



Energy Storage Reliability Codes and Standards Activities

May 5, 2022

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Pacific Northwest National Laboratory**

ESS Safety & Reliability Forum, Day 2



PNNL is operated by Battelle for the U.S. Department of Energy

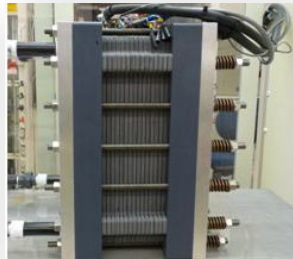


Grid Storage Efforts at the Pacific Northwest National Laboratory



Cost Competitive Technologies

Redox Flow



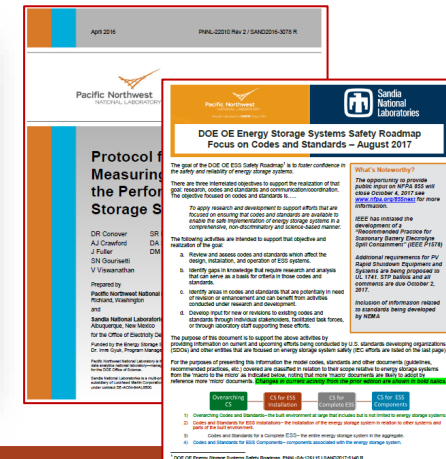
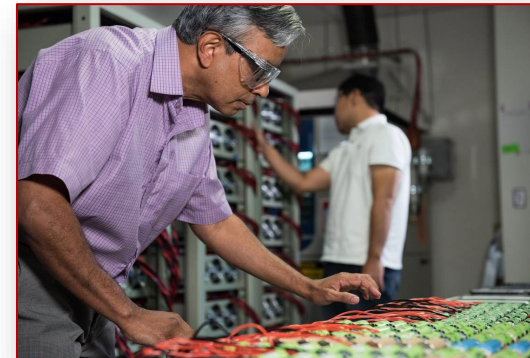
Sodium



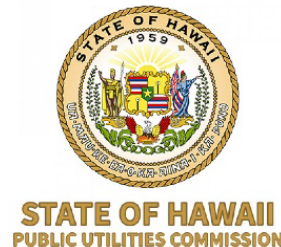
Zn-MnO₂



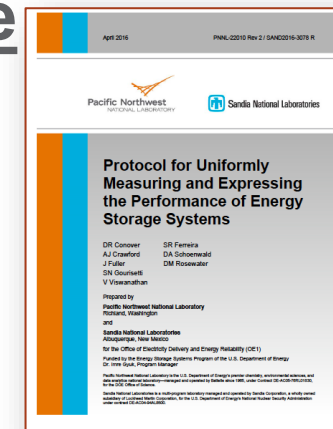
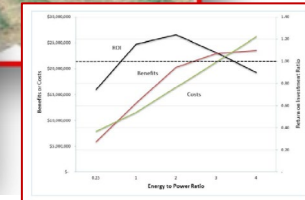
Safety and Reliability



