NEW YORK STATE

DEPLOYING SAFE LITHIUM-ION ENERGY STORAGE IN YOUR COMMUNITY

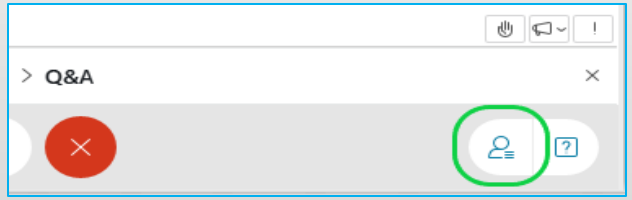
PRESENTED BY:
NEW YORK STATE INTER-AGENCY FIRE SAFETY WORKING GROUP

MAY 7TH, 2025

Meeting Procedures

Before beginning, a few reminders to ensure a smooth discussion:

- Today's webinar is being recorded
  - A copy of the recording and presentation slides will be available on NYSERDA's Inter-Agency Fire Safety Working Group webpage: https://www.nyserda.ny.gov/All-Programs/Energy-Storage-Program/New-York-Inter-Agency-Fire-Safety-Working-Group
- Attendees will be muted upon entry



Questions:

- Questions may be submitted in writing through the Q&A feature. Questions will be answered at the end of the presentation.

If technical problems arise, please contact John.Necroto@nyserda.ny.gov

AGENDA

1. Webinar Participant Introduction
2. Introduction to Battery Energy Storage Systems (BESS)
3. NYS Inter-Agency Fire Safety Working Group (FSWG) Overview
4. National Standards for Battery Energy Storage Systems (BESS)
5. Safeguarding Energy Storage Systems
6. Additional Resources
7. Q&A

INTER-AGENCY FIRE SAFETY WORKING GROUP WEBINAR PARTICIPANTS

- **New York State Energy Research and Development Authority (NYSERDA)**
  - David Sandbank, Bill Oberkehr, Camille Warner, Jen Manierre
- **Division of Homeland Security and Emergency Services (DHSES)**
  - **Office of Fire Prevention and Control (OFPC)**
  - Chief Jim Cable, Chief Luci Labriola-Cuffe
- **Department of Public Service (DPS)**
  - Jessica Waldorf, Marco Padula
- **Department of State (DOS)**
  - John Addario, Chad Sievers
- **Department of Environmental Conservation (DEC)**
  - Patrick Foster
- **Energy Safety Response Group (ESRG)**
  - Paul Rogers, Mike Bowes, Nick Petrakis, Derric Meister

INTRODUCTION TO BATTERY ENERGY STORAGE SYSTEMS

POWERING NEW YORK'S CLEAN ENERGY FUTURE WITH ENERGY STORAGE

Energy storage acts like a giant battery for the electric grid. It stores excess electricity — like solar power on sunny days — and delivers it when it's needed most, such as in the evening or on hot days with high air conditioning use.

- Statewide Energy Storage Target: **6,000 MW by 2030**
- Current deployed in New York State: **450 MW**
- International deployment: **120,000 MW**
- Current pipeline in New York State (NYSERDA + Utility): **697 MW**

NYSERDA Support & Funding
~$1.6 billion in market acceleration bridge incentives — available for both **retail and bulk** storage systems

TYPES OF BATTERY ENERGY STORAGE SYSTEMS (BESS)

Residential

Commercial

Utility

Behind-the-meter
“Customer-side”

Front-of-the-meter
“Utility-side”

APPLICATIONS FOR BESS: EXAMPLES BY SECTOR

Residential and Commercial

- **Backup Power** → Power availability during outages
- **Demand Charge Reduction and Time-of-Use Bill Management** → Shift consumption to save money during periods of high demand

Transmission and Distribution Grid Services (Utility)

- **Distribution and Transmission Deferral:** Defer costly upgrades to utility infrastructure and contribute to emissions reduction.
- **Energy Arbitrage:** Charge when costs/demand are low, discharge when high.
- **Frequency Regulation:** Energy storage systems can respond almost instantaneously to fluctuations in grid frequency, stabilizing the system and maintaining the balance between generation and consumption.
- **Black Start:** Help large generators come online following system failure.
- **Energy Reserves:** Dispatch energy as needed to ensure that grid supply equals electric demand.
- **Spinning Reserve Replacement:** Storage systems can act as a “spinning reserve,” providing quick-start capabilities to support the grid when there’s an unexpected loss of generation or a surge in demand.

