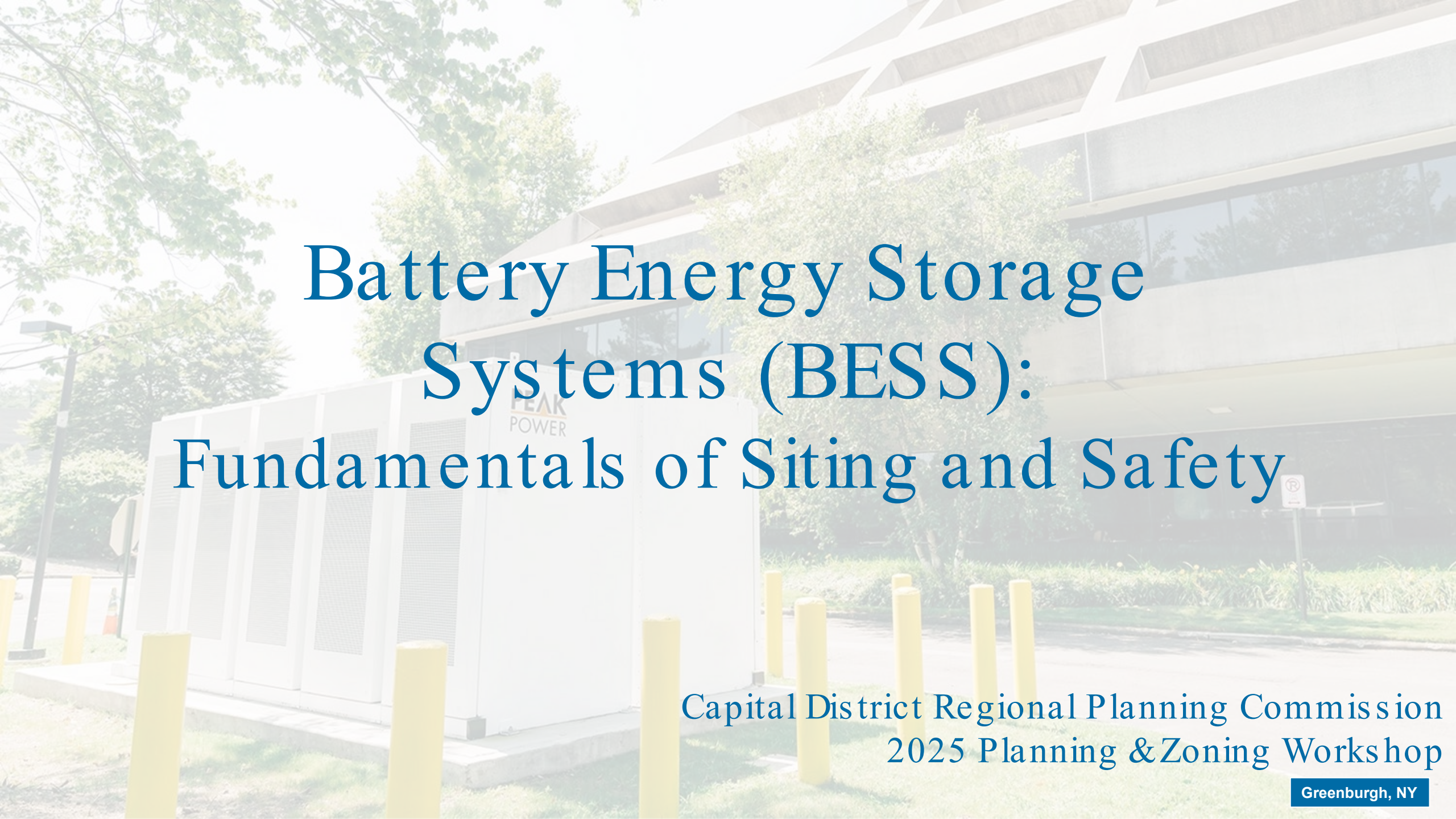




Battery Energy Storage Systems (BESS): Fundamentals of Siting and Safety

Capital District Regional Planning Commission
2025 Planning & Zoning Workshop

Greenburgh, NY

Agenda:

- Intro to BESS: Drivers & Technologies
- Siting & Permitting BESS
- Fire Safety & the 2025 NYS Fire Code
- Resources for Communities
- Q&A

Introduction

Jennifer Manierre
Director, Clean Energy Siting
NYSERDA

Eva Hoskin
Clean Energy Advisor,
Climate Action Associates LLC



An aerial photograph showing an electrical substation with various transformers and power lines on the left, and a large battery energy storage system (BESS) on the right. The BESS consists of numerous white, rectangular battery modules arranged in rows. The entire facility is surrounded by green trees and a clear sky.

Intro to BESS: Drivers & Technologies

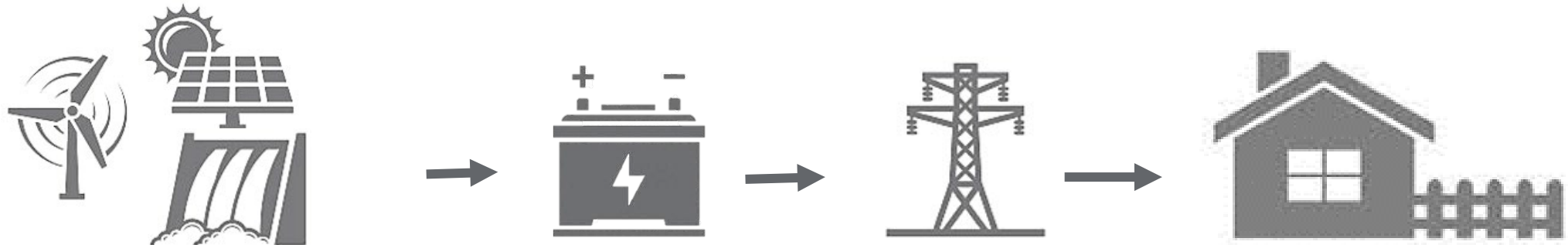
Intro to BESS: Drivers & Technologies

Why are we talking about batteries?

Energy storage acts like a giant battery for the electric grid. It can store extra electricity on sunny days when solar panels are producing more power than we need. Then, it releases that stored energy when we need it most, such as during the evening or on hot days when everyone's using air conditioning.

This helps the grid in two significant ways:

- Making it more resilient: If something goes wrong, like a storm knocking out power lines, energy storage can step in to supply electricity, keeping lights on and essential services running until the problem is fixed.
- Saving money: Storage helps avoid the need to turn on expensive power plants only used during peak demand times. By smoothing out supply and demand, it reduces costs for everyone.



Intro to BESS: Drivers & Technologies

Large Load Interconnection Queue

29 PROPOSALS, 6,055 MW AS OF JULY 2025

● ZONE A | WEST

250 MW 2025
Lake Mariner Data II

250 MW 2026
Wulf Compute Data Center II

300 MW 2027
Data & Technology Campus

140 MW 2027
Niagara Digital Campus

50.2 MW 2027
Digihost Load

● ZONE B | GENESEE

300 MW 2025
580 STAMP Increase

300 MW 2026
WNY STAMP

● ZONE C | CENTRAL

60 MW 2025 Greenidge Load	480 MW 2026 Micron Phase 1	88 MW 2026 Cayuga Compute	300 MW 2028 Ranalli SuperDC
50 MW 2026 Cayuga Load	162 MW 2026 Cayuga Data	200 MW 2028 Greenidge Data	576 MW 2030 Micron Phase 2

