Pacific Northwest
NATIONAL LABORATORY

Energy Storage Safety Collaborative – Update 2020

SAFETY COLLABORATIVE

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Battery Materials & Systems Group

DOE OE Peer Review 2020

U.S. DEPARTMENT OF ENERGY BATTELLE

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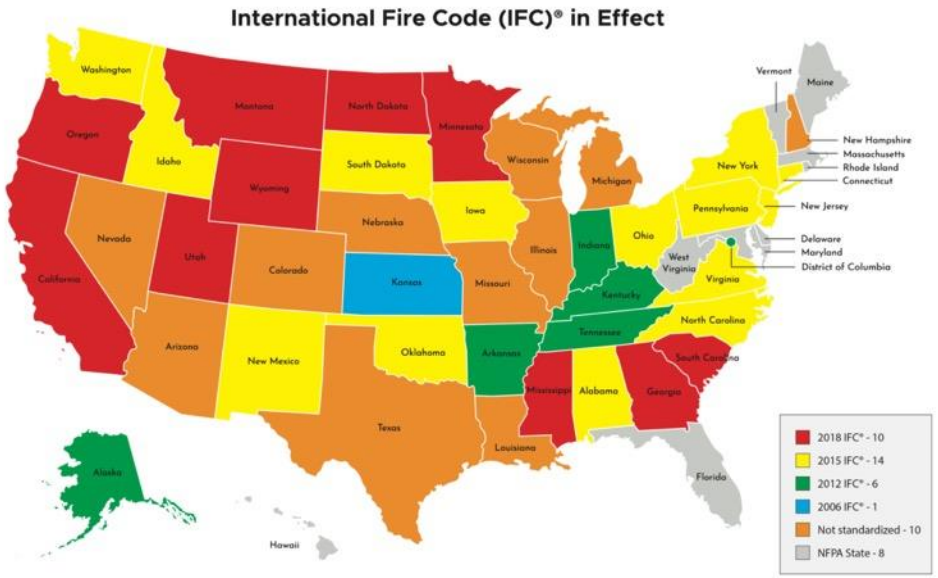
Areas of Activity

- ESS Codes & Standards Education & Outreach
  - Energy Storage Safety & Reliability Forum
- Representation in Technical Committees
  - NFPA 855
  - IFC, IRC
  - UL1974
  - UL 9540
- DOE ES Safety Strategy Update



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ES Safety & Reliability Forum

- March 4-5, 2020 Richland, WA
- 125 Attendees
- 43 Speakers

ES
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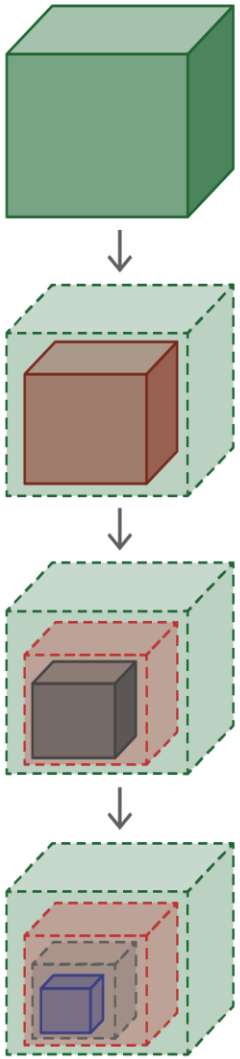
Standards and Model Codes Hierarchy



BUILT ENVIRONMENT

- iCodes – IFC, IRC, IBC
- IEEE – C2, SCC 18, SCC21
- NFPA 5000, NFPA 1, ISA

By Category

By Standards Development Org

ENERGY STORAGE SYSTEMS

- UL 9540, MESA
- ASME TES-1, NECA
- NFPA 791

INSTALLATION / APPLICATION

- NFPA 855
- NFPA 70
- UL 9540 A
- IEEE C2
- IEEE 1635/ASHRAE 21
- IEEE P1578
- DNVGL GRIDSTOR
- FM GLOBAL 5-33
- NECA 416 & 416

SYSTEM COMPONENTS

- UL 1973
- UL 1974
- UL 810A
- UL1741
- CSA 22.2 No. 340-201
- IEEE 1547
- IEEE 1679 Series

Regular C&S Activity Updates

- Tracking activity on 47 different Codes, Standards, or guidelines
- Reports avail by either SDO or by category
- Distribution increased to 3000.