BATTERY ENERGY STORAGE SYSTEMS (BESS)

Battery energy storage can comprise a variety of different electrochemical makeups:

- **Lithium Ion**
- Lead Acid
- Nickel-Based
- Flow Batteries

BESS building blocks:

- Cells
- Modules
- Racks

BATTERY ENERGY STORAGE SYSTEMS (BESS)

	Lead Acid	Sodium-Sulfur	Flow Batteries	**Lithium-Ion**
Efficiency	70-85%	70-80%	60-80%	**85-95%**
Typical duration	2-6 hours	6-8 hours	4-12 hours	**0.25-4 hours**
Cost	Moderate	Moderate	Moderate	**Low**
Space required	Large	Moderate	Moderate	**Small**
Cycle life	500-2,000	3,000-5,000	5,000-8,000+	**2,000-6,000+**
Technology maturity	Commercial	Commercial	Early-moderate	**Commercial**

BATTERY MANAGEMENT SYSTEM (BMS)

- Monitors each individual cell within the system
  - Capable of monitoring thousands of data points per second
- Will alarm if there are potential issues
- If required, can isolate affected cells or modules from the total system and activate fire protection systems, preventing further failure

Safety Features

- Cell balancing and monitoring
- Thermal management
- Overcharge and over-discharge protection
- Fault diagnosis and reporting

PERMITTING BATTERY ENERGY STORAGE SYSTEMS

In New York State the permitting process varies based on size and whether system is paired with generation.

- **Paired with Renewable Generator < 25 MW:**
  Permitted at local level (State Environmental Quality Review (SEQR), municipal/county requirements)
- **Paired with Renewable Generator > 25 MW:**
  Permitted at State level (Article 10, Office of Renewable Energy Siting and Electric Transmission (ORES)
- **Standalone System, < 80 MW:**
  Permitted at local level (SEQR, municipal/county requirements)
- **Standalone Systems > 80 MW:**
  Subject to licensing by the Public Service Commission (PSL §68) and SEQR (other State and local municipal reviews/approvals may apply)

NEW YORK STATE INTER-AGENCY FIRE SAFETY WORKING GROUP (FSWG) OVERVIEW

NYS INTER-AGENCY FIRE SAFETY WORKING GROUP

In July 2023, in response to fires in **Warwick, Chaumont, and East Hampton**, Governor Hochul convened an Inter-Agency Fire Safety Working Group (Working Group).

Agency Participants

- Division of Homeland Security and Emergency Services (DHSES)
- Office of Fire Prevention and Control (OFPC)
- New York State Energy Research and Development Authority (NYSERDA)
- Department of Environmental Conservation (DEC)
- Department of Public Service (DPS)
- Department of State (DOS)

Working Group Partners

Highly specialized Subject Matter Experts (SME), National Labs, Long Island Power Authority, and New York Power Authority.

Tasks include:

- Collect and assess air/soil/water testing data, review emergency response actions and data, and examine Root Cause Analyses.
- Review existing codes, standards, and regulations, and develop recommendations for revisions/enhancements.
- Field inspections of in-service BESS fleet.

NYS INTER-AGENCY FIRE SAFETY WORKING GROUP

Learning Together: How Conversations Outside Our Core Team Shaped Our Work

1. **Energy Storage Developers and Industry Support Professionals**: Project developers, system monitoring specialists, product manufacturers, trade groups, design review and inspection professionals, etc.
2. **National Labs**: Pacific Northwest National Laboratory, Sandia
3. **Other States**: California regarding Moss Landing, Massachusetts regarding siting and safety
4. **Insurance Companies**: What do insurance providers require regarding fire hazard and safety measures
5. **Finance Partners**: Increased scrutiny from tax equity partnerships – financiers require technical diligence at the *product* level and the *project* level
6. **FDNY**: Peer review process, central command process, inspection process
7. **Local Governments**: Local concerns, emergency service concerns, knowledge and education gaps, etc.
8. **Underwriters Laboratories (UL):** Fire testing and equipment listings

