Energy Storage Peer Review

Guidebook

January 2026

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1. Definitions, Acronyms, and Abbreviations

Definitions

Peer Reviewer	Primary reviewer for the project.
Secondary Reviewer	Additional peer reviewer providing internal quality control to ensure all peer reviewers are consistent and accurate in their reviews.

Acronyms and Abbreviations

Abbreviation	**Meaning**
AC	alternating current
AHJ	authority having jurisdiction
ASTM	American Society for Testing and Materials
BESS	battery energy storage system
BMS	battery management system
CATL	Contemporary Amperex Technology Co., Limited
CFD	computational fluid dynamics
DC	direct current
DNV	DNV Energy USA, Inc
EMS	energy management system
ERP	emergency response plan
ESMS	energy storage management system
ESRG	Energy Safety Response Group
ESS	energy storage system
FACP	fire alarm control panel
FCNYS	Fire Code of New York State
FMEA	failure mode and effect analysis
FOIL	New York State Freedom of Information Law
FSS	fire suppression system
HMA	hazard mitigation analysis
IEC	International Electrotechnical Commission

IEEE	Institute of Electrical and Electronics Engineers
IFC	International Fire Code
LEL	lower explosion limit
LFL	lower flammability limit
LFP	Lithium iron phosphate
Li-ion	Lithium-ion
MSDS	material safety data sheet
NEC	National Electric Code
NFPA	National Fire Protection Association
NMC	nickel manganese cobalt oxide
NOC	network operation center
NYCRR	New York Codes, Rules, and Regulations
NYSERDA	New York State Energy Research and Development Authority
O&M	operations and maintenance
OEM	original equipment manufacturer
OSHA	Occupational Safety and Health Administration
PCS	power conversion system
POI	point of interconnection
PRP	Peer Review Program
PRR	Peer Review Report
PRT	Peer Review Team
QMS	Quality and Market Standards
RDP	registered design professional
UL	Underwriters Laboratories

2. Peer Review Program Background

Critical battery energy storage system (BESS) permitting deliverables, particularly the Hazard Mitigation Analysis (HMA), Failure Modes and Effects Analysis (FMEA), and UL 9540A test reports containing product-level test data, collectively contain information on which to base important siting decisions and requirements. Misinterpretation or misunderstanding of these deliverables can lead to design and installation of energy storage systems for which the requirements of Fire Code of New York State (FCNYS) 1206 are not sufficiently met.

Peer reviews by experts in the field can assist local authorities having jurisdiction (AHJs) in their review and understanding of BESS permit applications and their compliance with existing fire code requirements. The 2020 FCNYS Section 1206.8 Peer Review[1] gives local AHJs the authority to require that BESS developers pay for an independent peer review of the developer's permit application. However, despite the benefits, peer reviews are rarely utilized. The 2025 Fire Code of New York State[2] will require Peer Review for any project over 600 kWh capacity, and this program is designed to fulfill that requirement.

Accordingly, NYSERDA has incorporated a mandate for peer reviews to be conducted by vetted, qualified experts for all BESS installations not sited in New York City exceeding energy capacity thresholds established for lithium-ion (Li-ion) batteries in 2020 FCNYS 1206.12 to ensure proper compliance and oversight for projects procured under NYSERDA's Retail and Bulk Energy Storage Programs.

[1] The 2020 Fire Code of New York State is available at https://dos.ny.gov/system/files/documents/2020/09/2020-fcnys-november-2019.pdf

[2] The 2025 Fire Code of New York State is available at https://codes.iccsafe.org/content/NYSFC2025P1

3. NYSERDA's Peer Review Team

- **NYSERDA**
  Bill Oberkehr, Program Manager, Bill.oberkehr@nyserda.ny.gov

- **Camelot Energy Group**
  Aaron King, Senior Project Engineer,Aaron.King@camelotenergygroup.com
  Camelot is a technical advisory firm focused on energy storage and solar technologies. Camelot has provided owner's engineering, technical due diligence, market advisory, and related services on over 8 GW of projects across the US market.

- **DNV Energy USA Inc. (DNV)**
  Carrie Kaplan, Director of Storage Technology & Safety, Carrie.Kaplan@dnv.com
  DNV is a global advisory, certification, and testing services company, providing assurance services to all sectors of the energy industry. In North America, DNV's Energy Storage Advisory Team provides technical due diligence and advisory services, ensuring storage projects and products are designed and operated with high performance, safety, and reliability.

- **Energy Safety Response Group (ESRG)**
  Michael Bowes, Senior Project Engineer, Michael.Bowes@energyresponsegroup.com
  ESRG is a globally recognized leader in battery energy storage system safety with deep roots in fighting and emergency response. Leveraging real-world experience in firefighting, risk assessment, and safety testing, ESRG bridges the gap between industry and the fire service to support the safe and reliable deployment of energy storage systems across the globe.

4. Peer Review Program Overview

The four phases of the Peer Review Program (PRP) are outlined here and shown in Figure 1.

Phase 1 – Pre-Filing: Process begins with Applicant review of this guidebook and deliverables submission. Peer Review Team (PRT) assesses completeness of application.

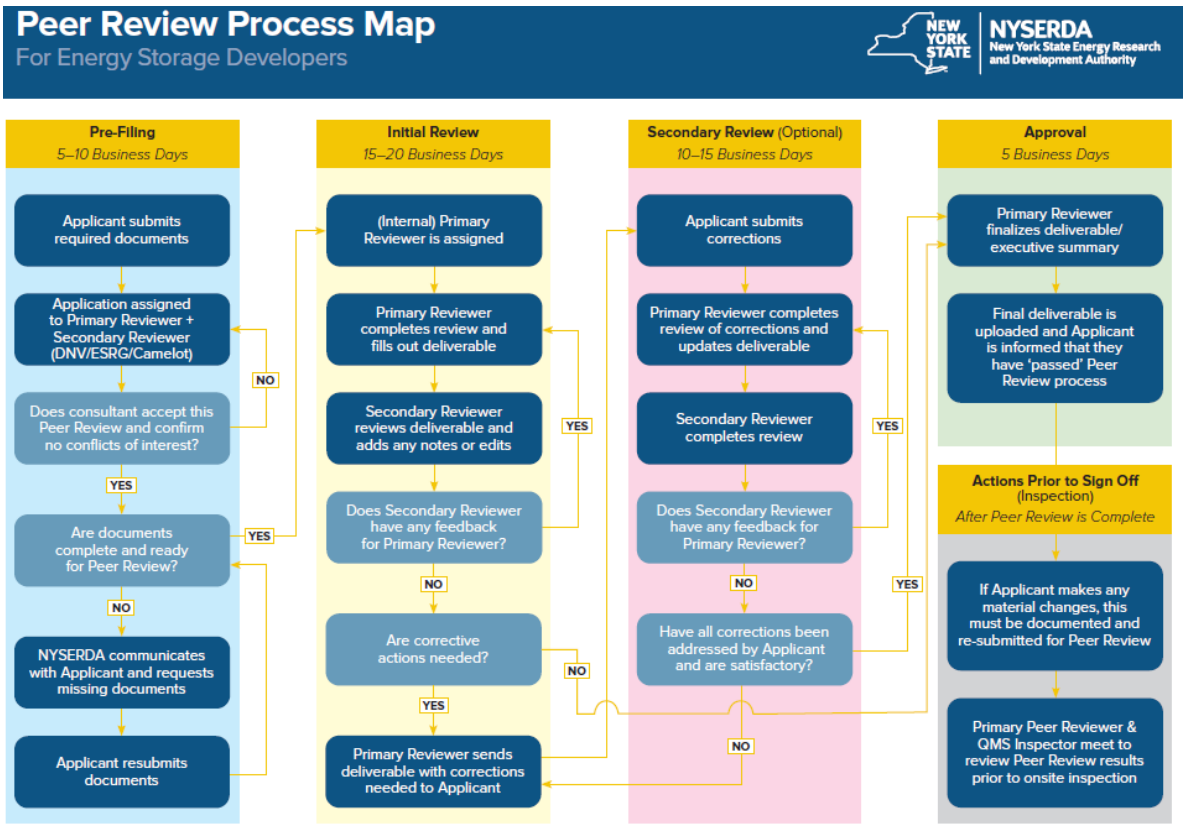
Phase 2 – Initial Review: Detailed peer review occurs with internal quality assurance to ensure that the Peer Review Report (PRR) is fair, correct, and consistent. PRT sends feedback/data requests to the Applicant, as needed.

Phase 3 – Secondary Review: Applicant corrects deficiencies noted by PRT and submits revised documentation.

Phase 4 – Approval: PRT approves Applicant materials and generates PRR.

Note that the PRT will make all reasonable efforts to review Applications efficiently. The best way to ensure an efficient review process is for Applicants to provide thorough technical documentation and a well-organized submittal. **It is recommended that Applicants plan for at least 45 business days to complete this process.**

Figure 1. Peer Review Process Map



5. The Peer Review Report

- NYSERDA's Peer Review Report (PRR) provides a detailed list of project aspects that have been reviewed and, upon completion of the PRP, found to be non-objectionable. The PRR will be delivered to the Applicant as a PDF file to document the successful completion of the PRP.
- The PRR is organized into sections corresponding to major deliverables submitted as part of a complete Application. It is structured as a checklist so that Applicants have a clear understanding
  of the scope of the peer review. The following pages include additional context.
- Applicants may, at their sole discretion, share copies of this report with local AHJs, investors, insurance companies, or other entities with an interest in the technical and safety aspects of the Project.

5.1 Applicable Codes and Standards

Peer reviewers will complete reviews based on the most current version of the adopted New York State editions of all Codes, including amendments, at the time of submission. This PRP is not intended to supersede local regulations or requirements. Moreover, the findings of the PRP in no way supersede the authority of the local AHJ. The PRP and AHJ permitting processes may proceed in parallel; successful completion of the PRP is a necessary milestone for projects to receive NYSERDA incentives, whereas the AHJ review of project plans and design is a necessary part of the local planning and permit approval process. While these processes are meant to complement one another, Applicants should understand that there may be some divergence in assessment and ultimately all projects must comply with both program requirements as well as relevant laws and AHJ requirements.

