

Energy Storage System Deployment Why Codes and Standards are Relevant and What is Happening



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U.S. DEPARTMENT OF
ENERGY



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Overview

Purpose – to reinforce that codes and standards are relevant to safe ESS development and deployment and C/S development and deployment must be coordinated as well as being informed by ESS research, technical support initiatives and field experiences

Expected Outcomes

- ✓ A recognition that C/S is an important topic and commit some time to focus on C/S
- ✓ An understanding of C/S development and deployment and through that how ESS safety can be fostered
- ✓ Seeing how C/S are a two way bridge between research and support for those involved with ESS in the field
- ✓ Agreement on the value of collaboration

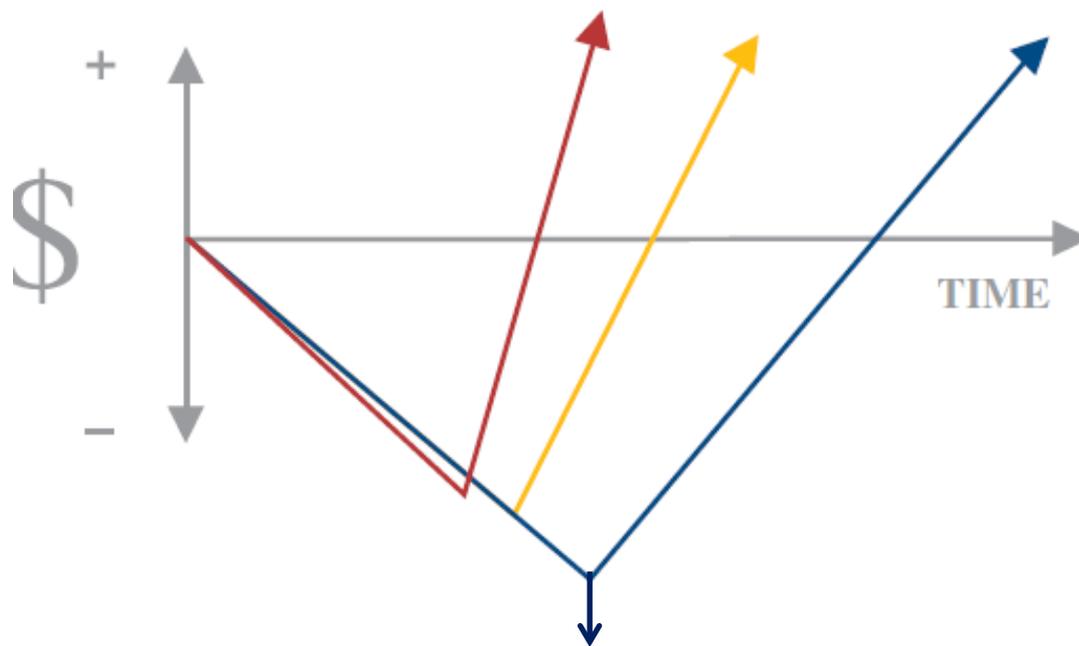


All ESS-related Activities are Interrelated through C/S

- ▶ Codes and standards are a basis for technical communication, commerce and delivery of expected outcomes
- ▶ Criteria are provided in CS that govern virtually all aspects of technology development, deployment, application and use
- ▶ Technology includes the micro to the macro (nut, bolt, weld, wire to an entire ESS installation)
- ▶ Conformity assessment (CA) involves verifying compliance with CS and the validity of that verification
- ▶ Research informs and provides a basis for CS provisions
- ▶ Those involved in documenting and verifying ESS safety can uniformly and effectively understand and apply CS
- ▶ Those involved in ensuring continued ESS safety or addressing safety-related incidents have the necessary information to do their jobs
- ▶ All stakeholders understand their role in the life cycle of an ESS and through collaboration can effectively communicate needs and information both 'up and down the line'