NYS INTER-AGENCY FIRE SAFETY WORKING GROUP

Working Group Milestones

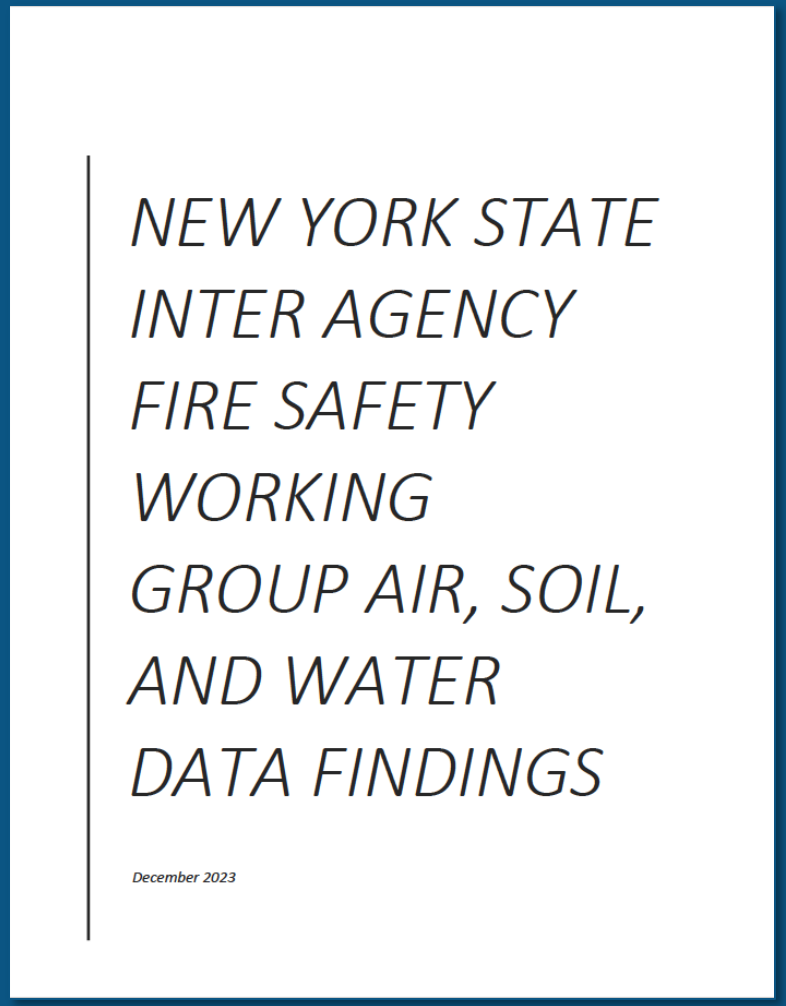
1. Release preliminary Air, Soil, and Water **Data Findings** Report. No reported injuries, no detected harmful levels of contaminants linked to the fires. *Issued December 2023*
2. Issuance of final **Fire Code Recommendations** for NYS Uniform Code. Resulted in 11 recommendations for large, grid-scale systems. Draft code language to reflect the recommendations now incorporated into the Notice of Proposed Rule Making. *Issued March 2025*
3. Field Inspections and Quality Assurance – inspected 57 in-service projects with SME collaboration resulting in an enhanced NYSERDA inspection process. *Completed Dec 2024*
    - *Through lessons learned, incorporated peer review into NYSERDA program*
4. Field inspection summary report outlining findings and improvements. Q2 2025
5. State-wide Webinar for local communities. Q2 2025
6. Accessing and examining Root Cause Analyses.
7. Compiling all preliminary working group findings, data, and other relevant materials and send to National Labs to review.