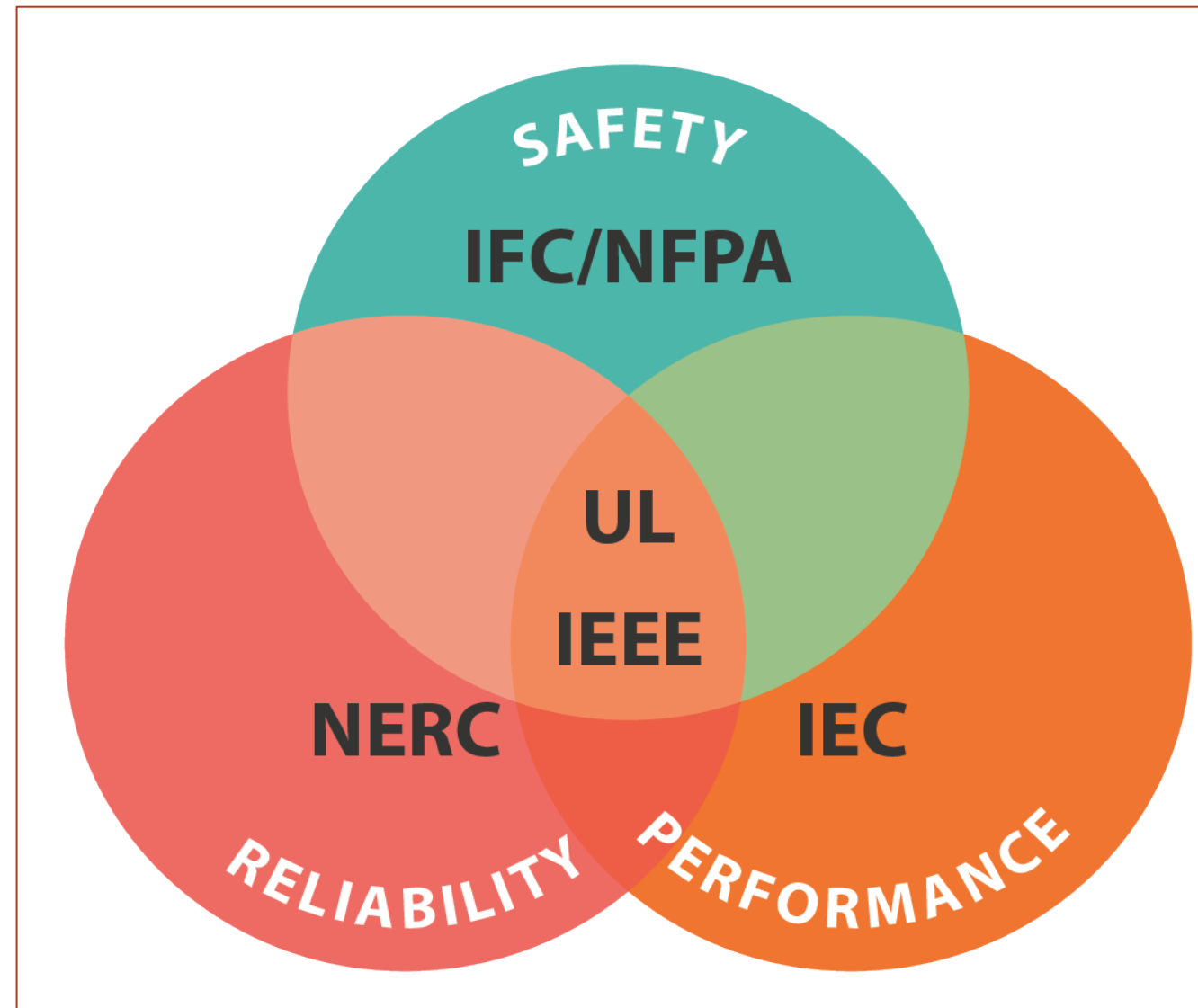
Regulatory Support



Industrial Acceptance



Coordinating Across Safety, Reliability and Performance ES Codes & Standards



PNNL OE ES's Codes & Standards (C&S) development activities include participation in:

Safety: NFPA 855, UL 9640, UL 1974

Reliability: IEEE, NERC

Performance: IEC TC 120, *EPRI ESIC (non-SDO)*, *MESA/SunSpec (non-SDO)*
and *SAE International*

ES Reliability C&S Program Metrics & Milestones,

Technical Standards Development Activities Supported by OE ES

- IEEE 1547.9 ES Interconnection Standard, *Ropp, Searles, McDermott, Asgeirsson, Vartanian*
- IEEE P2686 BMS Recommended Practice, *Rosewater, Searles*
- IEEE P1679.3 Adv. Battery Characterization Guide (Flow), *Viswanathan*
- IEEE P2688 ESMS Recommended Practice, *Schoenwald, Nguyen*
- IEEE 2800 Inverter Based Resources Transmission Interconnection Standard, *Elizondo*
- IEC TC-120, *N. American rep, Viswanathan, Paiss*
- EPRI ESIC participation, *Crawford, Viswanathan, Paiss*
- MESA Specifications Testing & Certification program, *Kolln*
- **(new)** SAE/IEEE 1547 Coordination, *Asgeirsson*
- **(future)** NERC Gen. Availability Data System (GADS), update for large BESS, *EPRI, Labs*

ES Technical Standards or References Created or Updated



- IEEE 1547.9 Recommended Practice for ES Interconnection. 98% approval, publication pending
- MESA-Device, Certification procedure complete, in cooperation with Sunspec Alliance
- MESA-DER Certification roadmap complete, in cooperation with DNP3 Work Group

Department of Energy's
GRID STORAGE LAUNCHPAD
Coming to PNNL's Campus in 2023

GSL Vitals

- 85,000 square feet
- 105 workstations
- 30 Lab Modules
- Estimated Facility Cost: \$75 Million
- Leveraged Funding: \$35 Million from State of Washington, Battelle, Pacific Northwest National Laboratory