



E-STORAGE BESS SOLUTION TECHNICAL WHITE PAPER

**Next-Generation Performance:
The e-STORAGE BESS Solution Featuring SolBank 3.0 Plus**



Next-Generation Performance

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1. Executive Summary

The **e-STORAGE BESS Solution featuring SolBank 3.0 Plus** delivers a new benchmark in utility-scale energy storage performance. Built for long-term reliability, safety, and operational value, this next-generation system is engineered to meet the evolving demands of global energy markets.

For the purpose of this paper, we also refer to the e-STORAGE BESS Solution featuring SolBank 3.0 Plus as "the Solution."

Key highlights include:

- Improved energy throughput performance: enabling up to 15% or more energy delivery over system life, depending on project-specific use cases and dispatch profiles.
- 25-year design life: engineered for long-duration reliability, with actual lifespan determined by operating conditions.
- Designed to exceed the latest safety and fire containment standards.
- Backed by global manufacturing and an end-to-end service model covering manufacturing, execution, permitting, commissioning, and long-term performance support.

2. Market Context & Industry Need

Stakeholders across the energy landscape, including project owners, developers, and operators, are navigating increasing complexity. Regulatory uncertainty, evolving interconnection rules, and fragmented safety standards pose challenges to deployment and project bankability.

These challenges highlight the importance of working with solution providers who can go beyond hardware delivery. The Solution addresses these gaps by offering technical leadership, compliance expertise, and full life-cycle support, helping projects stay on track and aligned with evolving market and safety expectations.

Emerging global regulations, including the EU Battery Passport, carbon footprint tracking, and regional compliance mandates, are highlighting the need for storage solutions that are transparent, future-ready, and aligned with global traceability standards.

The e-STORAGE BESS Solution is a fully integrated, modular platform centered around SolBank 3.0 Plus, designed to address the toughest operational, safety, and deployment challenges faced in utility-scale energy storage.

Key attributes include:

- Enhanced degradation performance and increased usable energy.
- Modular and flexible integration with reliable EMS and PCS partners.
- Mirror design simplifies layout, reducing site design complexity and installation time.
- Designed to meet local compliance, safety, and performance needs through validated system-level integration.



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3. Technology Highlights & Performance Benefits

- **More energy throughput** through improved degradation control and optimized system usage.
- **Extended design life** supports investment-grade performance and reliability.
- **Mirror design** enables lower EPC and installation cost, with improved site flexibility.
- **Noise control improvements** support broader deployment in sensitive locations.
- **Validated fire safety** through Heat Flux Analysis (HFA) and full-scale system-level fire containment testing, demonstrating performance beyond UL9540A requirements.
- **Improved heat insulation material** enhances resilience to external thermal threats and supports safe operation in extreme conditions.
- **System-Level Integration:** SolBank, PCS (inverter), and EMS are fully integrated and validated for seamless interoperability. This includes alignment across communications, control logic, protection response, and fault coordination. The solution meets system certification including UL 9540 system and is designed to mitigate risks such as signal mismatch, delayed response, or logic failure, ensuring reliable performance from commissioning through long-term operation.

4. Safety-First Engineering

Safety is foundational to the Solution. Beyond robust containment design, the system includes advanced multi-layer monitoring and real-time control coordination across all subsystems.

- **Early fault detection and reporting** is enabled through the Battery Management System (BMS), which monitors critical battery and auxiliary system parameters.
- **The Battery Control Interface (BCI)** along with advanced system optimization coordinates power block behavior across operational states, maintenance modes, or in response to faults.
- **The Energy Management System (EMS) and Data Analysis System (DAS)** continuously monitors performance, flags anomalies, and coordinates rapid system-wide response.
- This integration allows the system to **isolate faults quickly, notify operators, and prevent escalation**, reinforcing safety from both hardware and intelligence layers.
- In addition, the Solution's design **meets or exceeds UL9540 A-level expectations** and supports evolving global requirements, including EU compliance and Battery Passport standards.





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5. Global Supply Chain & Full-Lifecycle Services



The Solution is backed by a globally distributed and adaptable supply chain, ensuring timely delivery, compliance, and cost efficiency across regions.

- Battery product manufacturing and assembly across China, and the U.S. via e-STORAGE's own plants and qualified partners.
- Inverter and EMS sourcing optimized across U.S., Europe, and Asia based on project-specific needs.
- Regional adaptability for compliance, logistics, and cost efficiency.

As a total solution provider, e-STORAGE delivers services including:

- Integrated system design and engineering
- Permitting and regulatory support
- Full EPC and turnkey execution
- Long-term service and performance guarantees

6. Application Versatility

The Solution is designed for a wide range of current applications and is built with the flexibility to support emerging energy storage needs across global markets. As the grid evolves toward deeper renewable integration, long-duration energy needs, and more dynamic grid services, the Solution's modular design, advanced control architecture, and compliance-readiness position it as a future-proof platform.

Use cases include:

- Renewable energy firming (solar/wind smoothing)
- Energy time-shifting / arbitrage
- Peak shaving and demand management
- Frequency regulation and grid stability
- Black start and grid-forming support
- Microgrid operation and islanding
- Transmission & distribution (T&D) deferral
- Hybrid solar + storage system integration

Positioned for future energy trends including:

- Participation in capacity and ancillary markets with high-frequency, fast-response services
- Grid-forming and virtual synchronous machine capabilities to support inverter-dominated grids
- AI-enabled optimization across hybrid systems and portfolios
- Scalable for long-duration and dispatchable clean energy delivery
- Compliance with lifecycle traceability, Battery Passport, and evolving ESG reporting requirements



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7. Conclusion

With SolBank 3.0 Plus at its core, the e-STORAGE BESS Solution provides a proven pathway to long-term value, improved performance, and system-level safety. Its flexible design, manufacturing scale, and turnkey service model ensure readiness for the next generation of utility-scale storage projects around the world.

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