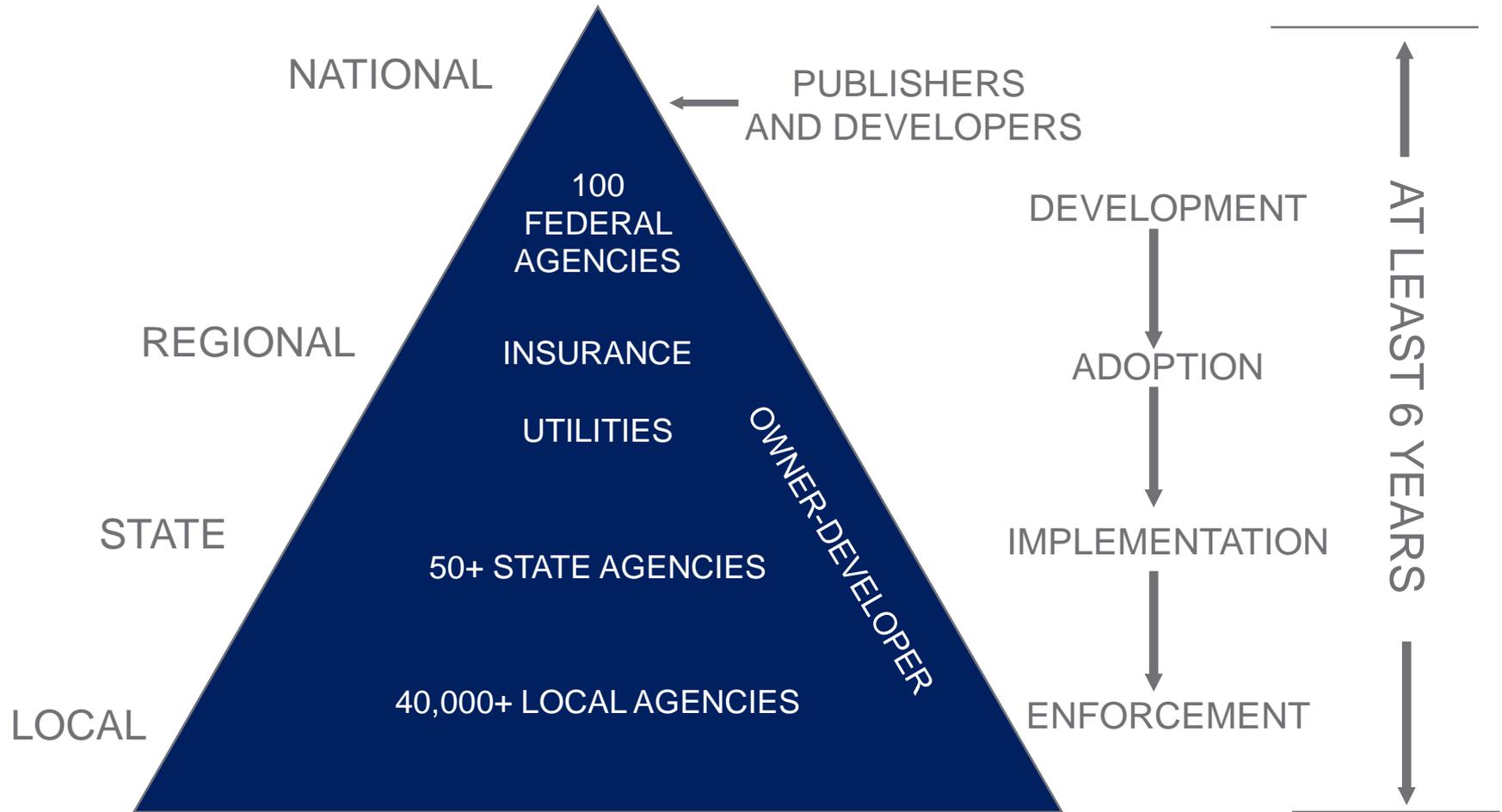
Successful Deployment (or not)