1) MILESTONE DELIVERIES TO DATE: DATA FINDINGS

December 2023

Issuance of preliminary **Air, Soil, and Water Data Findings Report**

- 500+ page report detailing available air, soil, and water sampling/monitoring data from the three fire incident sites
- Identified no reported injuries and no harmful levels of contaminants associated with the fires



2) MILESTONE DELIVERIES TO DATE: FIRE CODE RECOMMENDATIONS

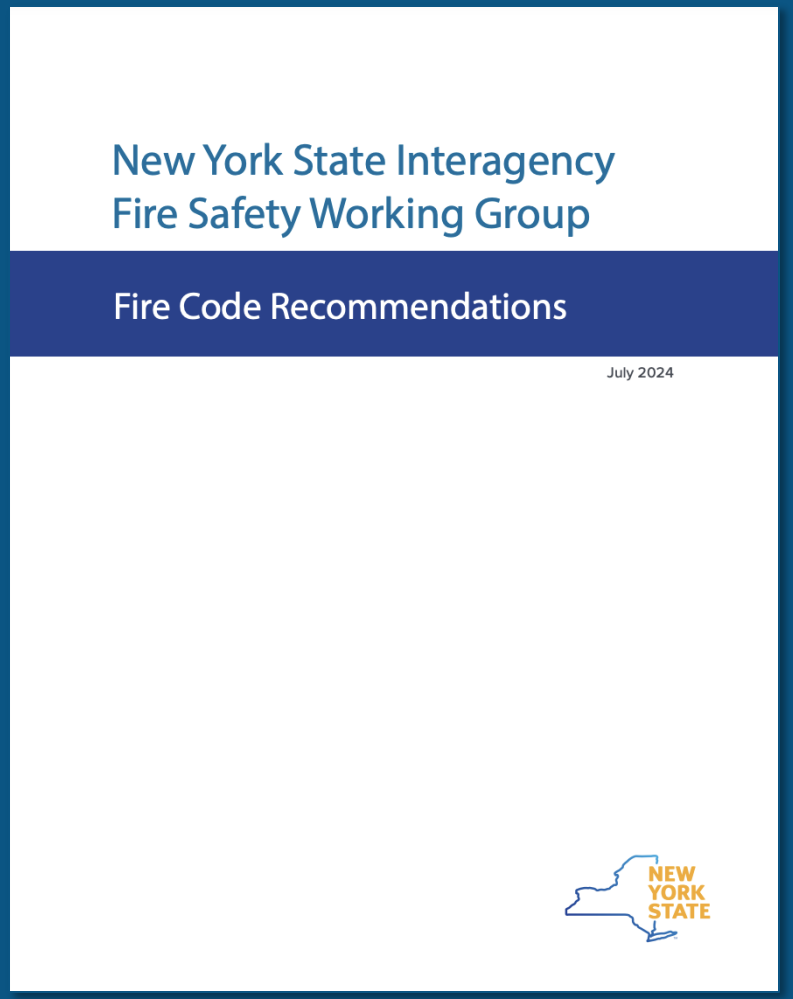
July 2024

Issuance of final **Fire Code Recommendations Report** and Notice of Rule in Development for the NYS Uniform Code

Report includes 11 recommendations across three categories for large, grid-scale systems.

- Fire Code Updates
- Fire Code Additions

Draft code language to reflect the recommendations have been incorporated into the **Notice of Proposed Rule Making** released March 2025.