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2Q2020Highlights

NFPA 855 2020 has been published as a standard and the NFPA 855 Committee has begun deliberations for revisions to be included in NFPA 855 2023.

The second draft report on NFPA 791 has closed including the filing of a NITMAM.

The second draft report on NFPA 1 has closed including the filing of a NITMAM.

The 2021 ICC Group B Codes updates are complete and should be published in Summer 2020.

The 2nd edition of UL 9540 was published February 27, 2020.

The 4th Edition of ANSI/CAN/UL 9540A was published on November 12, 2019.

CODES AND STANDARDS UPDATE
SPRING 2020

The goal of the DOE OE Energy Storage System Safety Roadmap[1] is to *foster confidence in the safety and reliability of energy storage systems*. There are three interrelated objectives to support the realization of that goal: [1]research, [2] codes and standards (C/S) and [3] communication/coordination. The objective focused on C/S is *"To apply research and development to support efforts focused on ensuring that codes and standards are available to enable the safe implementation of energy storage systems in a comprehensive, technology agnostic, and science-based manner."*

The following activities support that objective and realization of the goal:

a. Review and assess C/S which affect the design, installation, and operation of energy storage systems (ESS).
b. Identify gaps in knowledge that require research and analysis to provide data for technical committee inputs.
c. Identify areas in C/S that are potentially in need of revision or enhancement and can benefit from activities conducted under research and development.
d. Develop input for new or revisions to existing C/S through individual stakeholders, facilitated task forces, or through laboratory staff supporting these efforts.

The purpose of this Codes and Standards Update is to support these objectives by providing information on efforts being conducted by U.S. standards developing organizations (SDOs) and other entities that include focus on ESS safety.

The information is organized by SDO relative to the scope of each document in relation to how it fits into the ESS paradigm. The categories are color coded as codes and standards that apply as follows: [1] **Built Environment;** [2] **Complete ESS;** [3] **ESS Installation;** [4] **ESS Components;** and [5] **Reference Items**

Changes in current activity from the prior edition are shown in italics. Time-sensitive items (e.g., those having an upcoming schedule/due date) are shown as **highlighted, bold and underlined.**

To subscribe to the ES Safety Collaborative and receive ongoing ESS safety- related communications visit https://public.govdelivery.com/accounts/USDOESNLEC/subscriber/new?topic_id=USDOESNLEC_195

[1] DOE OE Energy Storage Systems Safety Roadmap, PNNL-SA-126115 I SAND2017-5140 R https://www.sandia.gov/ess-ssl/publications/EnergyStorage_safetyroadmap_2017.pdf

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SDO's currently included in reports:

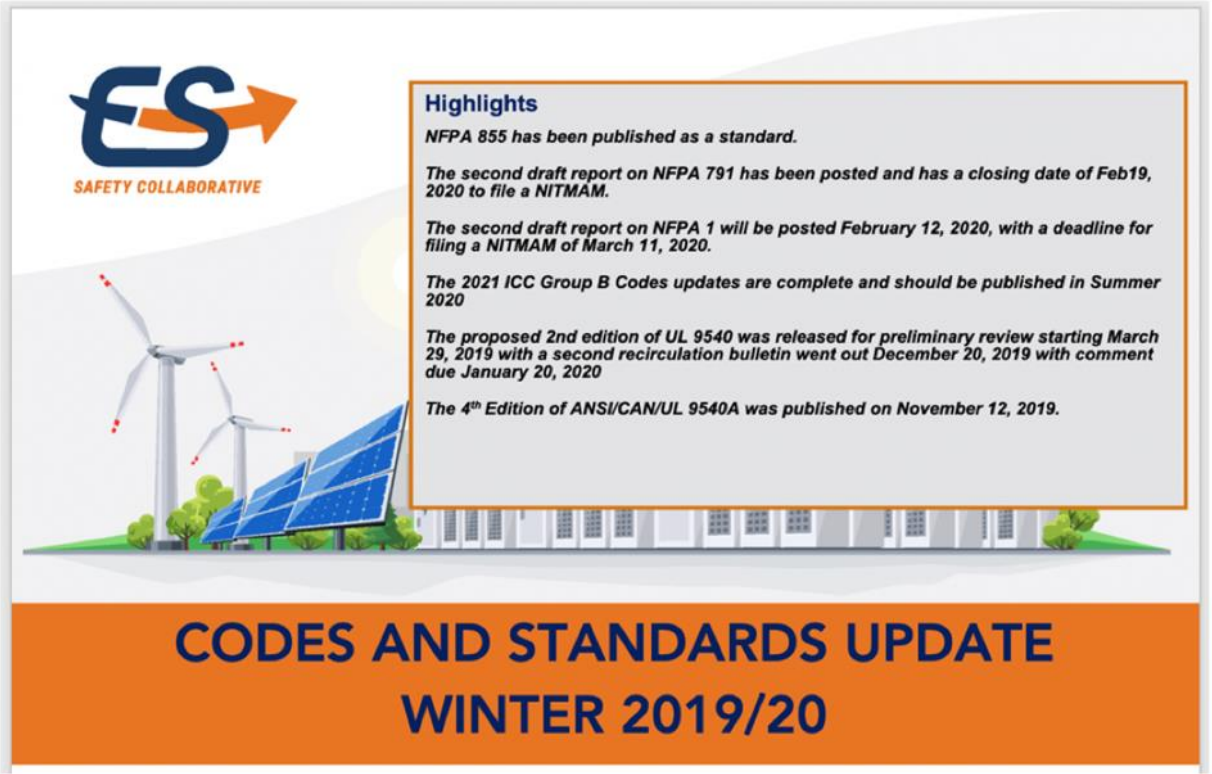
- NFPA
- UL
- ICC
- IEEE
- CSA
- ASME
- NECA
- NEMA
- DNV-GL
- MESA
- FM Global

	International Code Council (ICC) – www.iccsafe.org [Built Environment]
Document Name:	**International Building Code (IBC)**
ESS Relevance:	The IBC is an overarching code that provides minimum requirements to safeguard the public health, safety and general welfare of the occupants of new and existing buildings and structures. The IBC is fully compatible with the entire family of ICC codes including the International Fire Code (IFC), International Residential Code for One and Two-Family Dwellings, the International Green Construction Code (IgCC) among other ICC Codes. 35 Chapters make up the body of the IBC. Chapter 9 deals with Fire Protection Systems while Chapter 10 deals with Means of Egress. Chapter 13 deals with Energy Efficiency while Chapter 27 covers electrical issues referencing the various code sections requiring emergency and standby power, such as high-rise buildings and containing hazardous materials. Appendix D provides a useful tool to limit conflagration hazards in areas of a city with intense and concentrated development.
Date of Current Edition:	2018
Date of Next Edition:	2021
Current Activity:	Note: Beginning with the development of the 2021 edition of the I-Codes, there will be two groups of code development committees which will meet in separate years. The IFC and the General, Egress and Fire Safety Development Committees are part of the Group A Codes. The IRC is classified as a Group B Code. Deadline for recommended revisions the 2021 Codes will be early January 2021.

	International Code Council (ICC) – www.iccsafe.org [Built Environment]
Document Name:	**International Fire Code (IFC)**
ESS Relevance:	Chapter 12 of the IFC covers energy systems and Section 1206 in that chapter covers electrical energy storage systems. The ICC code development process (CDP) associated with the 2021 IFC has been completed and the new edition should be published by October 2020. During the process the provisions of the 2018 IFC related to ESS were enhanced to follow the requirements of NFPA 855.
Date of Current Edition:	2018
Date of Next Edition:	2021 (Expected release in the fall of 2020).
Current Activity:	A high-level summary of the provisions of the 2015, 2018 and 2021 editions of the IFC is under development. Information on the adoption of the I-Codes is available at https://www.iccsafe.org/advocacy/. Efforts to revise the 2021 IFC are expected to start sometime in 2020 and will include efforts of an ES Task Force under the ICC Fire Code Action Committee. Note that anyone can submit a proposed change to the 2021 IFC (or other I-Codes). See https://www.iccsafe.org/products-and-services/i-codes/code-development/ for more information.

