Update on Energy Storage Safety and Reliability Codes and Standards Activities

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DOE OE Energy Storage Peer Review
Online

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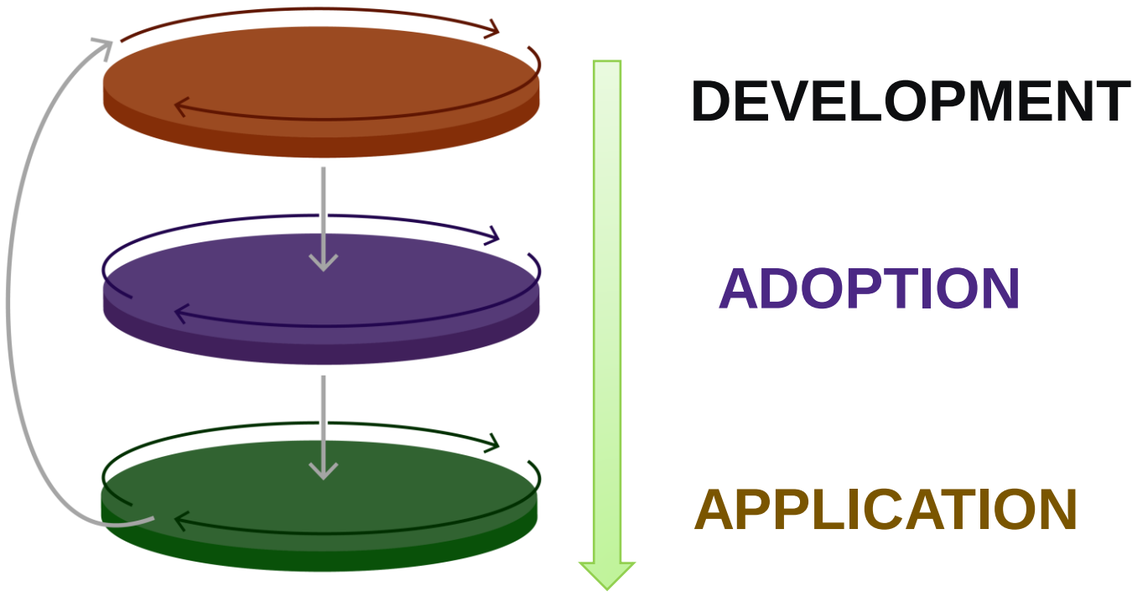
ESS Codes and Standards Project Purpose

Purpose

- Foster deployment and effective use of energy storage technology through development, adoption, and application technical standards.