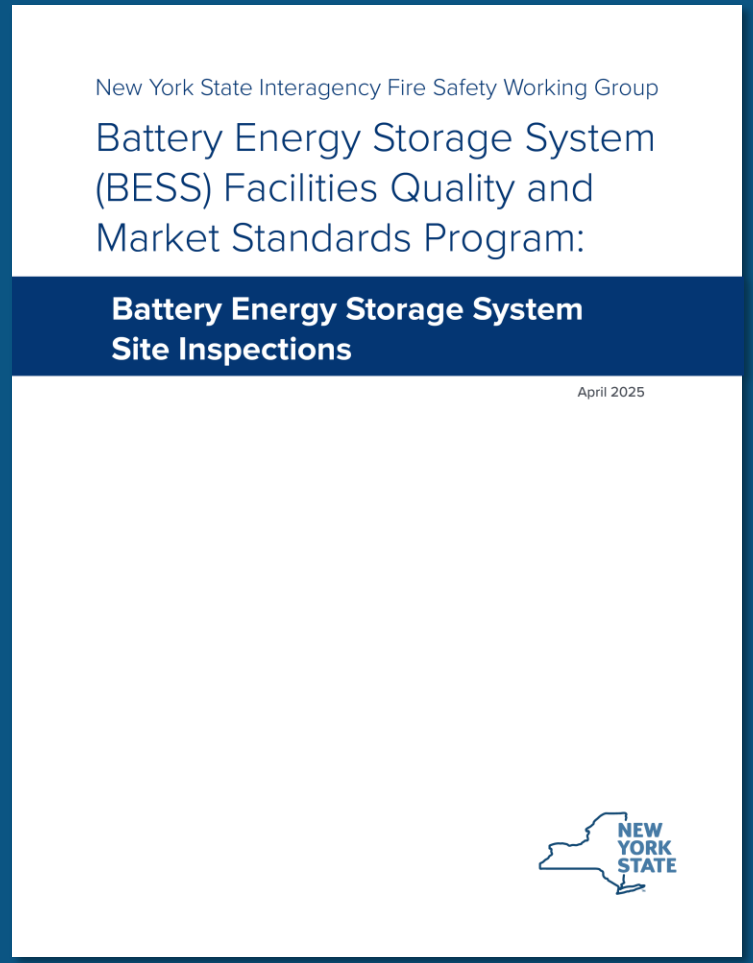


3) MILESTONE DELIVERIES TO DATE: FIELD INSPECTIONS

NYSERDA's BESS inspection program has significantly evolved since the establishment of the Working Group, with the Quality Assurance team conducting **57 in-field inspections** of in-service battery storage facilities 300 kWh and greater, leading to enhanced facility oversight, inspection process, and code recommendations.

Lessons learned and actions taken:

- Code recommendations resulting from inspection process:
  - Periodic third-party inspections, remote system monitoring
  - Enhanced signage, central station monitoring, and video monitoring
- Additions to incentive program rules:
  - Peer review for all projects
  - Required first-responder focused Emergency Response Plans for all projects
  - Required site-specific first responder training for all projects
- **Expanded checklist** of items to inspect



3A) NYSERDA PEER REVIEW LAUNCH

THE PROBLEM WE FACED

Local AHJs need better support to properly review energy storage projects

WHAT WE ARE DOING ABOUT IT

Peer reviews are thorough design reviews to ensure code compliance and they are now a **requirement for all NYSERDA-funded projects**

- Three nationally renowned expert firms are contracted to conduct peer reviews on behalf of NYSERDA.
  - **Camelot Energy Group** – Seasoned renewable industry engineering professionals with deep energy storage experience
  - **DNV** – Energy storage fire safety experts who perform peer reviews on behalf of NYC Dept. of Buildings and others
  - **ESRG** – Energy storage fire safety experts consisting of former first responders and engineers

PROCESS AND RESULT

- Peer reviewers looking for compliance with FCNYS, NEC, and other applicable standards.
- Peer reviewers will work on project plans with applicant until approved and then produce a report and approval letter for applicant to pass on to the local government.

NATIONAL STANDARDS FOR BESS

2020 FIRE CODE: UL 9540 EQUIPMENT LISTING

- All systems listed in accordance with **UL 9540** "Standard for Energy Storage Systems and Equipment."
  - This is an equipment listing, not a field verification or test method
  - Products that received UL 9540 equipment listing in mid-2020 or later have undergone UL 9540A testing
- UL 9540 Standard certifies that all components of the system work safely in harmony together.
  - Chargers, inverters, cells, and energy storage management systems covered as part of UL 9540 listing and listed separately
- Inverters for utility interactive systems listed under UL 1741.
- Non-identical repairs are considered retrofits.

2020 FIRE CODE: LARGE-SCALE FIRE TEST (UL 9540A)

What is UL 9540A?

- A performance test method (**not** a certification program) to evaluate fire characteristics of a BESS that undergoes thermal runway
- Data can inform product design for hazard mitigation mechanisms
- Data can inform installation parameters (separation distances, ventilation requirements, etc.)
- UL 9540A test is designed to provide product level data to inform code official decisions

What products utilize UL 9450A?