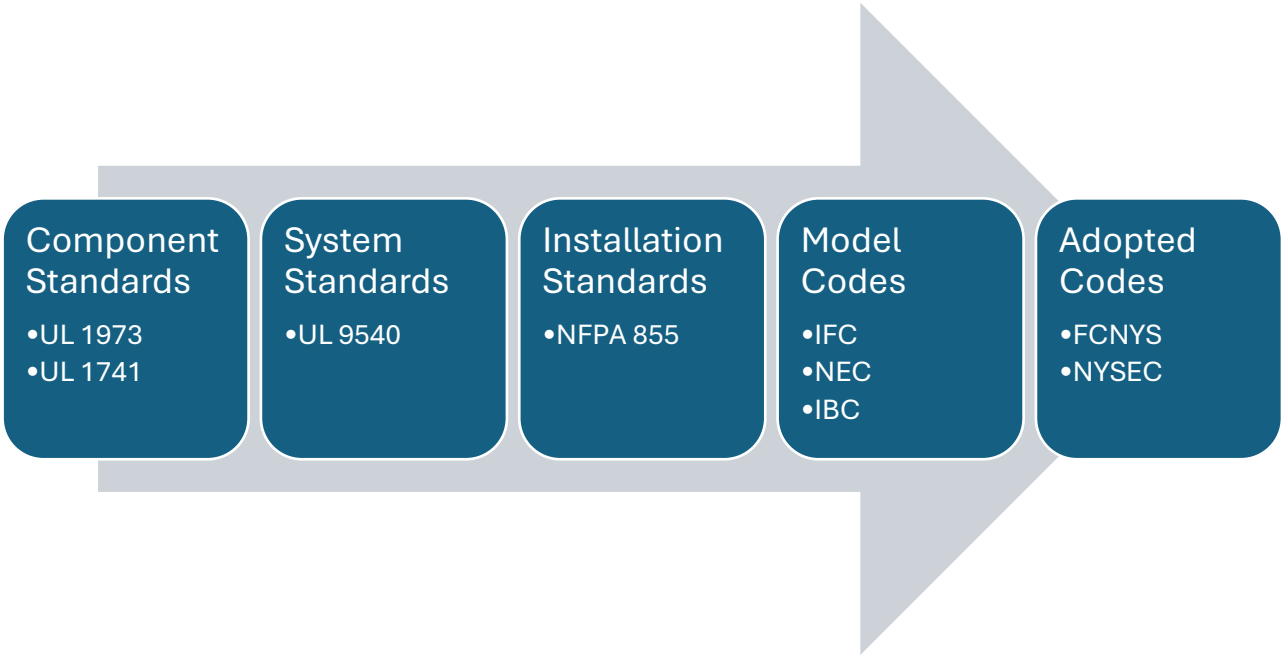
Energy storage system (ESS) projects are subject to a variety of requirements, and it can be difficult to understand exactly which requirements apply to any one project. The following section provides background information on relevant codes and standards. Note that this is provided for informational purposes only and general discussion here does not overrule the findings of any specific project-level review. Moreover, these requirements can change rapidly and while NYSERDA will make all reasonable efforts to keep this information up to date. Applicants are ultimately responsible for understanding the relevant requirements for their projects.

5.2 Codes vs Standards

Standards are consensus documents prepared by organized committees of industry experts, with each standard addressing a particular topic, method, or process. These committees are generally convened by standard-making bodies, such as UL, IEEE, IEC, and similar entities. Standards are not enforceable, however, unless they are incorporated into one or more codes. Codes are adopted as law by relevant authorities, such as local and state governments.

For example, ESS can be listed to UL 9540 (a standard) but doing so is only required because of FCNYS 1206.10.1 (a code), which notes that "Energy storage systems shall be listed in accordance with UL 9540…" Without a code to enforce the requirement, a standard has no independent authority.

Figure 2. Code Development Process



5.3 A Sample of the Relevant Standards and How They Apply to Energy Storage Systems

The standards that apply to ESS are interrelated and build upon one another. It is important for Applicants to understand how they relate.

Table 1. Safety Standards for Energy Storage Systems and Their Components

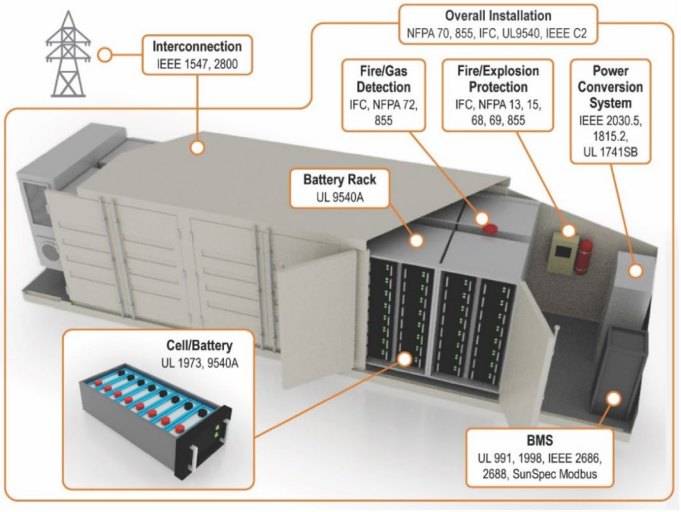
	Standard	Applicability
From smaller to larger scale	UL 1973 Batteries for Use in Stationary and Motive Auxiliary Power Applications	Product listing for battery cells and modules covering materials, construction methods, durability, and ability to withstand stress conditions. This is a precursor standard to achieving UL 9540 Listing on the overall ESS. NYSERDA does not explicitly require compliance with UL 1973, but compliance is implied via the code requirements for UL 9540 Listing of all installed ESS.

From smaller to larger scale (cont'd)	UL 9540A Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems	Large-scale fire testing is required under NY Fire Code and such testing must be conducted according to this test method. Notably, this test method provides criteria for evaluating cells, modules, units, and installations under thermal runaway conditions. The code requires the results of these tests to be incorporated into the overall system design. Note that there is no "pass" or "fail" criteria for this standard. Manufacturers are required to continue testing subsequently more integrated products until the results meet specific safety criteria. All projects seeking NYSERDA incentives must utilize equipment that has undergone UL 9540A testing per the test method. The Peer Review Team will be required to review the associated test reports closely.
	NFPA 68 Standard on Explosion Protection by Deflagration Venting	One of two[a] defined explosion control methods allowed under UL 9540 Listing. NFPA 68 provides direction on "control" of explosions via measures like deflagration venting panels or other measures intended to channel explosive energy in a controlled manner to protect life and property. NYSERDA, via requiring compliance with code and UL 9540 Listing, will verify that Applicants' projects comply with the methods of explosion control described in either NFPA 68 or 69 (see below) and Applicants should be prepared to provide technical justification for compliance, beyond the basic information provided on OEM specification sheets. Examples of substantiation could include engineering analyses and/or test results used in achieving UL 9540 Listing.
	NFPA 69 Standard for Explosion Control Systems	The companion to NFPA 68, NFPA 69 provides for an alternative approach to mitigating explosion risk. Under NFPA 69, the ESS will use gas detection, smoke detection, and similar means to identify potential explosion risk before interior gases reach the lower flammable limit, acting then to ventilate flammable gases before they pose an explosion risk. Projects receiving NYSERDA incentives will generally have to comply with either NFPA 68 or NFPA 69 in managing explosion risk and this requirement is drawn from Fire Code and associated requirements for UL 9540 Listing.

From smaller to larger scale (cont'd)	UL 9540 Energy Storage Systems and Equipment	UL 9540 is a key product standard for ESS and listing to this standard is required under both Fire and Electrical Code. However, there is sometimes confusion about when the listing process should take place. Most manufacturers have at least a DC block listed to UL 9540. It is theoretically possible to field list only at the installation level, but doing so significantly increases the field listing timeframe, as the field listing entity has to review all of the underlying documents and test results for each project. The Peer Review Team will also have to review all of the underlying documents and results, instead of the UL 9540 Listing Report, so Applicants intending to field list projects without an underlying listing that covers the DC or AC block should be prepared for additional time during the Peer Review process, as the Peer Review Team will not have a viable UL 9540 Listing Report to draw upon. Note also that completion of UL 9540A testing and listing of battery cells and modules to UL 1973 are both required to achieve UL 9540 Listing.
	NFPA 855 Standard for the Installation of Stationary Energy Storage Systems	This is the most comprehensive standard for installation-level ESS requirements. The requirements have been generally reflected in the relevant Fire Code requirements but in some cases NFPA 855 provides added context or educational material that can help with interpretation. Projects receiving incentives under the NYSERDA program are not explicitly required to comply with NFPA 855, other than to the extent NFPA 855 requirements are embedded in relevant sections of the New York Fire Code.

[a.] Note that the UL 9540 equipment listing does allow for alternative compliance means and, as of this writing, there is one major manufacturer in the U.S. market that has successfully listed products using a method that does not comply with either NFPA 68 or NFPA 69. NYSERDA's Peer Review Team will consider the full context of any proposed technology and ESS that achieve a UL 9540 Listing using an alternate means of explosion risk mitigation will be considered on a case-by-case basis.

Figure 3. Energy Storage System Components and Grid Connection



Notable New York State Codes Currently in Use (Uniform Code NYCRR 19)

Note that New York City maintains a robust body of city-specific codes. While projects sited in New York City are subject to peer review through the Department of Buildings rather than the NYSERDA incentive program, careful review of these requirements is recommended for any Applicant considering a project in New York City.

Table 2. Applicable Codes for Energy Storage Systems

Code	Edition	PRT Commentary
New York State Electrical Code (NFPA 70 + local amendments)	2023	• See Section 706 for applicable requirements. • Most modern BESS will be "Energy Storage System, Self-Contained" types in this Edition of the NEC. • Hybrid projects should also reference Sections 705, 690, and/or 691 for requirements related to PV systems.
New York State Fire Code (IFC 2024 + Amendments)	2025	• See Section 1207 for Energy Storage System Requirements. • Definitions vary slightly from NEC. • See details on documentation requirements, as these heavily inform the PRP. • Peer Review requirements in 1206.8.