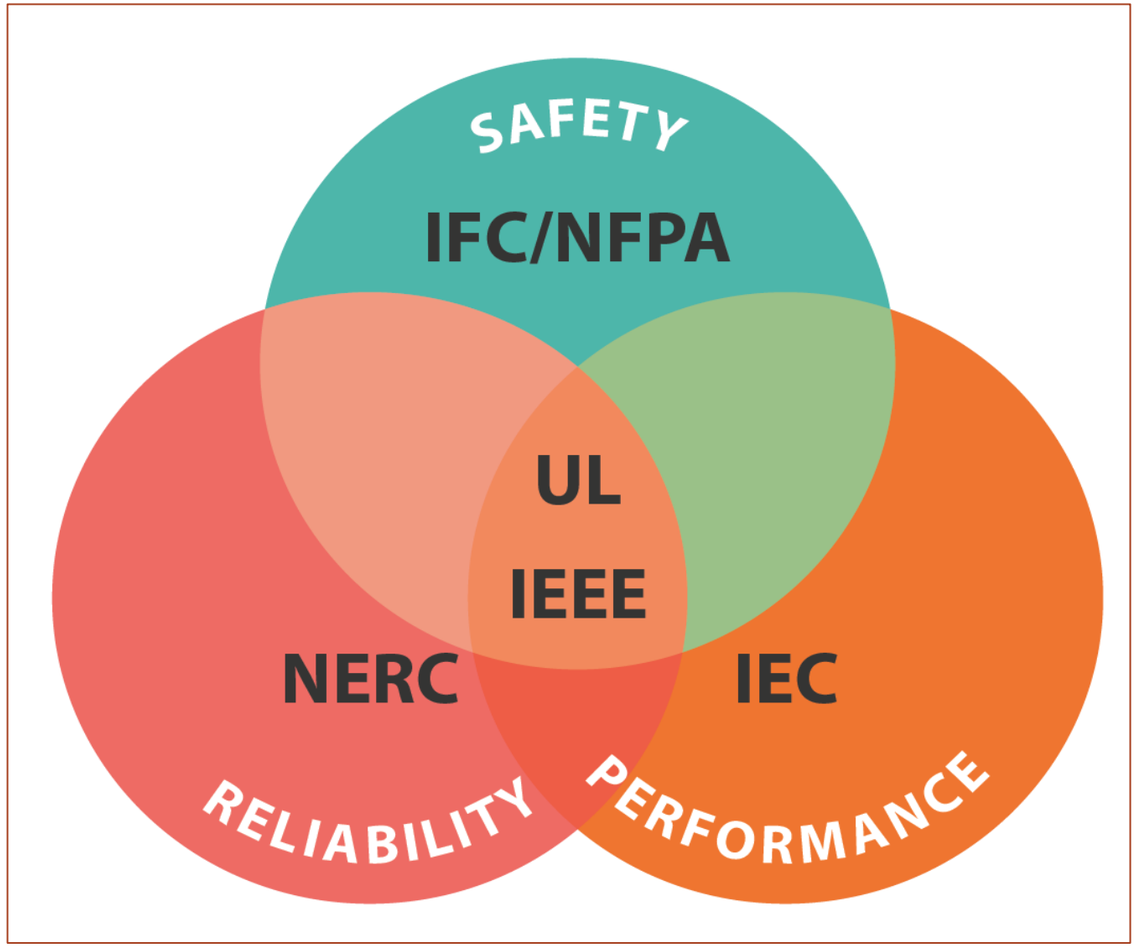
Impact

- Lower barriers to ESS adoption and improve reliability and resiliency of ESS and power systems.