- It is required by the Fire Code (600kWh or greater)
- May be used for fire code official to approve exceptions to certain requirements

2020 FIRE CODE: UL 9540A TESTING

- Developed to better understand safety risks and demonstrate compliance with codes and standards
- Testing performed at multiple levels of BESS
- Test results will inform system design and installation requirements:
  - Fire mitigation and protection
  - Ventilation
  - Incident management

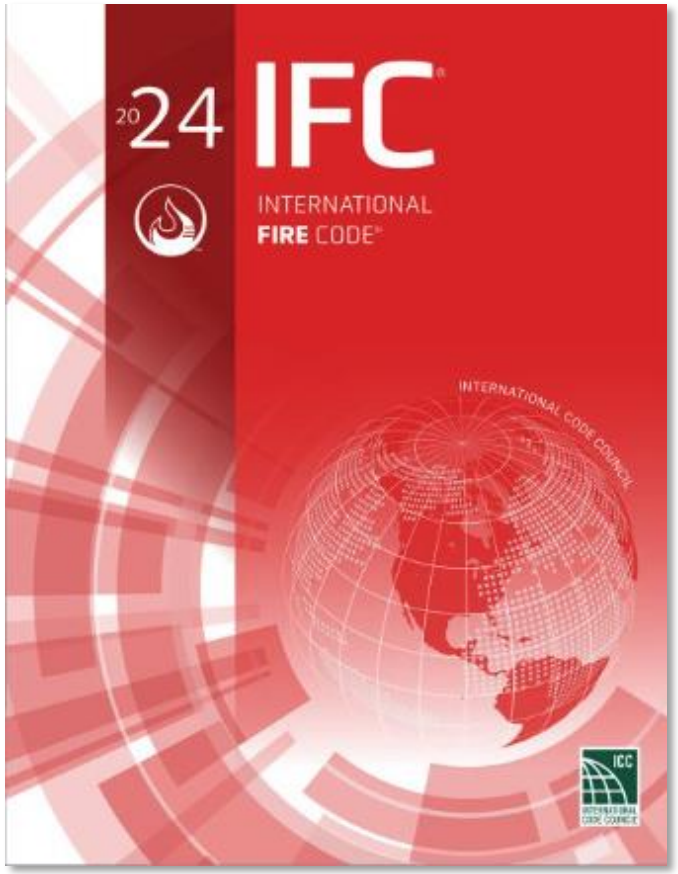
Level	Testing Hierarchy
Cell 	• Can cell exhibit thermal runaway • Thermal runaway characteristics • Flammability/composition of vent gas
Module 	• Thermal runaway containment/characteristics • Flammability/composition of vent gas • Heat and gas release rates
Unit 	• Evaluation of fire/thermal runaway spread • Heat and gas release rates • Deflagration and re-ignition behavior
Installation 	• Effectiveness of fire protection systems • Heat and gas release rates • Deflagration and re-ignition behavior

CODES AND STANDARDS

- **UL 9540:** “Standard for Energy Storage Systems and Equipment” certifies that all components of the system work safely in harmony together
- **UL 1741:** Inverters for utility interactive systems listed for use with distributed energy resources
- **UL 9540A:** Test method to evaluate system safety pertaining to thermal runaway

- **International Fire Code** (IFC) Chapter 1207, Energy Storage Systems
  - This is the basis for 2020 FCNYS section 1206 and section 1207 of the current draft fire code

- **NFPA 12** – Standard on CO_2 Extinguishing Systems
- **NFPA 13** – Standard for the Installation of Sprinkler Systems
- **NFPA 15** – Standard for Water Spray Fixed Systems for Fire Protection
- **NFPA 68** – Standard on Explosion Protection by Deflagration Venting
- **NFPA 69** – Standard on Explosion Prevention Systems
- **NFPA 70** – National Electric Code (NEC)
- **NFPA 72** – National Fire Alarm and Signaling Code
- **NFPA 750** – Standard on Water Mist Fire Protection Systems
- **NFPA 855** – Standard for the Installation of Stationary Energy Storage Systems*
- **NFPA 1142** – Standard on Water Supplies for Suburban and Rural Firefighting
- **NFPA 2001** – Standard on Clean Agent Fire Extinguishing Systems
- **NFPA 2010** – Standard for Fixed Aerosol Fire-Extinguishing Systems



SAFEGUARDING ENERGY STORAGE SYSTEMS

CURRENT REGULATIONS ARE SUFFICIENT WHEN ENFORCED

All electrical infrastructure and devices carry inherent fire hazards, which are addressed through codes, standards, and regulations

New York's current regulations are based on 2021 International Fire Code (IFC)

These codes contain strong regulations and need to be adequately enforced by AHJs to be effective. International Code Council updates typically happen in triennial cycles. NYS Code Council currently working to modify and adopt 2024 IFC.