● ZONE H | MILLWOOD

200 MW 2026
450 Broadway Data

● ZONE D | NORTH COUNTRY

176 MW 2024
North Country Data Center

120 MW 2025
SDC St. Lawrence

200 MW 2026
St. Lawrence Data & Agricultural Center

● ZONE E | MOHAWK VALLEY

300 MW 2025
New York State Artificial Intelligence Data Center

36 MW 2026
Griffiss Park Triangle Development

1,000 MW 2027
Arsenal Data Site

● ZONE F | CAPITAL

50 MW 2027
POWI Project

120 MW 2028
Remington Factory Redevelopment

● ZONE G | HUDSON VALLEY

25.3 MW 2026
Project Sycamore Orangeburg

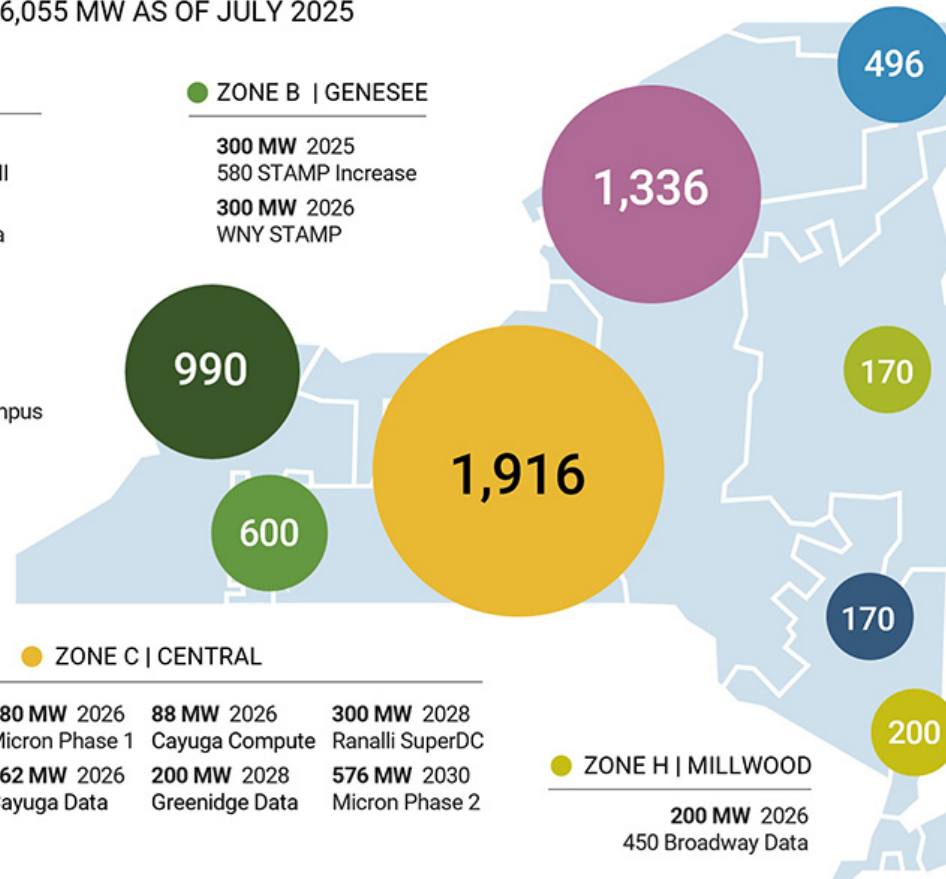
25 MW 2027
Hudson Valley Data Center

60 MW 2027
1547 CSR – Orangeburg LLC

60 MW 2027
Orangeburg Expansion Phase 2

● ZONE K | LONG ISLAND

176.6 MW 2027
Brookhaven Logistics Center



Intro to BESS: Drivers & Technologies

Numerous Applications for BESS: Examples by Sector

Utilities 	Grid Operators 	Commercial Consumers 	Residential Consumers 
 Increase renewable integration	 Balance electricity supply and demand	 Keep critical equipment online during power disruptions	 Reliable backup power during severe weather and other blackouts
 Reduce dependence on fossil-fuel peaker plants	 Improve power quality and reliability	 Reduce utility bills and generate revenue	 Reduce utility bills and generate revenue
 Reduce operating expenses	 Avoid costly system upgrades		

Energy storage technologies have the capacity to benefit each segment of the power system.

