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GRID INTERCONNECTION STANDARDS FOR ENERGY STORAGE

*Obtaining consistency and affordability while
retaining grid performance*

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PROJECT OVERVIEW



- Goal: to provide product-agnostic technical leadership in development of interconnection standards for energy storage
- Current Practice: IEEE 1547-2018 and IEEE 2800-2022
- Why Sandia: deep knowledge of and experience with the technology, the challenges, and the standards process, without financial interest in a specific product or technology
- Innovation: What is new in your approach and why do you think it will be successful?
- Duration: FY2025-FY2028.
- Impact: reduced costs (money and time) through clear and consistent requirements, while minimally limiting innovation.
- Vertical/Investment Area: (Select all that apply)
 - Grid Integration and Field Validation
 - Safety & Reliability
- Alignment/Supports strategic pathway: improves affordability of advanced technology; positively impacts Stabilization and Growth

AN IMPORTANT DISTINCTION



Interconnection standards

- ❖ Focus is on maintaining the integrity, reliability, security, and performance of the power system.
- ❖ Examples include the IEEE 1547 and IEEE 2800 series.

Design standards

- ❖ Focus is on the design of the ESS system or its components, for assurance of performance and longevity of the ESS.
- ❖ Examples include IEEE 1561, IEEE 1578, IEEE 2686, and IEEE P2688.

Safety standards

- ❖ Focus is on preventing and limiting the negative aspects of safety events like fires, explosions, and electric shocks.
- ❖ Examples include NFPA 855, the NEC (NFPA 70) and the NESC (IEEE C2).
- ❖ UL 9540, Standard for Safety of Energy Storage Systems and Equipment, which incorporates by reference UL 1741.

ALL ARE IMPORTANT! The focus of this presentation is on interconnection standards.

PROJECT DETAILS



- Leadership in standards groups like IEEE SA Standards Committee 21 and the IEEE Power Systems Relaying Committee
- Leadership and active technical-content contribution in relevant IEEE standard working groups Currently active:
 - P1547: Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
 - P1547.1: IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Energy Resources with Electric Power Systems and Associated Interfaces
 - P1547.4: Guide for Design, Operation, Integration and Interoperability of Intentional Electric Power Systems Islands
 - P1547.6: Guide for Interconnecting Distributed Energy Resources With Electric Distribution Systems Secondary Networks
 - P1547.7: Guide for Conducting Impact Studies for Distributed Energy Resource Interconnection
 - P2030.7: Standard for the Specification of Microgrid Controllers
 - P2800.1: Recommended Practice for Functional Capabilities and Performance of Grid Forming Equipment in Inverter-Based Resources (IBRs) / Converter-Based Resources (CBRs)
- Participation in NERC inverter interconnection processes (e.g., EOP-004)
- Participation in relevant CIGRE working groups (e.g., B5.92 on anti-islanding)

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