- ❖ CS impact the interests of ESS proponents and realization of the benefits associated with ESS
- ❖ Impacts can affect one ESS proponent or the entire industry
- ❖ CS can be a barrier - or - with effective management can become an asset
- ❖ CS can memorialize in uniform and easily replicable terms what is (and is not) acceptable
- ❖ CS provide a marker to and foundation for education and outreach as well as the ID of gaps in knowledge that can be filled through research



PAY ME NOW OR PAY ME LATER

Development and Deployment of Codes and Standards



Actions on Key U.S. C/S

Specific
Overarching CS

CS for ESS
Installation

CS for
Complete ESS

CS for ESS
Components

▶ NFPA

- 1 – Fire Code (next activity is to develop 2020 edition)
- 70 – National Electrical Code (next activity is to develop 2020 edition)
- 855 – Standard for the Installation of Stationary Energy Storage Systems (first draft being developed)

▶ ASME

- TES-1 – Safety Standard for Thermal Energy Storage Systems (first draft being developed)

▶ ICC

- International Fire Code
- International Residential Code
- International Mechanical Code
- International Building Code (next activity is to develop 2021 editions)



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Status of Key U.S. C/S

Specific
Overarching CS

CS for ESS
Installation

CS for
Complete ESS

CS for ESS
Components

- ▶ **UL**
 - 1973 – Batteries for Use in LER and Stationary Applications (suggest revisions any time)
 - 1974 – Evaluation of Batteries for Repurposing (just getting started to draft a standard)
 - 9540 – Safety of ES Systems and Equipment (suggest revisions any time)
- ▶ **NECA**
 - 416 – Recommended Practice for Installing Stored Energy Systems (draft being finalized for canvass vote)
- ▶ **IEEE**
 - 1653 – Guide for Ventilation and Thermal Management of Batteries for Stationary Applications (next action is comment on proposed revisions)
 - C2 – National Electrical Safety Code
- ▶ **CSA**
 - 283 – Battery Reuse (just getting started to draft a standard)



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Safety-Related Criteria U.S. National Level Activities

▶ EPRI

- ESIC Energy Storage Implementation Guide 2016 (Updates 2015 Integration Guidelines)
- ESIC Energy Technical Specification Template 2016
- ESIC Energy Storage Commissioning Guide 2016
- Energy Storage Safety 2016