Fire Safety Working Group recommendations align with '24 IFC and '23 NFPA 855 or go beyond those standards

The draft updated to the Uniform Code incorporates '23 NFPA 855 in its entirety

1) PEER REVIEWS

Peer Review is Allowed but Not Required in Current Fire Code

- The 2020 Fire Code (Sec. 1206.8) gives AHJs the **option** to require peer review but does **not mandate** it.
- When required, the **BESS owner must hire and fund** a qualified design professional or special expert.
- **Special experts** must have the necessary credentials to evaluate the safety and risks of BESS systems.

Recommendation - Make Peer Reviews Mandatory

- Many AHJs lack the **technical capacity** to assess complex BESS permit documents — especially UL 9540A reports.
- This gap has led to **incomplete or insufficient applications** that don't fully meet Fire Code requirements.
- **FSWG Recommendation** — Require peer review for **all BESS installations** above FCNYS Table 1206.1 thresholds.

NYSERDA contracted with nation-leading subject matter experts to conduct peer reviews for all new projects through the energy storage incentive program

2) FIRE MITIGATION PERSONNEL

Current 2020 Fire Code 1206.7.1

- **Where required by the AHJ,** BESS owner shall dispatch fire mitigation personnel to respond to possible ignition or re-ignition of a damaged BESS.
- On-duty fire mitigation personnel shall have the following responsibilities:
  - Fire watch
  - Notify FD if a fire occurs
  - Maintain until decommissioning is finished
  - Evacuate building if needed
- BESS owner shall mitigate the hazard or remove damaged equipment from the premises to a safe location.

Local officials should always check to ensure that hazard mitigation personnel are contracted when reviewing the commissioning plan

3) EMERGENCY RESPONSE PLANS & REGULAR FIRE DEPARTMENT TRAINING

FSWG Recommendation

- **Include a requirement for an Emergency Response Plan (ERP) and annual local first responder training for every BESS installation.**
- Existing standards such as fire safety plans in FCNYS Section 403 and 2023 NFPA 855 Section 4.3.2.1 address emergency operations for facility personnel, these standards are not specifically written for first responders
- There should be a requirement for emergency response protocols specifically addressing the needs of first responders in the event of a fire, like in 2023 NFPA 855 Appendix G
- WG recommends that the FCNYS grant the AHJ the flexibility to determine the most suitable presentation of the ERP based on local fire department needs
- The WG also recommends requiring site-specific training to be provided for local fire departments to familiarize them with the project, hazards associated with BESS, and procedures outlined in the ERP

Local governments may make emergency response plans/training a requirement for Site Plan Review in the interim period before the next Uniform Code update. NYSERDA is requiring both ERPs and local training through incentive program rules.

4) CURRENT PERCEIVED EXEMPTIONS FOR BESS CABINETS

FSWG Recommendation

- **Include “cabinets” in all Fire Code requirements that pertain to rooms, areas, or walk-in units, except for fire suppression requirements, as they may be inappropriate for cabinets.**
- Existing language in certain sections of FCNYS initially only appears to be applicable for indoor and outdoor walk-in BESS, as they do not directly address outdoor non-enterable, or cabinet, BESS – contradicting with Table 1206.15–causing uncertainty for the appropriate application and ensuing enforcement of requirements.
- Although the Fire Code does state that “the most restrictive [requirement] shall govern” where there are conflicts between sections, the WG recommends removing any ambiguity of cabinet ESS applicability for the following requirements:
  - §1206.6 Large-scale Fire Test
  - §1206.11.9 Security of Installations
  - §1206.12.2 Maximum Allowable Quantities of ESS (MAQ)
  - §1206.12.4 Fire Detection

NYSERDA began requiring these regulations for cabinet systems through incentive program rules in 2021