6. Confidentiality in the Peer Review Process

The Peer Review Team (PRT) recognizes that the requested documents to complete the peer review may contain confidential information and that the Applicant may need to rely on the BESS manufacturer or other third parties to provide key technical documents. The PRT is composed of industry professionals experienced in the handling of confidential manufacturer data and information and all submitted documentation will be treated in confidence.

However, please be aware that all information, in any format, submitted to the PRT shall be subject to and treated in accordance with the NYS Freedom of Information Law ("FOIL," Public Officers Law, Article 6). Pursuant to FOIL, NYSERDA is required to make available to the public, upon request, records or portions thereof which it possesses, unless that information is statutorily exempt from disclosure. FOIL does provide that NYSERDA may deny access to records or portions thereof that "are trade secrets or are submitted to an agency by a commercial enterprise or derived from information obtained from a commercial enterprise and which if disclosed would cause substantial injury to the competitive position of the subject enterprise."[3] Accordingly, if any information submitted to the Peer Review Team is considered proprietary and/or confidential trade secret, the information should be plainly labelled "confidential" or "proprietary" at the time of submission. In the event of a FOIL request, it is NYSERDA's policy to consider records marked as "confidential" or "proprietary" as subject to the trade secret exemption procedure set forth in 21 NYCRR § 501.6 and any other applicable law or regulation. However, NYSERDA cannot guarantee the confidentiality of any information submitted.

Additionally, NYSERDA reserves the right to notify local AHJs of any critical or major issues identified during the peer review process that are not addressed to the satisfaction of the Peer Review Team.

[3] Refer to Public Officers Law, § 87(2)(d)

7. Peer Review Technical Guidance

Information in this section is provided for reference only and Applicant remains solely responsible for compliance with all applicable laws, codes, and standards. Applicants unfamiliar with the terms and concepts discussed should seek support from relevant experts and professionals.

The checklist items reviewed by the PRT are included within the most current version of the PRR and listed below for transparency. This section provides additional context and guidelines on meeting some of these requirements (much like the National Electrical Code [NEC] Handbook does for the NEC).

1. Document Review

The deliverables listed in Table 3 should be provided for the desktop review of the project's product and project design documents.

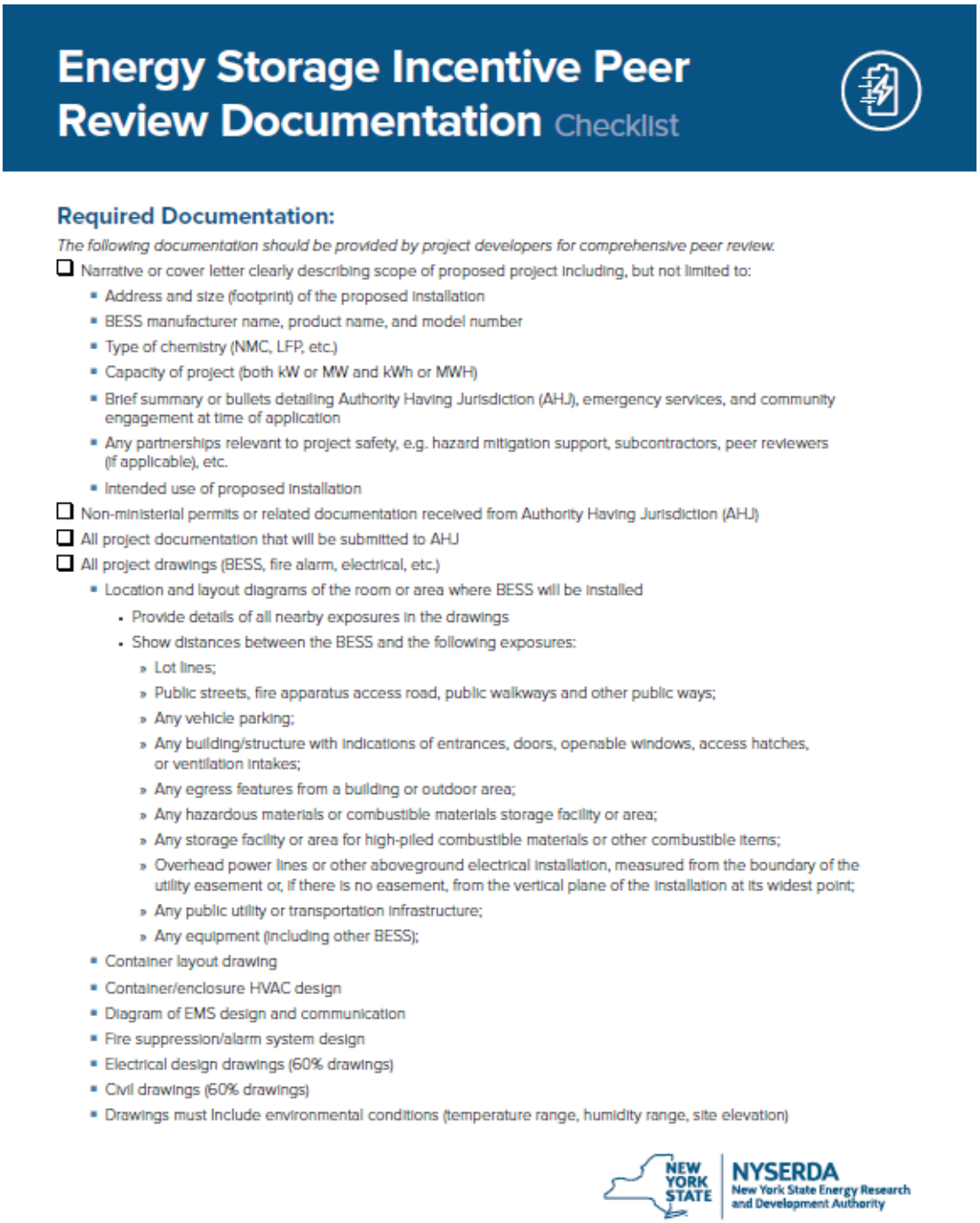
Table 3. Required Project Documentation

Item	Document Reviewed	Guidebook Section
	Cover Letter	2. Cover Letter Review
	Zoning Approval Letter	N/A
	Summary of AHJ Communications	N/A
	Permitting Matrix	N/A
	Design Drawings: Electrical (minimum 60%)	3. Project Design Review
	Design Drawings: Civil (minimum 60%)	3. Project Design Review
	Design Drawings: Mechanical (minimum 60%)	3. Project Design Review
	Design Drawings: Fire Suppression	3. Project Design Review
	Design Drawings: Fire Alarm	3. Project Design Review
	UL 9540 Listing and Full Report	3. Project Design Review
	UL 1973 Listing and Full Report	3. Project Design Review
	UL 1741 Listing and Full Report	3. Project Design Review
	Specification Sheet: Cell	3. Project Design Review
	Specification Sheet: BESS	3. Project Design Review
	Specification Sheet: PCS	3. Project Design Review
	Specification Sheet: FACP	3. Project Design Review

	Specification Sheet: EMS/ESMS	3. Project Design Review
	Specification Sheet: Site Controller (if applicable)	3. Project Design Review
	Specification Sheet: Fire Protection System	4. Fire Protection System(s) Review
	UL 9540A test report: Cell	5. Full UL 9540A Test Reports Review
	UL 9540A test report: Module	5. Full UL 9540A Test Reports Review
	UL 9540A test report: Unit	5. Full UL 9540A Test Reports Review
	UL 9540A test report: Installation (if applicable)	5. Full UL 9540A Test Reports Review
	Explosion Control Technical Reports as applicable (NFPA 68: Explosion Protection and/or NFPA 69: Explosion Prevention)	6. Explosion Control Review
	Manual: BESS Installation	7. O&M, BMS, and Installation Manuals Review
	Manual: Operations and Maintenance	7. O&M, BMS, and Installation Manuals Review
	Manual: BMS	7. O&M, BMS, and Installation Manuals Review
	Hazard Mitigation Analysis	8. Site-Specific Hazard Mitigation Analysis (HMA) Review
	Site-Specific Emergency Response Plan	9. Site-Specific Emergency Response Plan (ERP) Review
	Site-Specific Safety Training Materials	10. Site-Specific Safety Training Plan Review
	Commissioning Plan	11. Commissioning Plan Review
	Decommissioning Plan	12. Decommissioning Plan Review
	24/7 Monitoring/Central Station Agreement(s)*	
	Central Station Listing and Certifications[a]	

[a] This requirement was adopted in the 2025 Fire Code of New York State and will go into effect on January 1, 2026.

Figure 4. Peer Review Required Documentation Checklist



Energy Storage Incentive Peer Review Documentation Checklist

Required Documentation:

The following documentation should be provided by project developers for comprehensive peer review.