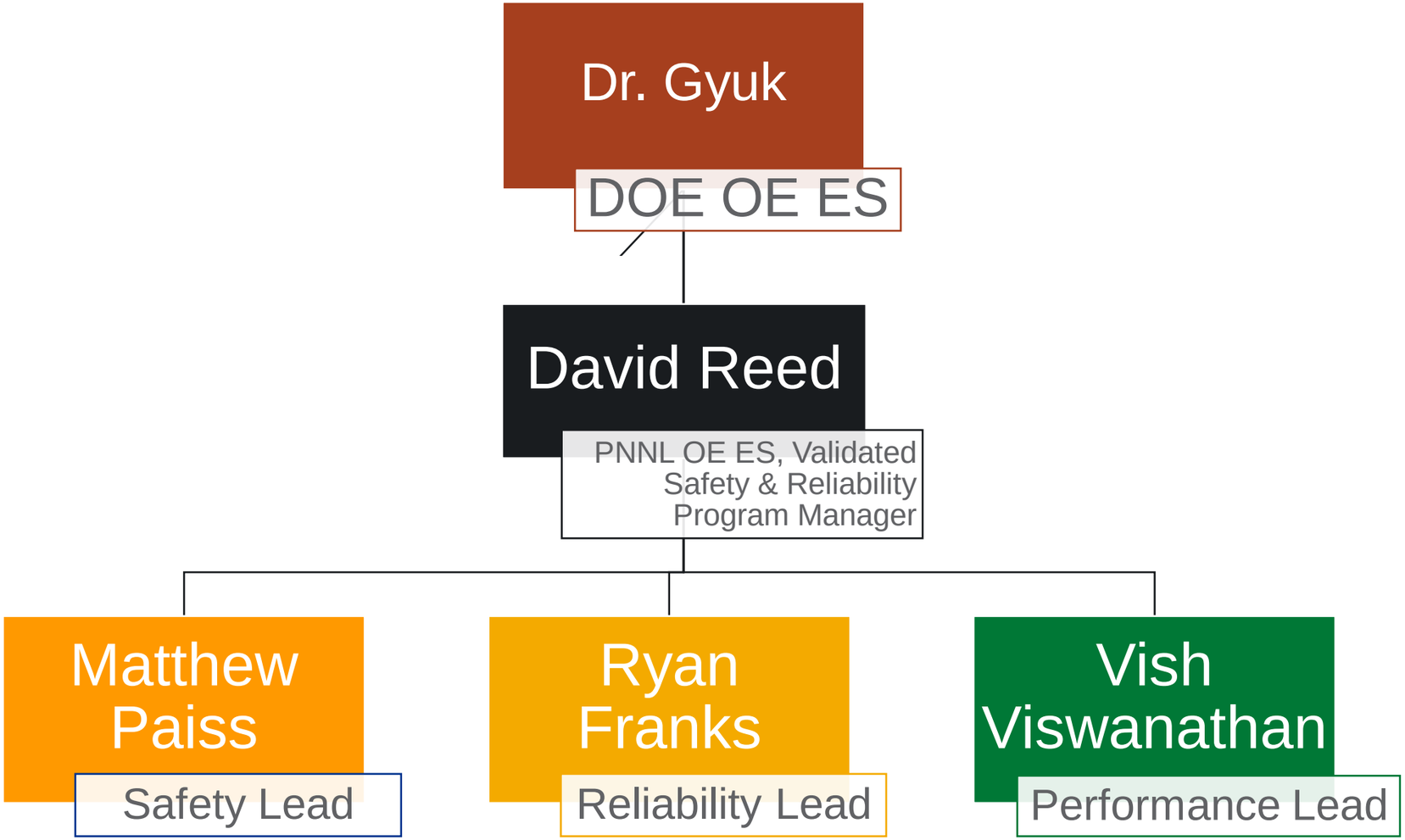


ESS Standards Lifecycle

Coordinating Across Safety, Reliability and Performance ES Codes & Standards



ES Safety, Reliability & Performance C&S Team



ES Reliability C&S Program Metrics & Milestones, October 2021 Update

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, Franks*
- IEEE P1679.3 Adv. Battery Characterization Guide (Flow), *Viswanathan, Franks*
- IEEE P2688 ESMS Recommended Practice*, Schoenwald, Nguyen, Franks*
- IEEE 2800 Inverter Based Resources Standard, *Elizondo*
- IEC TC-120*, N. American rep, Viswanathan, Paiss, Franks*
- EPRI ESIC, *Franks, Crawford, Viswanathan, Paiss*
- MESA Specifications, Testing & Certification program, *Kolln*
- (new) SAE/IEEE 1547 Coordination, Asgiersson
- (future) NERC Gen. Availability Data System (GADS), update for large BESS, *Labs, EPRI*
- IEEE P2962 Li-on Installation, Operation, Maintenance, Testing, and Replacement, *Franks*

ES Technical Standards or References Created or Updated

- IEEE 1547.9 Draft Recommended Practice Completed. Balloting active, expect publication early 2022
- MESA-Device, Certification procedure complete, in cooperation with Sunspec Alliance
- MESA-DER Certification roadmap complete, in cooperation with DNP3 Work Group

ES Reliability C&S Program, Looking Forward

- **Complete and report *first* EPRI ES Reliability Data project results** in FY21
- **Deploy GIMRE BESS March 2022**, start recording field results in FY22
- **Publish IEEE 1547.9 Guide for ES Interconnection** in FY22
- Publish 1679.3 Characterization Guide for Flow Batteries in FY22
- Start writing new IEEE BESS-EMS (ESMS P2688) Standard in FY22
  - SNL (Schoenwald, Nguyen) will lead this new IEEE Working Group, with support of PNNL (Franks)
- Start 2nd Life Re-rating protocol dev. & testing, FY22
- Start process to add large BESS projects to North American Electric Reliability Council's (NERC) reliability-reporting process and database, FY22-23

