



Update on Energy Storage Reliability Codes and Standards Activities

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

Technical Standards Development Activities Supported by OE ES

- IEEE 1547.9 ES Interconnection Standard, *Ropp (Chair), McDermott, Asgeirsson, Vartanian*
- IEEE 2800 Inverter Based Resources Standard, *Elizondo*
- IEEE P2686 BMS Recommended Practice, *Rosewater (Chair)*
- IEEE P1679.3 Adv. Battery Characterization Guide (Flow), *Viswanathan (Chair)*
- IEEE P2688 ESMS Recommended Practice, *Schoenwald (Chair), Nguyen*
- **(Future) IEEE P2800.9 ES Transmission Interconnection Guide**, *Labs, EPRI, NERC*
- **(Future) NERC Gen. Availability Data System (GADS), update for large BESS**, *Labs, EPRI, NERC*
- IEC, N. American rep, *Viswanathan*
- EPRI ESIC, *Crawford, Viswanathan, Paiss*
- MESA Specifications, *Kolln (Testing & Certification WG Chair)*

ES Technical Standards Created or Updated

- IEEE 1547.9 Draft 4 Completed (4 of the 6 estimated needed before completion)
- MESA-Device, Certification Procedure Report
- MESA-DER Certification Roadmap Report

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
- Complete draft IEEE 1547.9 Guide to ES Interconnection in FY21
 - IEEE approve and then publish in FY22
- Complete and report CECESI project results in FY21
- Start writing new IEEE BESS-EMS (ESMS) Standard in FY21
 - IEEE project request completed in FY20, approved by IEEE in FY21
 - This project will begin writing this new standard in FY21
 - SNL (Schoenwald, Nguyen) will lead this new IEEE Working Group
- Propose new IEEE project to write a guide for ES Interconnection to Transmission Systems, FY21-22
- Start process to add large BESS projects to North American Electric Reliability Council's (NERC) reliability-reporting process and database, FY21-22

ES Reliability C&S Program, Challenges

- Formal Standards Developing Organizations (SDO's) are in early 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
 - P1547.9 scope impact from "net power" criteria. Interconnection of V2G
 - Basic ES characteristics still not defined within IEEE: SoC, SoH, On/Off status
 - 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*