- ☐ Narrative or cover letter clearly describing scope of proposed project including, but not limited to:
  - Address and size (footprint) of the proposed installation
  - BESS manufacturer name, product name, and model number
  - Type of chemistry (NMC, LFP, etc.)
  - Capacity of project (both kW or MW and kWh or MWH)
  - Brief summary or bullets detailing Authority Having Jurisdiction (AHJ), emergency services, and community engagement at time of application
  - Any partnerships relevant to project safety, e.g. hazard mitigation support, subcontractors, peer reviewers (if applicable), etc.
  - Intended use of proposed installation
- ☐ Non-ministerial permits or related documentation received from Authority Having Jurisdiction (AHJ)
- ☐ All project documentation that will be submitted to AHJ
- ☐ All project drawings (BESS, fire alarm, electrical, etc.)
  - Location and layout diagrams of the room or area where BESS will be installed
    - Provide details of all nearby exposures in the drawings
    - Show distances between the BESS and the following exposures:
      - » Lot lines;
      - » Public streets, fire apparatus access road, public walkways and other public ways;
      - » Any vehicle parking;
      - » Any building/structure with indications of entrances, doors, openable windows, access hatches, or ventilation intakes;
      - » Any egress features from a building or outdoor area;
      - » Any hazardous materials or combustible materials storage facility or area;
      - » Any storage facility or area for high-piled combustible materials or other combustible items;
      - » Overhead power lines or other aboveground electrical installation, measured from the boundary of the utility easement or, if there is no easement, from the vertical plane of the installation at its widest point;
      - » Any public utility or transportation infrastructure;
      - » Any equipment (including other BESS);
  - Container layout drawing
  - Container/enclosure HVAC design
  - Diagram of EMS design and communication
  - Fire suppression/alarm system design
  - Electrical design drawings (60% drawings)
  - Civil drawings (60% drawings)
  - Drawings must include environmental conditions (temperature range, humidity range, site elevation)

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(cont'd)

- ☐ All BESS and fire protection system datasheets
  - BESS specifications sheet
  - Cell specifications and performance data
  - BMS specifications and performance data
  - Summary of BESS fire safety features (detection, alarms, fire suppression, sequence of operations of system response to thermal runaway event)
  - Summary of BESS thermal management systems
  - Summary of BESS explosion control or mitigation strategy
- ☐ O&M manual, BMS manual, Installation manual
- ☐ Communications architecture (SCADA interface, communication protocols, data connectivity requirements)
- ☐ Equipment Listings and certifications for the proposed model in the relevant categories (UL 9540 equipment listing and full report for the whole system, UL 1973 / IEC 62619 / UN38.3 certification for li-ion batteries, UL 1741 certification for inverter, appropriate indoor/outdoor NEMA or IP rating for enclosures)
- ☐ Full UL 9540A large-scale fire test reports (cell-level, module-level, and unit-level tests reports. Installation level test reports will be required for BESS which have not met unit-level performance criteria.)
- ☐ Site-specific Hazard Mitigation Analysis (HMA) that includes analysis of at least the following failure modes:
  - Thermal runaway or mechanical failure in a single BESS unit
  - Failure of an energy storage system that is not covered by the product listing Failure Modes and Effects Analysis (FMEA)
  - Failure of a required protection system
    - E.g., HVAC, exhaust ventilation, smoke or fire detection, fire suppression, or gas detection
- ☐ Site-specific Emergency Response Plan (ERP)
- ☐ Site-specific Safety Training including but not limited to
  - Plans for safety training
  - Safety training materials
  - Site map complete with hazard identification
- ☐ Deflagration analysis substantiating design of explosion control system(s)
- ☐ Substantiation of explosion control design, including UL 9540 Report, completed under the most current edition of the Standard, indicating compliance with Section 24.5 and one, or more of the following additional documents:
  - Deflagration Hazard Analysis based on applicable UL 9540A test results and data, demonstrating that the flammable gas concentration remains below 25% of LFL. This may be completed by the manufacturer or a suitable third-party engineer.
  - Technical report substantiating compliance with either NFPA 68 or NFPA 69 requirements. This report should provide sufficient detail for Peer Reviewer to reasonably validate the conclusions reached in granting the UL 9540 Listing and developer may submit manufacturer documentation used in the UL 9540 Listing process, if desired.
- ☐ Commissioning and decommissioning plans (should include details on emergency decommissioning in addition to details about hazard support personnel)
- ☐ Central Station, 24/7 Network Operations Center (NOC), and video monitoring contracts

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2. Cover Letter Review

The cover letter is meant to provide a concise summary of the submitted project documents, ensuring all key details are included for a smooth Peer Review. It should confirm document completeness and highlight essential project information such as name, capacity, location, technology, and purpose. Including clear contact details will help facilitate the review process and ensure efficient evaluation of the project.

Cover Letter Template: [Refer to Section 9]

Peer Review Report checklist items for cover letter

- **a** Project name included (2.1)
- **b** Applicant contact information provided for the peer review process (2.2**)**
- **c** Owner/developer name included (2.3)
- **d** Project location and address included (2.4)
- **e** Project system nameplate energy capacity (kWh-DC) included (2.5)
- **f** Project AC POI capacity (kW) included (2.6)
- **g** BESS Technology included (make and model number) (2.7)
- **h** Total number of BESS enclosures (2.8)
- **i** Purpose/Use case included (2.9)
- **j** Narrative description of emergency response procedures (2.10)
- **k** Checklist confirmation of all required document submitted (2.11)

3. Project Design Review

The goal of the Peer Review is to verify the project is designed in compliance with applicable codes and standards for New York State. This includes reviewing the proposed equipment for installation as well as the project design drawings. This section encompasses both reviews.

- **a** **Equipment Review**
  All equipment proposed for installation must comply with applicable standards and obtain all required certifications. In order to ascertain this, various specification sheets, certifications, and other information will be reviewed by the PRT. See below for specific checklist items that the PRT will review.
- **b** **Project Design Drawings Review**
  The PRT will review the electrical, civil, mechanical, fire suppression, and fire alarm design drawings over the course of this review process. All design drawings need to reach a sufficient level of maturity before the review process to ensure the equipment and system design being reviewed will be an a accurate representation of what will be installed.

  Therefore, the minimum requirement for the maturity of the drawings is 60%. Across all design drawings, information that must be included, at a minimum, is as follows:

  - Location of major equipment including BESS, inverters, transformers, protection devices, and disconnects with distances shown between the BESS and other major equipment to potential exposures.
  - Single line diagram illustrating the complete electrical design from the point of interconnection to the BESS equipment. This should also include auxiliary power design and requirements.
  - Interconnection plan per NEC/NESC requirements.
  - Wire and conduit routing throughout the system, including wire and conduit schedules, with details on material/type, trade-size, and loss characteristics.
  - Fencing, bollards, and other safety features present on site.
  - Exposures within 100 ft of the BESS including, but not limited to buildings, buildable lot lines, public roadways, and parking lots.

c Project Design Drawings Review

Equipment Review

- All documents submitted to the authority having jurisdiction (AHJ). (3.1)
- Full UL 9540 and UL 1973 listing and test report done by a nationally recognized testing laboratory (NRTL) as listed by OSHA. (3.2)
    - ◊ UL 9540 certification must include chargers, inverters, and energy storage management systems. Otherwise, separate listings must be obtained.
- UL 1741 certification done by a NRTL as listed by OSHA. (3.3)
- Manufacturer's specification sheets for BESS and PCS. (3.4)
    - ◊ BESS datasheet shall have cell, module, unit, and enclosure levels parameters such as voltage, weight, dimension, operating temperature, and model numbers.
    - ◊ BESS datasheet shall include the chemistry of the system (e.g., LFP or NMC)
- Description of energy storage management system and its operation. (3.5)
- Details on system level fire suppression (including location/number of sprinklers, nozzles, and other release points), smoke or fire detection, as applicable. (3.6)
- Details on system level thermal management, ventilation, and deflagration venting systems.(3.7)
- BESS equipment's rated environmental conditions (temperatures, snow load, humidity, elevation).(3.8)
- Arc flash hazard analyses with appropriate mitigation measures identified. (3.9)

Project Design Drawings Review:

- All drawings shall be prepared and stamped by an appropriate Registered Design Professional (RDP).(3.10)
- Location and layout diagram, with distances shown, of the room or area in which the energy storage system is to be installed. (3.11)
- Location and content of required signage.4 (3.12)
- Support arrangement associated with the installation, including any required seismic restraint. (3.13)
- Single line diagram with sufficient clarity and detail. (3.14)
- Size of conductors, disconnects, overcurrent protection, and other devices complying with NEC requirements are clearly shown.(3.15)
- Site access/egress and security methods5 clearly indicated in drawings.(3.16)

[4] An enhanced signage requirement was adopted in the 2025 Fire Code of New York State and will go into effect on January 1, 2026.

[5] Enhanced security of installations requirements were adopted in the 2025 Fire Code of New York State and will go into effect on January 1, 2026.

- Equipment must be located outside floodplains, wetlands, waterbodies, and other unsuitable areas.[6] (3.17)
- Communications infrastructure and block diagram clearly indicating all key equipment details and ownership. (3.18)
- Roads and other infrastructure shall be suitably engineered for access by cranes and other heavy equipment. (3.19)
- Electrical grounding means fully specified and compliant with NEC requirements. (3.20)
- Locations and technical details of all site level fire suppression equipment, and audible/visual alarms, gas, smoke, and other fire related sensors. (3.21)
    - ◊ This should include a Single Line Diagram and layout that show the locations and connections between all components of the fire alarm system. It should also include any connections to the existing fire alarm system of the building and/or connection to the 24/7 monitoring station if applicable.

4. BESS Fire Protection System(s) Review

The Peer Review Team will be looking for substantial details on the BESS fire safety systems to ensure compliance with the relevant codes and standards. This may require some coordination with the BESS manufacturer, as these components are often provided by third-party manufacturers and installed in the BESS enclosure at the factory. For manufacturers that cannot provide an "off the shelf" data sheet on their fire protection system, it may be necessary to compile the documents indicated below into a single organized document. While the information needed for this review can sometimes be spread across a variety of other documents, Applicants are encouraged to provide the information requested in a single well-organized file to avoid delays in the review process.

Peer Review Report checklist items for BESS Fire Protection System(s) Review

a Fire Protection System Datasheet is provided and shall include: (4.1)

- The mechanism of fire suppression during a thermal runaway event
- Material Safety Data Sheet (MSDS) of the used suppressant
- Operating temperature of the fire suppression system

b All equipment shall bear the appropriate listing mark of an NRTL where such marking is required as part of the listing and installed in accordance with its listing (NEC Article 110.3(B)). (4.2)

c Chargers, inverters, and energy storage management systems shall be covered as part of the UL 9540 listing or shall be listed separately (FCNYS 1206.10.2). (4.3)

d Only inverters listed and labeled for utility interactive system use and identified as interactive shall

[6] E.g. FEMA maps:
https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd
State (DEC) Wetland mapper: https://gisservices.dec.ny.gov/gis/erm/
Federal (NWI) wetland mapper: https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/

be allowed to operate in parallel with the electric utility power system to supply power to common loads. Inverters shall be listed and labeled in accordance with UL 1741 (FCNYS 1206.10.3). (4.4)

e Fire safety and explosion control systems match tested configuration in UL 9540A test reports. (4.5)

f Fire and explosion control systems match what is documented in the Emergency Response Plan. (4.6)

g Design based on results of UL 9540A or approved equivalent large-scale fire testing. (4.7)

h Fire and explosion control sequence of operation clearly described and aligns with industry best practices.(4.8)

i System has provision for BMS backup power sufficient to provide at least 24 hours on standby or 2 hours in alarm condition.(4.9)

j Area in a 10-ft radius surrounding the BESS is free of flammable materials, including provision for preventing foliage growth. (4.10)

5. Full UL 9540A Test Reports Review

Full Test Reports must be submitted. Letters from laboratories providing a summary of results or declaring the test "passed" will not be accepted.

