



# ENERGY STORAGE SYSTEM SAFETY

## ESS-Related Proposed Changes to the Group B 2018 ICC International Codes

### Introduction

The goal of the DOE OE ESS Safety Roadmap<sup>1</sup> is to *foster confidence in the safety and reliability of energy storage systems (ESSs)*. Three interrelated objectives support the realization of that goal: research, codes and standards, and communication/coordination. The objective focused on codes and standards is as follows:

To apply research and development (R&D) to support efforts that are focused on ensuring that codes and standards are available to enable the safe implementation of ESSs in a comprehensive, non-discriminatory and science-based manner.

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

- a. Review and assess codes and standards that affect the design, installation, and operation of ESSs.

- b. Identify gaps in knowledge that require research and analysis that can serve as a basis for criteria in those codes and standards.
- c. Identify areas in codes and standards that potentially need revision or enhancement and can benefit from activities conducted under R&D.
- d. Develop input for new or revisions to existing codes and standards through individual stakeholders, facilitated task forces, or through laboratory staff supporting these efforts.

The purpose of this special briefing paper is to support the above objective by providing information about current and upcoming efforts being conducted by U.S. standards and model code developing organizations, specifically code changes associated with the 2018 Group B International Codes (I-Codes) of the International Code Council (ICC)<sup>2</sup> that are relevant to ESSs.

<sup>1</sup> [https://www.sandia.gov/ess-ssl/publications/EnergyStorage\\_safetyroadmap\\_2017.pdf](https://www.sandia.gov/ess-ssl/publications/EnergyStorage_safetyroadmap_2017.pdf)  
(PNNL-SA-126115 | SAND2017-5140 R)

<sup>2</sup> <https://www.iccsafe.org/codes-tech-support/codes/the-i-codes/>

Proposed changes to the I-Codes were posted by the ICC on March 4, 2019. Public hearings (committee action hearings) on those changes will be held April 28 to May 8, 2019 in Albuquerque, New Mexico. PNNL staff undertook a cursory review of the proposed changes (the code change monograph contained over 2900 pages), identified proposed changes that are relevant to ESSs and are providing the results of that cursory review in this document.

The intent of this effort is to reduce the need for those interested in ESSs to review the entire monograph to find ESS-relevant changes. This will allow interested

parties to focus on the assessment of the proposed changes and, if desired, to participate in the ICC code development process

The following table identifies and provides a brief synopsis of the ESS-relevant changes (*and where necessary a comment about why the change has been identified as being ESS-relevant*). No attempt to analyze the changes has been made nor has a position on any of the changes been suggested. More in-depth review and analysis of these changes is left to the reader as deemed appropriate. For further information see <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/2019-group-b/>.

Code Change Number <sup>1</sup>	Summary of the Code Change
ADM21-19	Proposes a modification to the alternative materials, design and methods of construction and equipment provisions (104.11) that would limit the application and use of this provision of the code to a specific (e.g. singular) project.
ADM22-19	Proposes a modification to the test requirements associated with 104.11 that test samples be randomly selected by an approved agency.
ADM32-19	Proposes to revise the provisions of the administrative (Chapter 1) provisions of the I-Codes from applying to temporary structures and uses to temporary uses, equipment and structures. Provisions would also be revised to now include sources of energy within the provisions associated with temporary power or utilities.
ADM39-19	Proposes to revise the provisions of the administrative (Chapter 1) provisions of the I-Codes addressing service utilities.
ADM47-19	Updates the reference to UL 9540 in the IFC and IRC from the 2014 to the 2016 edition.
CE1-19 PI and PII <sup>2</sup>	Clarification of the scope of the IECC to include sites and associated systems and equipment (e.g. things other than a building and its systems).
CE2-19	Adds a recognition of shifting of loads from on to off peak as part of the intent of the IECC.
CE3-19 PI and PII	Adds energy storage systems to the intent of the IECC.
CE7-19 PI and PII	Adds storage of energy to the intent of the IECC.
CE57-19	Adds a new exemption to the IECC for buildings not over 1,100 sf in size used only for electric distribution system equipment
CE217-19 PI and PII	Adds provisions in the IECC for the availability of electric vehicle charging from the building wiring to the EV.
CE238-19	Adds ESS to a list of additional energy efficiency measures that one must select from (currently one must be selected) in order to achieve compliance with the IECC.
CE242-19	Adds EV supply equipment to a list of additional energy efficiency measures that one must select from (currently one must be selected) in order to achieve compliance with the IECC.
CE245-19	Eliminates a provision in the IECC associated with total building performance that limits the consideration of on-site renewable energy to 5% of the total energy cost and adds a provision that allows consideration of renewable energy systems without limitation.
CE262-19	Adds a provision in Appendix CA of the IECC to provide for an electrical ESS ready area in the building.