ES Reliability C&S Program, Challenges

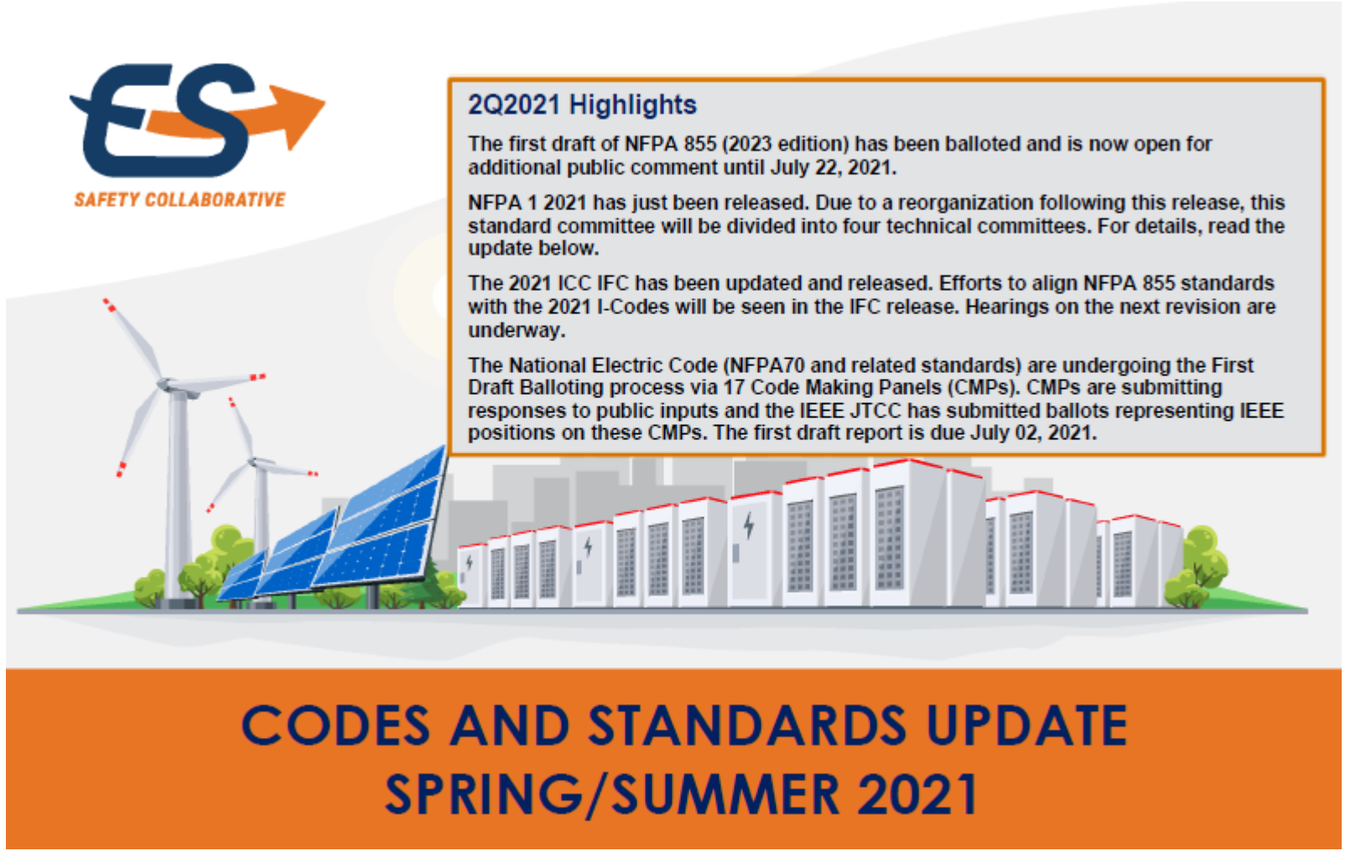
- Formal Standards Developing Organizations (SDO's) are in intermediate stages of development for grid ESS standards:
  - The rapid pace of industry adoption and deployment of the technology is ahead of SDO's pace of creating and updating standards.
  - *Industry groups offer interim solution, and provide 'best practice' input to formal SDO's*
- Modern Grid Connected and Interactive ESS's are Predominately Inverter-Based Resources
  - 'Smart inverter' standards are still evolving, and are very PV-focused
  - ESS's have unique characteristics and capabilities that well thought out standards will support. Badly designed, or lack of, standards will be barriers to full utilization and benefit from ES.
- Examples of Specific Challenges with Solutions In Progress
  - Basic ES characteristics still not defined within IEEE: SoC, SoH
  - Example of major benefits enabled by effective C&S – *ES performing enhanced Fast Frequency Response to deliver inertia support to power systems. IEEE & NERC topic.*

ES Safety C&S Program, October 2021 Update

- NFPA 855 Standard for Safe Installation of ESS, is being updated for 2023 Edition, *Paiss*
  - Improved reorganization of chapters by technology for clarity
  - Inclusion of “cabinets”
  - Improvements to explosion controls
- IFC 2023 in final voting stages, *Paiss*
  - Will refer to NFPA 855
  - May require hazard mitigation analyses (HMA) for existing unlisted installations
- UL 9540 and UL 9540A, *Paiss*
- IEC 62933-5-1, 5-2 Safety Considerations for Grid-Integrated ESS Systems
- Challenges: Uniformity of content and adoption time across jurisdictions

Energy Storage Safety Collaborative Reports

Get the reports to remain alerted to codes and standards updates



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Acknowledgement

Dr. Imre Gyuk, DOE – Office of Electricity, Energy Storage Program

ES Reliability C&S Project's collaborative industry partners include,

- ***IEEE Standards Association***
- ***MESA Alliance***
- ***EPRI Energy Storage Integration Council (ESIC)***

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Thank you

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