Tests and reporting must comply with the 4th edition of UL 9540A (or the most current version), unless otherwise specified by FCNYS or NFPA 855. The report must be clearly written, with suitable graphics and photographs to properly evaluate the methodology and results.

Test reports must be provided at the cell, module, and unit level for review. If the installation level test was conducted, the test report must be provided as well. All test reports must use the same equipment that matches the model numbers provided in the Cover Letter (refer to Section 2 herein). Example: If the cell-level test report is based on Contemporary Amperex Technology Co., Limited (CATL) cells, then the module and unit level test reports must also use the same CATL cells. Furthermore, the peer reviewer will confirm that the equipment reflected in the test report(s) matches the equipment included in relevant design drawings and submittals. Any deviation between the tested and proposed equipment will be flagged by the peer reviewer, so Applicants are encouraged to closely verify any documentation from their BESS integrator before submitting.

Peer Review Report checklist items for the Full UL 9540A Test Report Review

a Cell-level UL 9540A report with details consistent with UL 9540A reports at the module, unit, and (if required) installation level. (5.1)

- UL 9540A is not required at higher levels if cell-level report indicates thermal runaway cannot be initiated via one of the allowed initiation methods and if the vent gas is non-flammable. At this time, NYSERDA is unaware of Li-ion cells that meet this requirement to forego further testing.

b Module-level UL 9540A report with details consistent with UL 9540A reports at the cell, unit, and (if required) installation level. (5.2)

- If module-level results indicate non-flammable off-gas and complete isolation of the thermal runaway within the module, further testing is not required. However, as with the cell-level

test, there are no known Li-ion batteries that would meet the requirement of a non-flammable gas product, so Applicant should generally assume a unit-level test will be required.

- If the BESS is a cell-to-system design, a module-level test may not be applicable. Peer reviewers will use their discretion if this is the case.

c Unit-level UL 9540A report with details consistent with UL 9540A reports at the cell, module, and (if required) installation level. (5.3)

d If required, installation-level UL 9540A report with details consistent with UL 9540A reports at the cell, module, and unit level. (5.4)
Note that all Li-ion projects must have a valid UL 9540A test report at the cell, module, and unit level. Installation level testing is only required in the case of the unit level test results not meeting the performance criteria as specified in the test method . In such cases, the Applicant must also submit the Installation Level Test Report for review. These reports should be provided by the BESS integrator or manufacturer.

e All UL 9540A test reports provided are based on the 4th edition of the UL 9540A standard, unless a later edition has been adopted by code. (5.5)

f The testing lab where the UL 9540A test is performed must be ISO 17025 accredited. This should include accreditation for both battery testing (e.g., UL 1973, Batteries for use in stationary, vehicle auxiliary power and light electric rail ((LER)) applications) and fire protection testing (e.g., ASTM E1354, Standard test method for heat and visible smoke release rates for materials and products using an oxygen consumption calorimeter; ASTM E662, Standard test method for specific optical density of smoke generated by solid materials). (5.6)

Many facilities can offer large-scale fire testing but conforming to the UL 9540A testing standard will require test reports to be prepared by an appropriate Nationally Recognized Testing Laboratory. Applicants are encouraged to review manufacturer-supplied test reports to ensure they are issued by an appropriate entity. Manufacturer self-testing results will not be accepted.

g The unit construction details and specifications shall be provided within the test report. (5.7)
Each Test Report should include sufficient details, such as dimensions, photographs from multiple angles, and written descriptions to reasonably confirm that the tested equipment matches specifications provided in other project documents.

h The number and location of cells forced to fail during module and unit level testing shall be the same. (5.8)
The Reviewer will be looking for consistency between the various levels of UL 9540A testing per the test method's requirements.

i The method used to initiate thermal runaway must be the same as the for the cell, module, and unit level test. (5.9)

j Mitigation devices that are not part of the test method's installation's module/system construction shall not be introduced during the test to impact the outcome. (Example: thermal barriers introduced around the external heater on the cell.) (5.10)

It is very important the device under test in the Test Report matches the equipment to be installed onsite in all possible respects. Seemingly minor changes, like adding insulating pads or other devices can substantially change results.

Additionally, one common misconception is that it is acceptable to "improve" a system in the field compared to its as-tested configuration. This commonly takes the form of added fire suppression systems. While it seems reasonable to assume that adding more safety features can only improve the system, this is not necessarily the case and we encourage Applicants not to arbitrarily add new features that have not been part of the UL 9540A testing, as these features can inadvertently reduce the safety of the system by producing unpredictable results during a thermal event. If the applicant is considering such an alteration or being instructed by a local AHJ to add this type of equipment, bear in mind that doing so may violate the UL 9540 Listing of the equipment. Any such changes should be discussed with the Reviewer before finalizing.

k Critical information on any fire mitigation means employed during testing of the system shall be provided and be consistent with the intended installation. (5.11)

If the testing involves the use of any special fire mitigation features, this should be documented in the Test Report and such features should be applicable to the proposed equipment for the Project.

l Testing shall be done in an indoor facility unless the BESS is intended for outdoor installations only. (5.12)

Test Setup

m A summary of the critical data from the cell test is provided (vent temperature, thermal runaway temperature, and gas data is available as noted under gas measurements below) in the module, unit, and (if applicable) installation level Test Reports. (5.13)

n A summary of the critical data from the module test is provided (thermal runaway temperature, propagation occurrence, peak heat release rate, convective heat release rate, peak smoke release rate, gas data) in the unit and (if required) installation level Test Reports. (5.14)

o Test walls and test rooms were built using 5/8-inch drywall and painted flat black except for outdoor ground-mounted residential applications or outdoor wall-mounted residential applications which need to be tested with 3/4-inch plywood. (5.15)

p The test layout matched the intended installation layout with regard to separation distances from walls and other units. (5.16)

q The system was at maximum operating state of charge, which was checked prior to initiation of the test. (5.17)

Test Method

r Test outcome, other than Installation-level, did not rely upon operation of integral electrical devices such as the BMS, fans or coolant pumps. (5.18)
The general purpose of the UL 9540A testing is to represent a relatively "worst case" scenario. At the unit level, the device under test must rely solely on the structural and material properties of the cell, module, and enclosure to contain flame, debris, and explosion. Active systems, such as fans, fire suppression, or motorized door controls can only be used in an installation-level test.

s The test did not rely, except for Installation-level tests, upon devices introduced into the module that are not part of the module design to limit the effects of the heaters during the test. (5.19)

t In the unit level test, temperatures were measured on walls and did not exceed 97°C of temperature rise above ambient. (5.20)

u In the unit level test, heat flux was measured in the center of the planned egress path and did not exceed 1.3kW/m^2. (5.21)

v In the unit level test, temperatures measured on target units did not exceed the onset of cell venting temperature measured during the cell test. (5.22)

w In the unit level test, heat flux measured on walls and target units were measured and recorded. (5.23)

x The report indicated whether there was evidence of explosions or flying debris during the test or reignitions after the test. (5.24)

y The report indicated whether or not the performance criteria of the unit level test were met. (5.25)

Though it is important to understand that there is no "pass" or "fail" result for UL 9540A, the outcome of the unit-level test dictates if a further installation-level test will be required. In general, unit-level tests with no evidence of flying debris, flames extending beyond the enclosure, ejected material, or explosive propagation will not require an installation-level test. If this is not the case, an installation-level test will generally be conducted outdoors with a full-scale installation of the BESS and all applicable features operational to provide the most realistic assessment of real-world impacts possible. Applicants are encouraged to familiarize themselves with the UL 9540A testing standard and work closely with reputable and knowledgeable testing laboratories to ensure compliance. This is especially important, as the UL 9540A test report underpins much of the design and any required re-testing due to meet relevant requirements will likely have significant cost and timeline impacts for the Applicant.

Gas Measurements

Gas measurement is a key part of emergency planning and the UL 9540A reports should provide key data on gas composition and development rates.

z The total hydrocarbon (THC) gas volume was measured and recorded for both the pre-flaming period and after the start of flaming during the test using flame ionization detection (FID). (5.26)

aa The total volume of carbon monoxide (CO) and carbon dioxide (CO_2) gases were measured using non-dispersive infrared spectroscopy (NDIR) and recorded for both the pre-flaming period and after the initiation of flaming during the test. (5.27)

bb The volume of hydrogen (H_2) was measured using a solid-state hydrogen sensor during the pre-flaming period and after initiation of flaming during the test. (5.28)

cc The critical properties from the cell level test were provided on the cell vent gas: lower flammability limit (LFL), burning velocity (Su) and maximum deflagration pressure (Pmax). This data is necessary for evaluating the suitability of explosion mitigation means. (5.29)

dd Smoke release rate measured with white light source and photo detector for the duration of the test was provided. (5.30)

Supporting Documentation

ee Profiles showing the temperatures of initiating cells and nearby cells within the initiating module, modules in the initiating unit are provided. (5.31)

ff Profiles showing that temperatures on target units do not exceed the cell vent temperature are provided. (5.32)

gg Profiles showing heat flux measurements are provided showing that they do not exceed 1.3 kW/m2 at the egress path for non-residential applications and outdoor ground mounted residential applications. (5.33)

hh Profile showing the heat release rate (chemical & convective heat release rate) versus time data for non-residential applications was provided. (5.34)

ii The report provided photos taken during the test to show the progress of the initiating thermal runaway as well as diagrams and photos to show the test layout.(5.35)

6. Explosion Control Review

Deflagration management takes two distinct approaches: Deflagration Protection (as detailed in NFPA 68) and Deflagration Prevention (as detailed in NFPA 69). Different battery systems may use both approaches or may use one of them depending on the technology and manufacturer.

