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Battery Management System Standards

Update on IEEE P2686 Recommended Practice for Battery Management Systems in Stationary Energy Storage Applications

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DOE OE Energy Storage Peer Review

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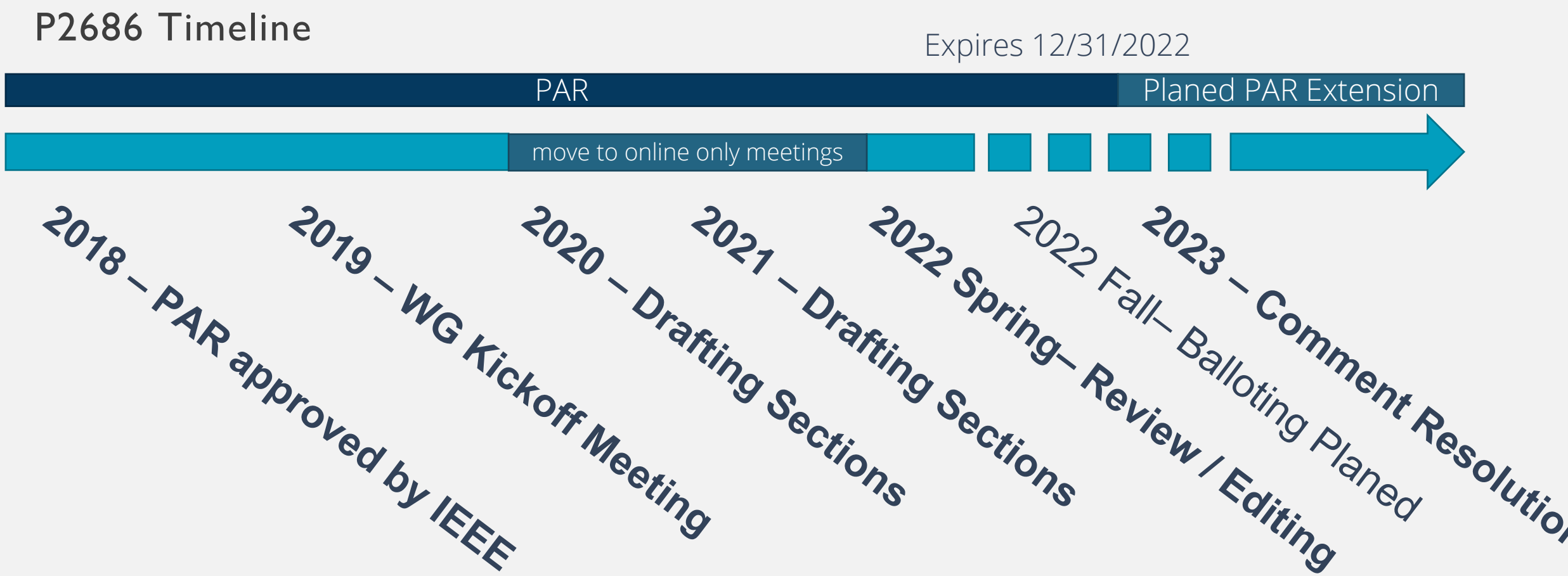
Purpose

Well-designed battery management is critical for the safety and longevity of batteries in stationary applications. This [Recommended Practice] is intended to inform battery system designers and integrators in the challenges to battery management design. This document assists in the selection between design options by supplying the pros and cons of a range of technical solutions.

Many aspects of battery management design require integration with other systems such as energy management or charge control systems. System integration can be made difficult or impossible without a minimal level of communication interface and control interface standardization. To address this issue, this document offers recommendations and best practices for interface design to streamline system integration.

Standard Development Timeline



Covid-19 resulted in a slower process (roughly a 6 month delay) but wider participation.

Document Structure and Progress

Introduction

What is a battery management system? What is it designed to do? This section outlines how the BMS design and integration process should be conducted and guides the reader on how to navigate the rest of the document.

Battery Management System Technology

What are the physical and communication architectures of modern battery management systems? What are their functions? This section discusses a range of design options for the BMS.

Configuration by Application and Battery Type

If you have a X battery providing Y services, how should your BMS be configured? This section offers recommendations on the architectures and functions that should be used based on application and battery type.

Communications and Interoperability

What data should be BMS make available to the ESMS? How long should the BMS sore data internally? This section provides recommendations on design choices around communications and interoperability.

- 15 online working group meetings were held in FY21, averaging 16 participants per meeting (max 25, min 11) with 49 of 120 working group members having attended at least one meeting.
- Working group members represent critical stockholders form suppliers (e.g. SAFT, Deka Batteries, Zinc 8 Energy Solutions) to testing labs (e.g. CSA Group, Exponent, UL) and utilities (e.g. Southern Company, National Grid). Membership spans Asia, North America, and Europe.
- We have progressed through two major revisions from version 2 to version 4.
- We have restructured the introduction, revised the technology description clause, and flushed out both the configuration and communications clauses.
- We have built consensus on controversial topics such as reporting state-of-charge and how to designate the responsibilities of the BMS holistically with other safety devices.

Conclusions

- Well-designed battery management is critical for the safety and longevity of batteries in energy storage applications.
- Standardization will help engineers navigate design options and owner's know what to expect from the BMS.
- The P2686 working group is a global effort with membership from a large range of institutions.
- We are on track to publish a completely new BMS standard in 2023.

Funding for me to be able to serve as the working group chair was provided by the DOE OE Energy Storage Program. Thank you to Dr. Imre Gyuk for supporting the development of energy storage technology and safety standards.

If you have knowledge of BMS design and would like to participate, please email me at dmrose@sandia.gov, and join us for the next digital working group meeting.