE)?
- How will the State of Health (SOH) develop over time?

- Is the battery capacity indicated on the nameplate actually available to the market participant (performance testing)?
- Is the stated degradation realistic, or merely a sales argument?
- Which technical standards for grid connection and operation does the system comply with?
- How effectively have noise protection, fire safety and environmental requirements been addressed?

In practice, however, many of these values turn out to be “*sticker numbers*”, not unlike fuel consumption labels on new cars. Perfect on paper, less robust in reality. Ultimately, what matters is not what the datasheet claims, but how the system performs after commissioning.

Quality Is Not Declared: It Is Verified

Reliability is determined not by choosing a manufacturer but by independent quality verification during and after installation. A systematic quality management approach and performance testing, technically, documentarily and organizationally, is the only way to ensure that a built system actually meets its planning assumptions.

A professional BESS quality assessment typically includes:

- **Mechanical verification:** Was the physical installation completed correctly? Are containers, foundations, cooling systems and auxiliary infrastructure properly installed?
- **Electrical verification:** Do all connections, grounding systems, protection devices and cabling routes comply with specifications - and have they been tested appropriately?
- **Complete documentation:** Certificates, test reports, acceptance documents, performance and warranty conditions, protection concepts: all must be complete, consistent and verifiable.
- **Communication & IT:** Does data communication between the BMS (Battery Management System), EMS (Energy Management System), PCS (Power Conversion System) and market participant function reliably?
- **Standard conformity:** Are all relevant grid connection rules, safety standards and testing requirements met?
- **Safety functions:** Do alarms, shutdown mechanisms and fire protection systems operate as designed?
- **Test profile & performance validation:** Execution of a defined test profile to verify charge/discharge performance, efficiency, temperature behavior and dynamic system response.
- **Thermal behavior:** How does the system behave under load? Are there hotspots or critical operating conditions?

These assessments not only provide certainty but also protect operators from future disputes with manufacturers, insurers or market partners.

Why an Independent BESS Expert Is Often Indispensable

Modern BESS technologies are technically sophisticated, and the manufacturer landscape is highly heterogeneous. An independent BESS expert (BESS-Gutachter: independent technical auditor) provides three key advantages:

- Neutrality toward manufacturer claims
- Experience across numerous projects
- Documentation quality that supports evidentiary and liability requirements

For many investors, such quality verification has already become a prerequisite for financing decisions.

What Comes Next? Without Optimized EMS Control, Performance Remains Untapped

Another critical factor in the lifecycle of a storage asset is the Energy Management System (EMS) and its interaction with the market participant. Many performance or economic deficits observed later in operation stem not from the storage hardware itself but from suboptimal control strategies. We will explore this in detail in one of the upcoming editions.

Conclusion

Standardized BESS quality management is not an administrative add-on - it is the cornerstone of safety, efficiency and economic success. Those who work closely with storage projects know: quality is not determined by what is written on the datasheet but by what happens during commissioning and early operation. Only thorough and independent verification creates the foundation for reliable, sustainable and commercially robust BESS operation over the many years of its service life.

Note: *This article reflects our practical experience and is not a substitute for legal advice.*

Feel free to contact us if you're planning a project—we'll support you with hands-on expertise.

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