Peer Review Report Checklist Items for Explosion Control Review

Explosion Prevention (NFPA 69)

a Third-party deflagration analysis or full-scale explosion testing report demonstrating that the explosion prevention system(s) shall function as designed to adequately prevent a deflagration event. (6.1)

Acceptable forms of substantiating documentation include:

- Computational Fluid Dynamics (CFD) modeling.
- Technical calculations (e.g., NFPA 69 exhaust fans and active vents sizing).
- Full-scale testing of respective BESS enclosure and constituent battery components demonstrating that a deflagration shall be effectively managed by the provided explosion control system(s).

b Deflagration analysis shall be conducted utilizing UL 9540A data for the respective battery cell, module, racks, and BESS enclosure geometry. (6.2)

c All assumptions (e.g., number of cells undergoing thermal runaway, gas volume and release rates, enclosure geometry, etc.) are clearly stated in the report. (6.3)

d Specifications of the product deployed shall be included within the report to show that critical component specifications match the technical assumptions of the compliance report/simulation. (6.4)

Explosion Protection by Deflagration Venting (NFPA 68)

e Third-party deflagration analysis or full-scale explosion testing report demonstrating that the explosion control system(s) shall function as designed to adequately mitigate the effects of a deflagration event. (6.5)

Acceptable forms of substantiating documentation include:

- Computational Fluid Dynamics (CFD) modeling
- Technical calculations (e.g., NFPA 68 deflagration vent panel sizing calculations)
- Full-scale testing of respective BESS enclosure and constituent battery components demonstrating that a deflagration shall be effectively managed by the provided explosion control system(s)

f Deflagration analysis shall be conducted utilizing UL 9540A data for the respective battery cell, module, racks, and BESS enclosure geometry. (6.6)

g All assumptions (e.g., number of cells undergoing thermal runaway, gas volume and release rates, enclosure geometry, etc.) are clearly stated in the report. (6.7)

h Specification of the deflagration panels and components deployed in the BESS shall be included within the report to ensure they match the recommendations/ calculated specifications from NFPA 68 calculations/simulations (to make sure the product uses the correct recommendations coming from the calculations/simulations). (6.8)

i Document and product design show consideration toward snow loading when using deflagration panels. (6.9)

Alternative Explosion Control Systems

j Third-party deflagration analysis or full-scale explosion test report demonstrating that the explosion control system(s) shall function as designed to adequately prevent a deflagration event. (6.10)

Acceptable forms of substantiating documentation include:

- Computational Fluid Dynamics (CFD) modeling
- Full-scale testing of respective BESS enclosure and constituent battery components demonstrating that a deflagration shall be effectively managed by the provided explosion control system(s).

k Deflagration analysis conducted utilizing UL 9540A data for the respective battery cell, module, racks, and BESS enclosure geometry. (6.11)

l All assumptions (e.g., number of cells undergoing thermal runaway, gas volume and release rates, enclosure geometry, etc.) are clearly stated in the report.(6.12)

m Specifications of the product deployed show that critical component specifications match the technical assumptions of the compliance report/simulation. (6.13)

7. O&M, BMS, and Installation Manuals Review

Having key safety features incorporated into the BESS specifications and design is only useful if those features work as intended in the field. Accordingly, the Peer Review Team will need to examine the relevant manuals pertaining to the proposed equipment to determine if the manufacturer has put in place suitable processes and instructions to ensure that key safety features and equipment are adequately installed, commissioned, and maintained.

All manuals should be provided to the Applicant by the BESS manufacturer and must be relevant to the proposed equipment (it is acceptable if the manual references a "family" or "class" of related model numbers, so long as the specific equipment proposed for installation is included). In addition, the manual available at the time of peer review must be the most recent version and should generally have a publication date in the past 12 months.

The team will review the manuals carefully to verify that hazards during the installation and operational phases are appropriately identified, described, and mitigated to support safety during all phases of the project. The manuals will also be checked for alignment with other key documents, such as the Hazard Mitigation Analysis (HMA) and Emergency Response Plan (ERP). In the event the team identifies any deficiencies in the manual, the Applicant may be prompted to request updates from the manufacturer, manufacturer-provided addenda to manuals, and/or evidence that Applicant has addressed such deficiencies via relevant contract documents, such as amendments to EPC or O&M agreements.

Peer Review Report Checklist Items for the O&M, BMS, and Installation Manuals Review

a Installation Manual for BESS and associated components shall be provided for corresponding model number. (7.1)

b Installation Manual includes safety instructions, including but not limited to descriptions of warning notices and symbols, handling precautions, environmental conditions for storage and operation, electrical hazards, access requirements, and safety gear requirements. (7.2)

c Installation Manual includes description of system configuration and components. (7.3)

d Installation Manual includes description of site preparation requirements including but not limited to electrical and civil work, transport and handling requirements, storage methods. (7.4)

e Installation Manual includes description of connections between components. (7.5)

f Installation Manual includes inspection checklist/criteria. (7.6)
PRT will be focusing on safety related aspects and expect manuals to provide guidance on setup, inspection, and commissioning of fire alarm panels, strobes, audible alarms, sensors, fire suppression systems, and other relevant subsystems. Furthermore, PRT will seek to confirm that known risk factors, such as leaking from liquid cooling systems, are adequately addressed in relevant pre-startup instructions.

g A BMS Manual shall be provided for corresponding model number.(7.7)
The BMS manual may be included in other technical manuals from the manufacturer but the key consideration for Peer Review is to determine that the Applicant has sufficient information

regarding BMS operations, monitoring points, sampling frequency, backup power capability, and resolution. This information is vital to crafting a functional ERP and identifying signs of potential hazards before the onset of a major thermal event. As such, PRT will confirm alignment between BMS capabilities and assumptions made in the HMA, ERP, and other key documents. For example, if the ERP relies on cell-level monitoring via the BMS with an operating timeframe of 24 hours on backup power but the BMS is only capable of such operation for 4 hours, that misalignment could put emergency personnel at risk and PRT would require such a shortfall addressed.

h An Operation and Maintenance (O&M) Manual shall be provided for corresponding model number.(7.8)

While many modern BESS are maintained by the system integrator via a long-term service agreement (LTSA), there can be a variety of reasons that the Applicant or a future owner might require a more detailed understanding of the O&M processes for the system (e.g., Integrator goes out of business, owner wishes to take over O&M activities). Furthermore, owner personnel and contractors may be required to operate the BESS for contractually required testing, de-energizing the system for relevant site work, or other activities and will require clear operating instructions. Finally, personnel performing the non-BESS O&M activities will need to have clearly denoted responsibilities. PRT will seek to ensure that O&M processes pay adequate attention to maintaining site safety features. This could include periodic testing, calibration, or replacement of sensors, checking/recharging fire suppression systems, or similar items. For general site O&M, the team will want to confirm that adequate attention is paid to vegetation management and maintaining suitable site access for emergency responders. Note that these requirements are reflected in relevant Fire Code requirements.

i The O&M shall include the Manufacturer's O&M for the entire energy storage system or for each component of the system requiring maintenance, that clearly identifies the required routine maintenance actions. (FCNYS 1206.9.2) (7.9)

j The O&M shall include the name, address, and phone number of a service agency that has been contracted to service the energy storage system and its associated safety systems. (FCNYS 1206.9.2) (7.10)

k The O&M shall include maintenance and calibration information, including wiring diagrams, control drawings, schematics, system programming instructions and control sequence descriptions, for all energy storage systems controls. (FCNYS 1206.9.2) (7.11)

l The O&M shall include desired or field-determined control set points that are permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions. (FCNYS 1206.9.2) (7.12)

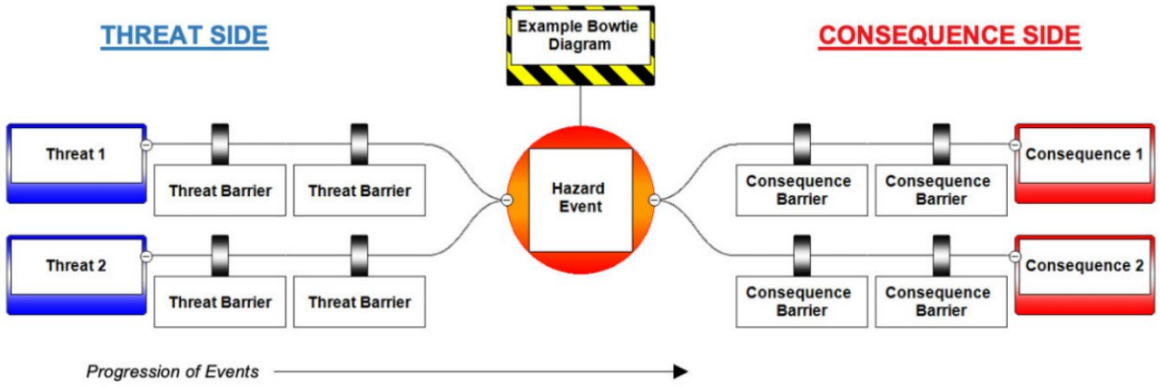
m The O&M shall include a schedule for inspecting and recalibrating all energy storage system controls. (FCNYS 1206.9.2) (7.13)

n The O&M shall include a service record log form that lists the schedule for all required servicing and maintenance actions and space for logging such actions that are completed over time and retained on site. (FCNYS 1206.9.2) (7.14)

8. Site-Specific Hazard Mitigation Analysis (HMA) Review

An HMA is a tool used to evaluate potential failure modes ahead of time so stakeholders can prepare for foreseeable issues. An HMA may be prepared by OEMs or consultants (or combinations thereof). If provided by OEMs, site-specific information may be required, as the HMA evaluates risks at nearby exposures. A generic, non-site-specific HMA will not be accepted. The Fire Code requires several potential failure modes to be evaluated. Consideration should be given to gas generation, as well as potential fire and explosion risk. Indoor BESS will likely require a more complex HMA.