ADDITIONAL RESOURCES

ADDITIONAL NYSERDA SUPPORT: CLEAN ENERGY SITING TEAM

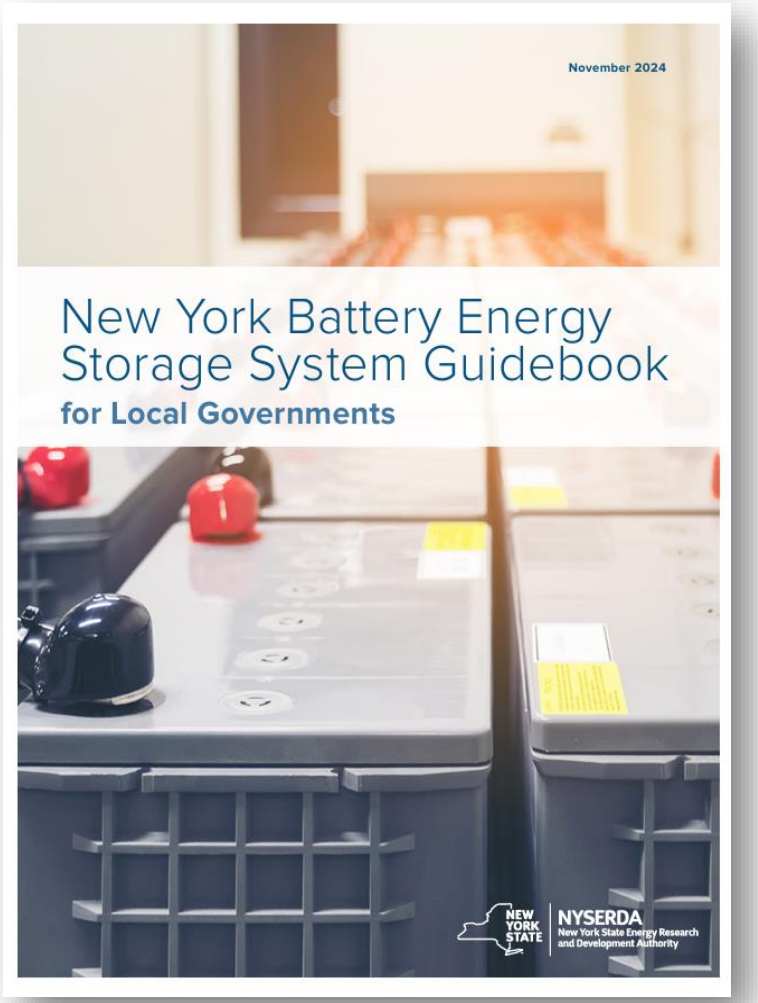
In addition to the advancements resulting from the Fire Safety Working Group, NYSERDA provides community support through its Clean Energy Siting Team.

- The program helps municipalities and communities navigate the regulatory, permitting, and technical aspects of siting clean energy projects.

WHAT NYSERDA CAN OFFER

- **Guidance & Tools**: Model ordinances, AHJ training, best practices, siting guides
- **Community Engagement**: Assistance with outreach, education, and benefit-sharing strategies
- **Energy Storage Guidebook for Local Governments**: New chapter emphasizes critical regulations and authority given to AHJs under the 2020 FCNYS, which is the current regulatory framework for stationary energy storage systems

BATTERY ENERGY STORAGE GUIDEBOOK FOR LOCAL GOVERNMENTS



Chapter 1 Battery Energy Storage Model Law

Chapter 2 Battery Energy Storage Model Permit

Chapter 3 Battery Energy Storage Inspection Checklist

Chapter 4 2020 New York State Uniform Code

Chapter 5 Siting Battery Energy Storage Systems to the 2020 Fire Code of New York State

RESOURCES

Inter-Agency Fire Safety Working Group Resources:

- Inter-Agency Fire Safety Working Group Site (created December 2023)
- Data Collection Press Release (December 2023)
- Code Recommendations Document (July 2024)

OFPC Resources:

- BESS Fire Service Response Guide
- Lithium-ion Battery Awareness Course (DHSES Learning Management)

Clean Energy Siting Resources:

- Energy Storage Guidebook for Local Governments
- Energy Storage Trainings for Local Governments

Q&A

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