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)*



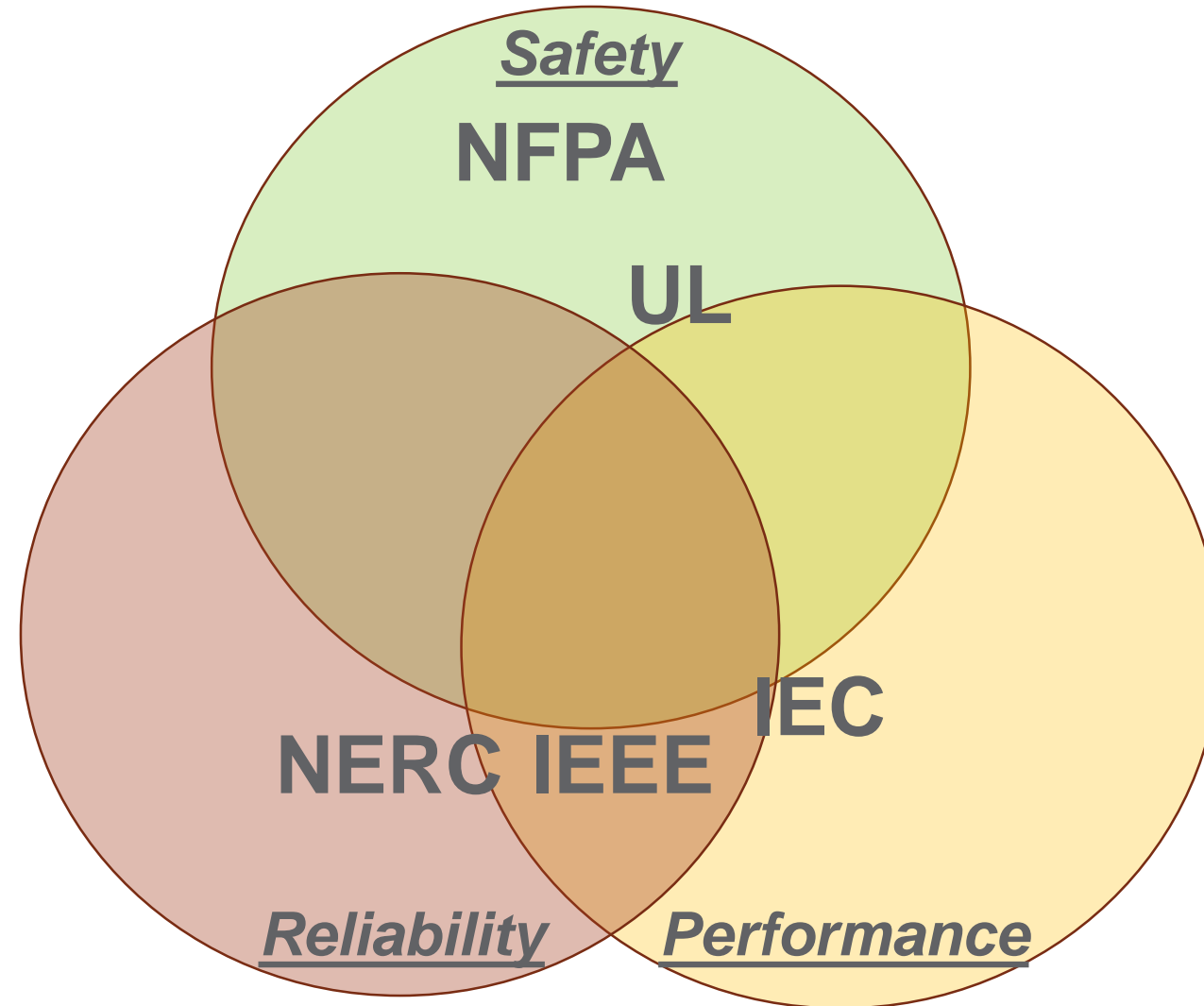
Thank you

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Backup Slides

Coordinating Across Safety, Reliability and Performance ES Codes & Standards



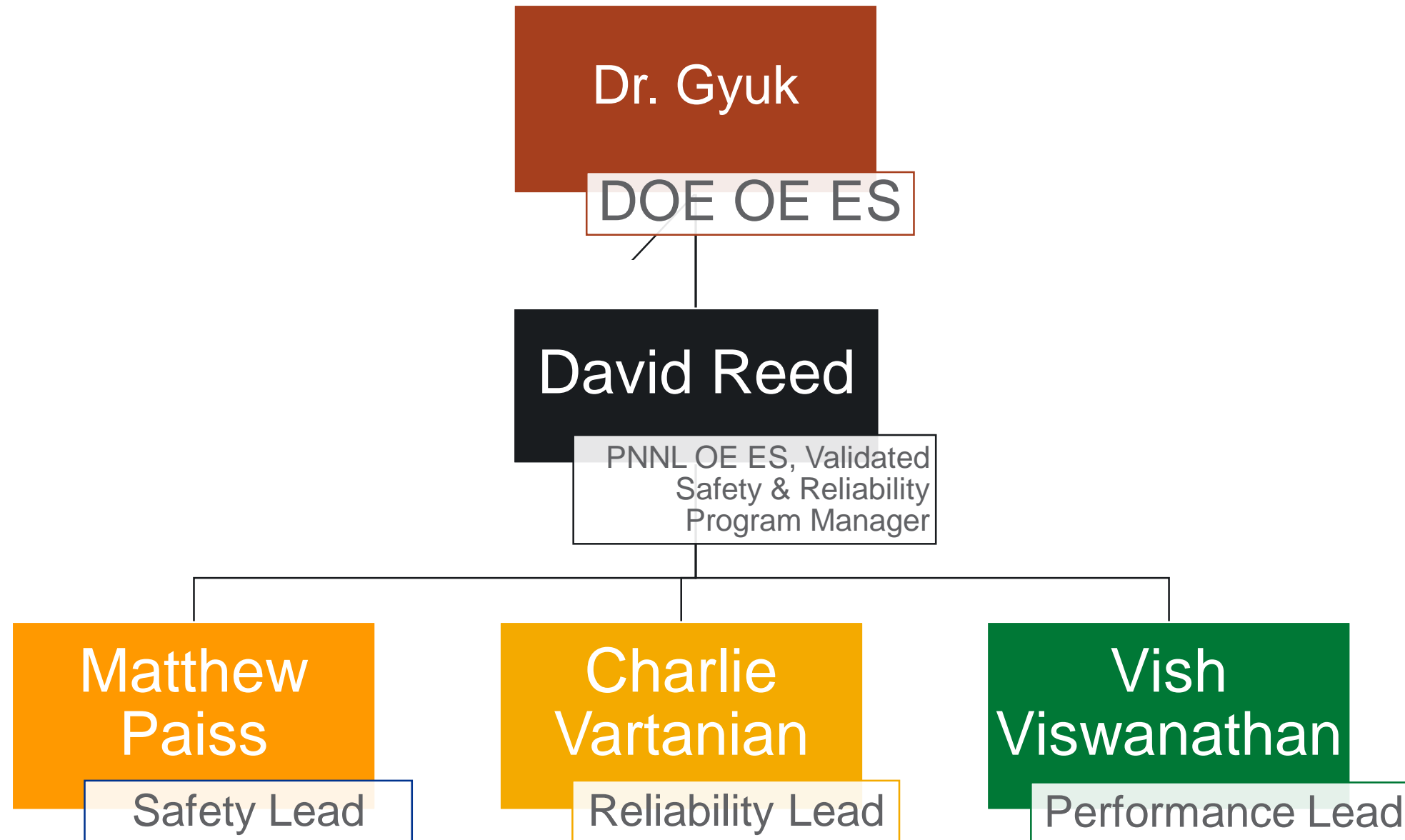
PNNL OE ES's Codes & Standards (C&S) development activities include participation in:

Safety: NFPA 855, UL 9640, UL 1974

Reliability: IEEE, NERC

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

ES Safety, Reliability & Performance C&S Team



ES Reliability C&S Project Purpose

Purpose

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

Impact

- Lower barriers to ESS adoption and improved reliability and resiliency of ESS's and power systems.