Figure 6. Hazard Mitigation Analysis Bowtie Diagram



Guidelines and references for requirements related to an HMA can be found in NFPA 855 Section G.4, UL-9540A/UL-1973.

Peer Review Report Checklist Items for the HMA Review

a A failure modes and effects analysis (FMEA) or other approved hazard mitigation analysis shall be provided under any of the following conditions (FCNYS 1206.5, 2020): (8.1)

- Where energy storage system technologies not specifically identified in 1206.1 are provided.
- More than one energy storage system technology is provided in a room or enclosed area.
- The Installation exceeds 600 kWh for lithium-ion BESS, or maximum quantities established in FCNYS Section 1206.12.2.

b The hazard mitigation analysis shall evaluate the consequences of the following failure modes. Only single failure modes shall be considered (FCNYS 1206.5.1, 2020): (8.2)

- A thermal runaway condition in a single energy storage system rack, module, or unit.

Per NFPA 855, consequences of thermal runaway that should be considered in the HMA:

Heat generation
Off-gassing
Chemical gas release
Smoke/fire
Explosion/deflagration

- Failure of any energy storage management system.

  Some examples may include:

  Abnormal system operation
  Inability to shut system down
  Loss of system communications
  Lack of system control
  Compromised fault protections
  Lack of equipment environmental condition control

- Failure of any required ventilation or exhaust system.

  Examples of consequences of ventilation or exhaust system failures:

  Equipment damage/failure due to overheating
  Hinder/Prevent gas, smoke, and/or fire detection
  Potential gas build-up

- Voltage surges on the primary electric supply.

  BMS monitors and triggers protective actions as needed including potential system shutdown.

- Short circuits on the load side of the energy storage system.

  BMS monitors and triggers protective actions as needed including potential system shutdown.

  System design—passive circuit OCPD (fuses/breakers) interruption.

- Failure of the smoke detection, fire detection, fire suppression, or gas detection system.

  BMS transmits fault notification to Network Operations Center[7] *alerting owner to abnormal condition.*

  Data from BMS may be communicated to site personnel or provide guidance to the fire department in case of emergency.

  Failure beyond established safety threshold will trigger system shutdown.

- Required spill neutralization not being provided or failure of a required secondary containment system.

  Not Required for Li-ion batteries.

c Hazard mitigation analysis demonstrates the following: (FCNYS 1206.5.2) (8.3)

- Fires will be contained within unoccupied energy storage system rooms or areas for the minimum duration of the fire-resistance rated assemblies identified in Section 1206.14.4.
  Separation *shall be provided by 2 hour rated fire barriers constructed in accordance with Section 707 of the Building Code of New York State.*
  Separation *shall be provided by 2 hour rated horizontal assemblies constructed in accordance with Section 711 of the Building Code of New York State.*
- Fires in occupied work centers will be detected in time to allow occupants within the room or area to safely evacuate.

[7] This requirement was adopted in the 2025 Fire Code of New York State and will go into effect on January 1, 2026.

Toxic and highly toxic gases released during fires will not reach *concentrations* in excess of OSHA-regulated IDLH levels in the building or in adjacent means of egress routes during the time deemed necessary to evacuate occupants from any affected area.

OSHA IDLH Table

- Flammable gases released from energy storage systems during charging, discharging, and normal operation will not exceed 25 percent of their lower flammability limit (LFL).
- Flammable gases released from energy storage systems during fire, overcharging, and other abnormal conditions will be controlled through the use of ventilation of the gases preventing accumulation or by deflagration venting.

9. Site-Specific Emergency Response Plan (ERP) Review

A site-specific Emergency Response Plan (ERP) must be submitted for all BESS projects, with a physical copy of the ERP provided in a lockbox at a safe location at the project site once constructed (generally on the exterior of the primary gated entrances, such that first responders are able to access without entering the project fence line). The ERP should provide concise information to first responders about the overall project and equipment located on-site, BESS technology and all associated fire protection features, key emergency contacts, general hazards associated with lithium-ion BESS, site-specific hazards which may exist, as well as procedures and best practices for responding to an incident on-site.

There are many examples of ERPs available from various sources (e.g., NFPA 855[8], ACP, etc.), though Applicants are encouraged to engage a knowledgeable entity in preparing the ERP and conducting associated trainings, as much of the content is specific to fire safety practices.

Important Notes:

Two ERP versions shall be required for submission during the overall project review process:

- Draft "as-designed" ERP – submitted during Peer Review phase
- Final "as-built" ERP – to be submitted once the project is substantially complete and prior to NYSERDA's QA inspection. It should be ensured that all equipment, layouts, emergency contacts, and communications protocols are in place and accurately documented in this version.

Annual ERP updates shall be required to be submitted to NYSERDA over the course of the project lifetime, which shall account for any material changes to equipment (e.g., augmentations, replacements, etc.) or changes in communications protocols (e.g., emergency contacts, Central Station or NOC operators, etc.).

The ERP must be site-specific and include all major reference materials that emergency personnel may require to notify key personnel, disconnect major equipment from utility power, assess risks associated with incident response, and control the scene.

[8] Section 11 of Annex G in the 2023 edition of NFPA 855

Significant input will likely be required from the OEM but site details (access points, contact information, passwords, lockbox combinations, etc.) will also be required for a complete ERP. Some manufacturers provide documents that meet many of these requirements but lack important site-specific details and such general documents will not be accepted as ERPs by the Peer Review Team.

There are many examples of ERPs available from various sources and the NFPA 855 Standard offers reasonable general guidance but Applicants are encouraged to engage a knowledgeable entity in preparing the ERP and conducting associated trainings, as much of the content is specific to fire safety practices. The ERP should balance depth with clarity, as it will be the primary document used by emergency personnel in the initial hours of a response action.

Peer Review Report Checklist Items for the ERP

- **a** Location and layout diagram of the room or area in which the BESS is to be installed is shown (9.1)
- **b** Details provided on fire-resistant-rated assemblies provided or relied upon in relation to the BESS (9.2)
- **c** Quantities and types of BESS units included (9.3)
- **d** Manufacturer's specifications, ratings and listings of BESS included (9.4)
- **e** Description of energy storage management systems and their operation included (9.5)
- **f** Location and content of required signage is shown (9.6)
- **g** Details provided on fire suppression/protection, smoke or fire detection, gas detection, thermal management, ventilation, exhaust, and deflagration venting systems, if applicable(9.7)
- **h** Support arrangement associated with the installation, including any required seismic support is provided (9.8)
- **i** Site location included (9.9)
- **j** Site address included (9.10)
- **k** Entrance address included (9.11)
- **l** Access control information included(9.12)
- **m** Utility disconnect location included (9.13)
- **n** Map of site included (9.14)
- **o** Nearest hospital name and address included (9.15)
- **p** Emergency contact (title, name, phone number for each) included (9.16)
- **q** Emergency operation coordinator included (9.17)
- **r** Owner representative/project manager included (9.18)
- **s** Emergency operation contractor included (9.19)
- **t** O&M contractor included (9.20)
- **u** Site manager included (9.21)
- **v** Equipment summary (V, kW, kVA, brand, model, quantity) included for BESS rack, BESS converter, and Inverter (9.22)
- **w** Picture of BESS container provided, indicating container type, exterior accessibility and auxiliary equipment (9.23)

x Date of ERP included (9.24)
y Training requirements included (9.25)
z Potential hazards identified (9.26)
aa Risk mitigation measures included (9.27)
bb Emergency scenarios and procedures included (9.28)
cc System shutdown and isolation procedures included (9.29)
dd Building evacuation plan and emergency exits included (9.30)
ee Communication protocols included (9.31)
ff Post-emergency actions included (9.32)
gg Re-entry criteria and procedures included (9.33)

10. Site-Specific Safety Training Plan Review

Supplemental to ERP, Applicants must provide training to emergency response and operations personnel. Ideally, Applicant will submit a copy of planned presentation materials and engagement strategy for review, but alternative deliverables may be considered at Peer Reviewer and NYSERDA discretion.

Safety training should cover the following topics:

- Site layout and orientation
- Hazards associated with the BESS
- BESS Safety protocols
- Job Hazard Identification
- Rules for site access (badging, sign in/out, NOC call, etc.)
- Key contact information including contracting documents and contact information for qualified hazard mitigation personnel
- Location of relevant medical facilities
- PPE requirements
- Overview and location of key documents, such as the ERP

Peer Review Report Checklist Items for Site-Specific Safety Training Plan Review

a Training contents align with site-specific ERP (10.1)

The training is meant to supplement the ERP and provide a visual/hands-on version of largely the same information. Therefore, PRT will be assessing for consistency between the two documents. Ideally, the training will reference the ERP throughout.

b Training is specific to project, equipment, and site (10.2)

PRT frequently receives feedback that trainings are overly general. The Applicant is encouraged to prepare training that uses a combination of classroom and in-field elements so that the relevant personnel receive both the necessary theoretical and technical information but also have the opportunity to walk the site with the trainer and visually confirm the locations of key equipment, walk through disconnecting and equipment isolation methods, identify access points, and similar items. This should not be an "off the shelf" presentation from the manufacturer, though such details can be included as part of a broader training program.*

The 2025 FCNYS addresses first responder training with the following language:* ***1207.13.1 First responder site familiarization**. ESS owners shall provide an annual site visit and review of the pre-incident plan developed in accordance with section 1207.13 of this code to the local fire department.*

c Addresses response strategies and is targeted to first responders in accordance with Appendix G of 2023 NFPA 855 (10.3)

Though the training can provide some general background, the focus should be on supporting first responders, O&M staff, and other personnel during an emergency response situation.

d Spill containment and toxic gas mitigation documented (10.4)

This portion of the training material should align with the HMA and ERP and include details on when and how environmental monitoring may be required.

e Site evacuation and re-entry procedures included (10.5)

For indoor BESS installations only, the training should provide necessary steps and conditions for the safe and orderly removal of personnel from the building. This may include, but not be limited to, building staff key contact(s), emergency exits, and muster points. Note this is not required for outdoor BESS without permanent onsite staff.

f Site de-energization and equipment isolation procedures addressed (10.6)

g Includes guidance on site hazards during normal operation (10.7)

h Training includes on-site components to orient attendees (10.8)

i Training includes information (including relevant websites, passwords, and other details) on accessing project data and monitoring platforms to facilitate data-driven emergency response (10.9)

j Emergency contact information provided (10.10)

k Training is, to the extent practical, recorded and provided to local authorities to facilitate orientation of new personnel (10.11)

The Applicant should provide a brief narrative describing how the training will be delivered, recorded, and maintained.

l Training recipients and dates are tracked and made available to local officials for recordkeeping purposes (10.12)

The Applicant may wish to provide the local Fire Department with a simple log, or equivalent means, for the Department to document trainee name, training date, and other relevant details. This may vary by Department and situation, so Applicant should provide a brief summary of how these records will be maintained.

m Provision included for updated/refresher trainings on an annual basis, if requested by the relevant local authorities (10.13)

The Applicant is encouraged to codify responsibility for updated trainings within relevant contract(s) with O&M contractor, BESS integrator, or other appropriate parties and to reference that contract language here. In the event the Applicant intends to do this in-house, please provide a brief narrative explaining how training updates can be requested and provided.