Energy Storage Safety Collaborative Reports

Get the free reports to remain alerted to key Codes & Standards updates!

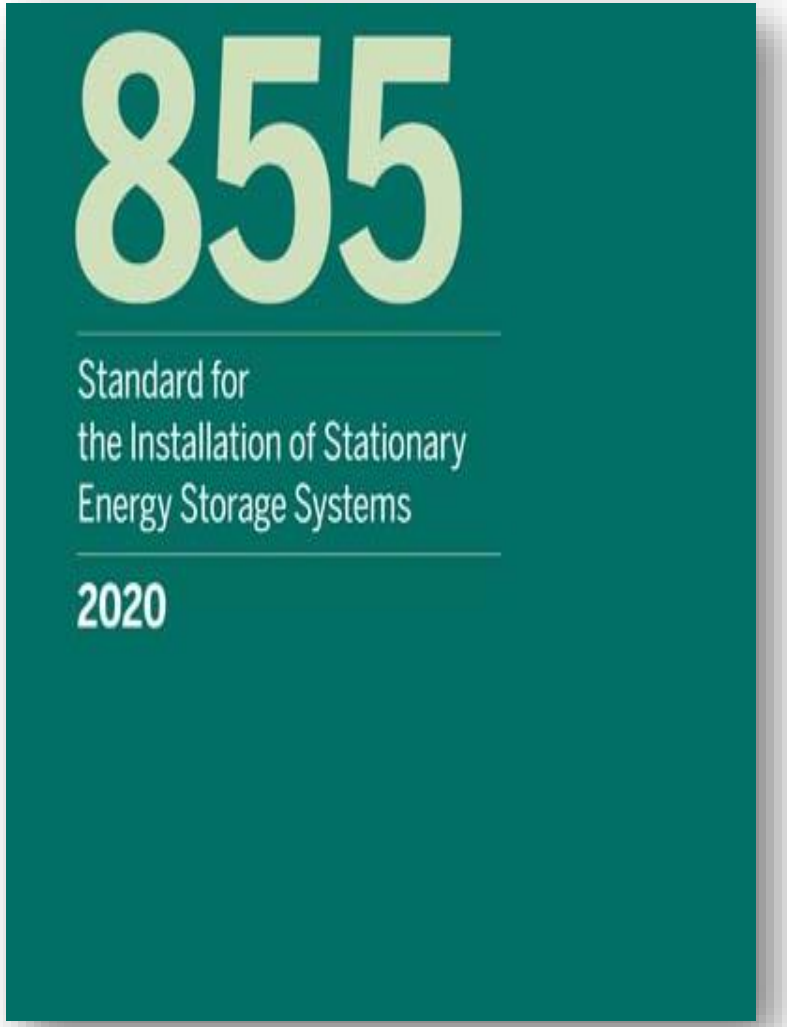


Take photo of code to sign-up to receive quarterly reports

https://public.govdelivery.com/accounts/USDOESNLEC/subscriber/new?topic_id=USDOESNLEC_195