<sup>1</sup> ADM refers to Administrative (Chapter 1 of the I-Codes), CE refers to Commercial Energy (IECC C), RE refers to Residential Energy (IECC R) and RB refers to Residential Building (IRC)

<sup>2</sup> Code changes starting with CE or RE are NOT associated with ESS safety but rather are intended

to provide consideration for ESS in relation to energy efficiency. Where the change has two parts PI applies to commercial and PII applies to residential buildings as defined in the IECC. A third part PIII refers to the IRC.



Code Change Number <sup>1</sup>	Summary of the Code Change
CE263-19 PI, PII and PIII	Adds a new Appendix CB and RB to the IECC and a new Appendix U to the IRC requiring solar photovoltaic systems in certain circumstances.
CE264-19	Adds a new Appendix AX to the IECC that provides for a zero code renewable energy standard.
CE265-19	Adds ESS to a list of additional energy efficiency measures that one must select from (currently one must be selected) in order to achieve compliance with the IECC and provides requirements for the ESS (not part of an emergency power system and capable of interacting with the grid or an on-site renewable energy system or both).
RE146-191	Adds new provisions to the IECC that provide for EV ready parking and charging service.
RE168-19	Adds an exception to the specifications for the standard reference design (performance based compliance) that includes consideration of grid-interactive thermal storage for space heating.
RB153-19	Revises Section R327 to refer to ESS as opposed to the current stationary storage battery system term, add new provisions for commissioning of the ESS.
RB154-19	Revises Section R327 to refer to ESS as opposed to the current stationary storage battery system term. Also changes the requirement threshold for ESS listing to UL 9540 to ESS at least 1 kWh in maximum stored energy, and then adds an exception for ESS listed and labeled to UL 9540 used only for utility or commercial use and installed per Section 1206 of the IFC. Also adds new provisions covering the location, fire separation and spacing of ESS, as well as for fire detection and the use of an EV as a temporary ESS.
RB155-19	Revises Section R327 to refer to ESS as opposed to the current stationary storage battery system term, adds new provisions for protection of openings between an area housing an ESS and other habitable rooms and spaces, and proposes a reference to Chapters 34 to 43 of the IRC instead of NFPA 70 for electrical installation requirements.
RB156-19	Revises the IRC to stipulate where a stationary storage battery system can be installed as opposed to where it cannot be installed (habitable space in a dwelling unit) and that the system be listed.
RB157-19	Revises the IRC to stipulate where a stationary storage battery system can be installed in a dwelling unit and that it be marked for residential dwelling units.
RB158-19	Revises Section R327 to refer to ESS as opposed to the current stationary storage battery system term.

Note that CE218-19, CE219-19, CE220-19, CE226-19, C3229-19, CE230-19, CE232-19, CE235-19 and CE240-19 propose revisions to the provisions in the IECC associated with consideration of on-site renewable energy but those revisions do not include ESS.

## References

1. 2019 GROUP B PROPOSED CHANGES TO THE I-CODES ALBUQUERQUE COMMITTEE ACTION HEARINGS, International Code Council, March 4, 2019 <https://www.iccsafe.org/codes-tech-support/codes/code-development-process/2019-group-b/>.

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