Commissioning Plan Review

Most OEMs will be able to provide a template commissioning plan as an exhibit to the Supply Agreement, but this will need to be updated to reflect site-specific information.

Note that completing a proper Commissioning Plan may require combining commissioning plans from several OEMs (e.g., BESS OEM, inverter OEM, transformer OEM). Submitting a Commissioning Plan that does not include all equipment or is not site-specific will not be sufficient for Peer Review.

11. Peer Review Report Checklist Items for Commissioning Plan Review

- **a** A narrative description of the activities that will be accomplished during each phase of commissioning including the personnel intended to accomplish each of the activities. (FCNYS 1206.9.1) (11.1)
- **b** A listing of the specific energy storage system and associated components, controls and safety related devices to be tested, a description of the tests to be performed and the functions to be tested. (FCNYS 1206.9.1) (11.2)
- **c** Conditions under which all testing will be performed, which are representative of the conditions during normal operation of the system. (FCNYS 1206.9.1) (11.3)
- **d** Documentation of the owner's project requirements and the basis of design necessary to understand the installation and operation of the energy storage system. (FCNYS 1206.9.1) (11.4)
- **e** Plan for the verification that the required equipment and systems are installed in accordance with the approved plans and specifications. (FCNYS 1206.9.1) (11.5)
- **f** Integrated testing plan for all fire and safety systems. (FCNYS 1206.9.1) (11.6)
- **g** Testing plan for any required thermal management, ventilation or exhaust systems associated with the energy storage system installation. (FCNYS 1206.9.1) (11.7)
- **h** Plan for delivery of operation and maintenance documentation. (FCNYS 1206.9.1) (11.8)
- **i** Training plan for facility operating and maintenance staff. (FCNYS 1206.9.1) (11.9)
- **j** Identification and documentation of the requirements for maintaining system performance to meet the original design intent during the operation phase. (FCNYS 1206.9.1) (11.10)

k Identification and documentation of personnel who are qualified to service and maintain the energy storage system, and respond to incidents involving the energy storage system, including documentation that such service has been contracted for. (FCNYS 1206.9.1) (11.11)

12. Decommissioning Plan Review

Peer Review Report Checklist Items for Decommissioning Plan Review

a Description of BESS size and quantity, structure, system, and components to be decommissioned included (12.1)
b Enclosure and facility type included (12.2)
c Weight of components included (12.3)
d Salvage material listed (12.4)
e Roles and responsibility of the decommissioning process included (12.5)
f Plan and specification necessary to understand BESS operation, control, and safety system included (12.6)
g Detailed description of each activity to be conducted during the decommissioning process included (12.7)
h Plan to notify the authority having jurisdiction prior to energy storage system decommissioning included. (12.8)
i Details on providing a safe and orderly shutdown of the energy storage system included (FCNYS 1206.9.3). (12.9)
j A narrative description of the activities to be accomplished for removing the energy storage system from service and from the facility in which it is located is included (FCNYS 1206.9.3).(12.10)
k A listing of any contingencies for removing an intact operational energy storage system from service and for removing an energy storage system from service that has been damaged by a fire or other event included (FCNYS 1206.9.3).(12.11)
l Instructions for site decommissioning (or partial decommissioning) after a thermal event are provided and sufficiently safeguard personnel safety.(12.12)

8. Frequently Asked Questions

Table 4. Frequently Asked Questions

Question	Answer
I have shown my PRR to my AHJ or other external party and they have some questions and may want some updates to the Report. What do I do?	For AHJ follow-up questions on the peer review report, please email NYSERDA's Clean Energy Siting Team at cleanenergyhelp@nyserda.ny.gov; for all other inquiries, please email NYSERDA's Energy Storage team at energystorage@nyserda.ny.gov
My project is at an early stage and I need help putting a good Application together for the PRP. Can I get help from the PRT on that?	Project applicants seeking design consultants should procure such services independently prior to submitting project documents to the PRP.
I disagree with my Peer Reviewer's findings. How can I appeal a Peer Review Report?	If any deficiencies are identified, the Peer Reviewer will share the PRP with the applicant, giving them an opportunity to respond and provide corrective actions before finalizing the report. Project applicants with outstanding objections from PRT will not be eligible for incentive funding
I have completed a Peer Review for my project already. Do I need to still go through NYSERDA's process?	The PRT will review the peer review report and assess completeness.

9. Example Templates

9.1 Cover Letter Templates

[Date]

NYSERDA
Peer Review Team
17 Columbia Cir
Albany, NY 12203

Cover Letter for Application [application ID]; BESS at [address]

[*Applicant*] is intending to install a [*X kW/ X kWh*] lithium-ion based battery energy storage system (BESS) at [*address*] with an intended AC power capacity of [*kW*] and [*h*]-hour duration at POI. The BESS facility, known as [*insert BESS facility name*] will be used for [*please insert intended use cases*]. This cover letter provides high level details on the project.

General System Properties and Description

The proposed BESS facility will contain:

- [number of enclosures] of [BESS product type], model number [insert model number]
  - The BESS will utilize [*LFP/NMC*]- type cells, model number [*insert model number*]
- [number] of [inverter product type], model number [insert model number]

In this section, please describe the following additional information:

- *What the BESS and inverters are mounted on/how they are mounted*
- *How the equipment is interconnected and where the cables are run*
- *Where the POI is and how the equipment will be connected*

The key organizations involved in the proposed project are:

- Developer: [Developer name and address]
- Owner: [Owner name and address]
- Operator: [Operator name and address]
- Construction (EPC): [EPC name and address]
- Supporting Parties (if any): [Supporting parties]

Site Location and Access

In this section, please describe where the procured property for the project is located. Please include any nearby exposures within 100 ft of the property or within 100 ft of the proposed BESS location on the property. Additionally, please describe the security features of the site (fence, security cameras, CMU fire walls, impact protections, etc.).

System Monitoring

In this section, please describe how the BESS facility will be monitored for faults and failures and how that information will be relayed to emergency personnel.

Explosion Protection and Prevention System

In this section, please provide a brief description of the methodology and design for the explosion protection and prevention system. Furthermore, please indicate whether the adopted methodologies have been validated by an independent party.

Emergency Shutdown and Response

In this section, please describe any emergency shutdown procedures for the BESS including location of E-Stops and/or Fire Department Connection (FDC) panels. Please describe[9] evacuation procedures for any onsite personnel and general guidance for emergency personnel including firefighting techniques (let it burn, water spray on adjacent containers, etc.) and minimum approach distances for personnel.

Community Engagement to Date

In this section, please describe (bullet points are acceptable) engagement with the AHJ, emergency services, and the community to date.

Required Document Checklist

As a part of this application, the following documents have been included in the submittal package for Peer Review Team review and approval.

Table 5. Required Documents Checklist

Document Number	Document Name	Requirement Reference Section*	✓
1	Cover Letter	2	
2	Zoning Approval Letter		
3	Summary of AHJ communications		
4	Permitting Matrix		
5	Design Drawings: Electrical	3	
6	Design Drawings: Civil	3	

[9] Language taken directly from the project's emergency response plan will suffice.

7	Design Drawings: Mechanical	3	
8	Design Drawings: Fire Suppression	3	
9	Design Drawings: Fire alarm	3	
10	UL 9540A test report: cell	5	
11	UL 9540A test report: module	5	
12	UL 9540A test report: unit	5	
13	UL 9540A test report: installation (if applicable)	5	
14	Manual: BESS Installation	6	
15	Manual: Operations and Maintenance	6	
16	Manual: BMS	6	
17	Hazard Mitigation Analysis	7	
18	Site-Specific Emergency Response Plan	8	
19	Site-Specific Safety Training Materials	9	
20	Explosion Control Technical Reports as applicable NFPA 68: Explosion protection and/or NFPA 69: Explosion prevention	10	
21	Commissioning Plan	11	
22	Decommissioning Plan	12	
23	UL 9540 listing and full report	3	
24	UL 1973 listing and full report	3	
25	UL 1741 listing and full report	3	

26	Specification Sheet: Cell	3	
27	Specification Sheet: BESS	3	
28	Specification Sheet: PCS	3	
29	Specification Sheet: Fire Protection System	4	
30	Specification Sheet: FACP	3	
31	Specification Sheet: EMS/ESMS	3	
32	Specification Sheet: Site Controller (if applicable)	3	
33	24/7 Monitoring/Central Station Agreement(s)		
34	Central Station Listing and Certifications		

***Reference Section refers to the corresponding section in the Guidebook where more information on the Document's requirements can be found.**

Should any questions come up during the Peer Review Process, please contact:

[Applicant Name, email, phone number]
[Applicant Company]
[Company Address]

State of New York
Kathy Hochul, Governor

New York State Energy Research and Development Authority
Charles Bell, Acting Chair | Doreen M. Harris, President and CEO