▶ DNV GL

- GRIDSTORE

▶ MESA

- Modular Energy Storage Architecture

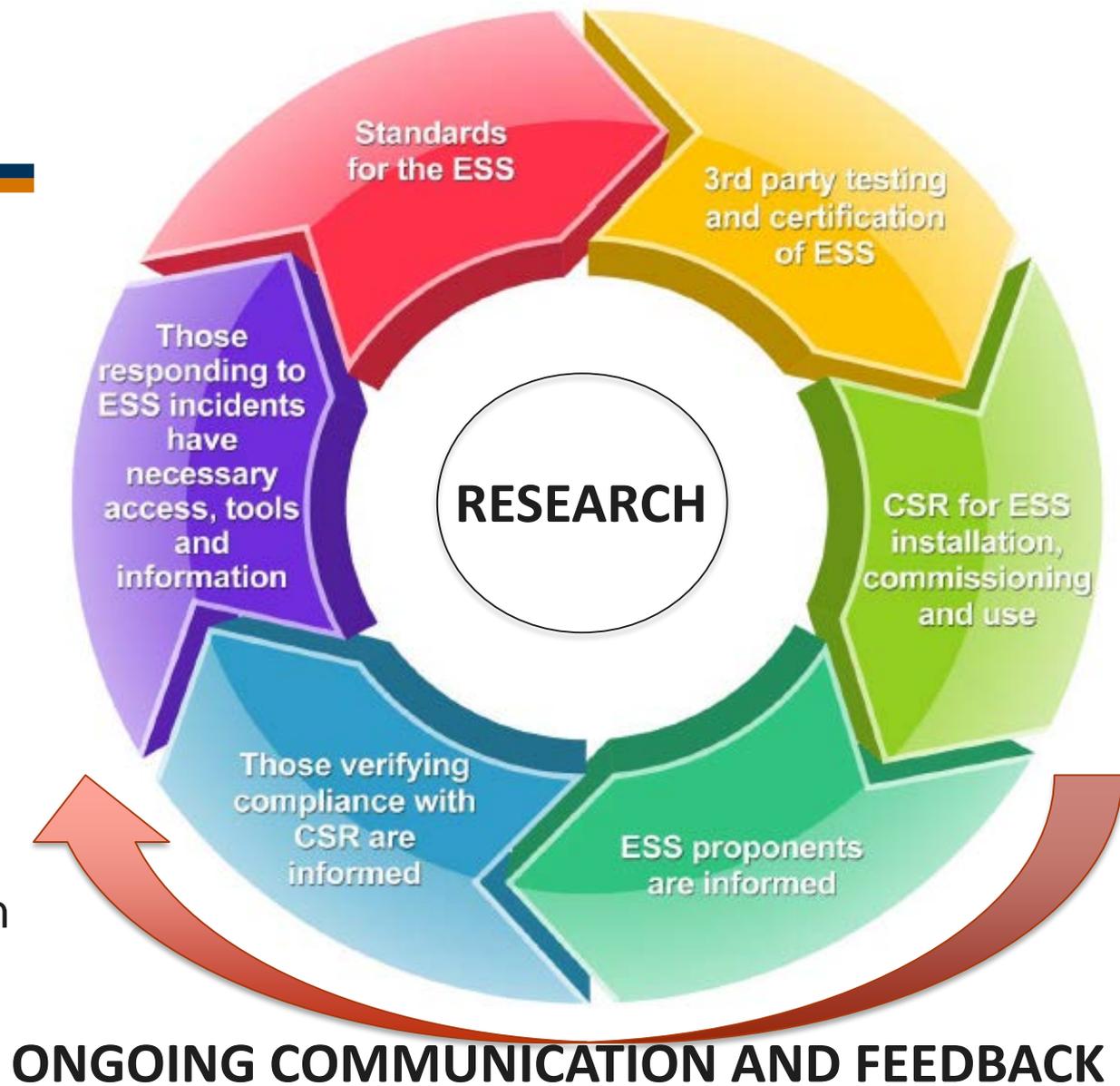
Support for Deployment of Safe ESS

Communication with a number of organizations representing key stakeholders and collaboration on safety-related initiatives that reach those in the field

- APPA – American Public Power Association
 - EPRI – Electric Power Research Institute
 - ESA – Energy Storage Association
 - IAEI – International Association of Electrical Inspectors
 - IAFC – International Association of Fire Chefs
 - IAFF - International Association Fire Fighters
 - ICC - International Code Council
 - NEMA – National Electrical Manufacturer’s Association
 - NECA - National Electrical Contractors Association
 - NFPA – National Fire Protection Association
- Webinars relevant to their needs
 - Articles in their publications
 - Presentations at meetings and conferences
 - Website enhancements to direct their members to ESS resources
 - Development of content directed at the needs of their members
 - Coordination of activities with all stakeholders to build bridges, foster collaboration and enhance outcomes

Summary

- ▶ The value of addressing C/S and how to do that is recognized
- ▶ All stakeholders understand their role and each others role
- ▶ Research informs C/S which in turn drive education of and support to those in the field
- ▶ Those in the field inform C/S which in turn drive an ID of research needs
- ▶ Everyone works together



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Moving Forward

- ▶ All stakeholders have a common goal/vision and communicate and collaborate to achieve success
- ▶ R&D, C&S and E&O inform each other and support development and deployment of work to address identified needs and gaps
- ▶ Communication and collaboration becomes focused with joint support for development and implementation of a plan that supports the goal/vision



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