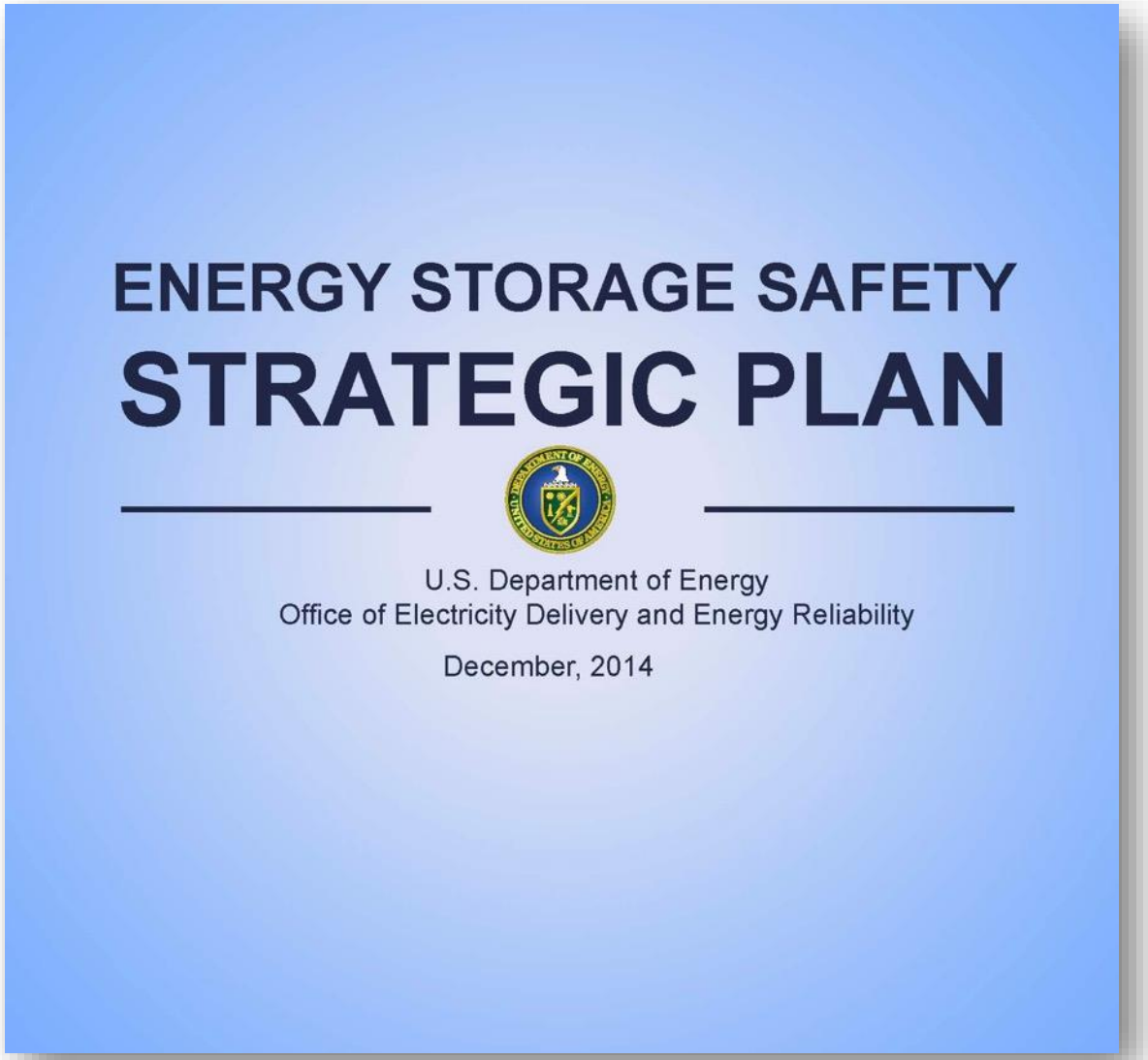
Significant Changes in C&S

- NFPA 855 and IFC in revision for 2023 edition.
- UL 9540 2nd edition now requires fire testing for most installations.
- IEEE 1679 to standardize performance & testing data
- UL 9540 & 1973 addressing pathways for Pb & NiCd certification



DOE ES Safety Strategic Plan Update

- Update lead by SNL (J. Lamb)
- Original Release Dec 2014: https://www.sandia.gov/ess-ssl/docs/other/DOE_OE_Safety_Strategic_Plan_Dec_2014_final.pdf
- The previous 6 years has seen a rise in new grid scale energy storage systems, giving new lessons learned and areas of interest for research and outreach
- A need to capture the maturing battery safety codes and standards



DOE ES Safety Strategic Plan Update

- Forming Technical Advisory Committee to contribute to the plan update.

SCAN ME

- Join effort by filling out Doodle Form by QR code or link:
- https://bit.ly/32tqr8D

ENERGY STORAGE SAFETY
STRATEGIC PLAN

DOE Energy Storage Safety Strategic Plan Technical Advisory Committee

Please submit your name & contact information if you are interested in participating on the Technical Advisory Committee to assist in the update of the DOE Energy Storage Strategic Plan.

* Required

Name *

Your answer

Acknowledgement

Dr. Imre Gyuk, DOE
Office of Electricity

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