© CLEAN ENERGY GROUP

Intro to BESS: Drivers & Technologies

Residential



Commercial



Utility



**Behind-the-meter
“Customer-side”**

**Front-of-the-meter
“Utility-side”**

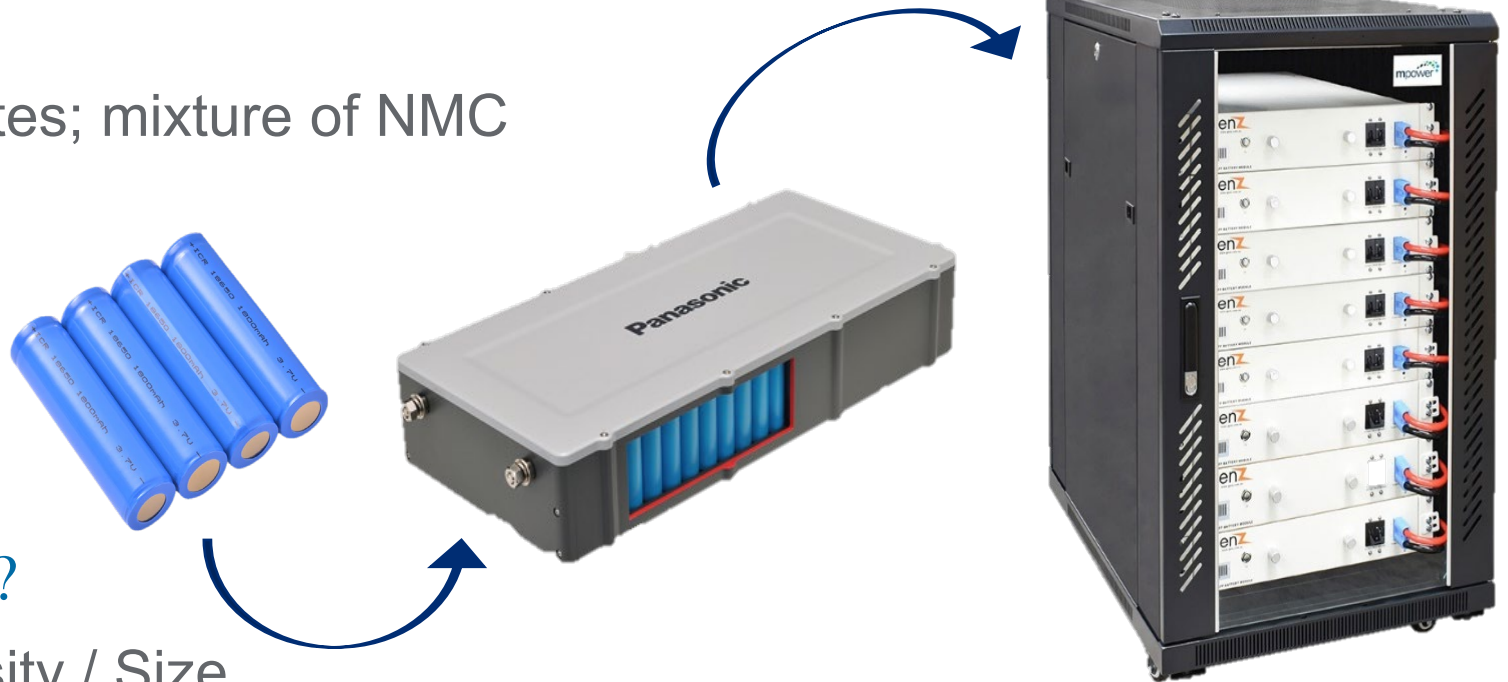
Intro to BESS: Drivers & Technologies

BESS Technology: BESS can vary in their electrochemical composition

- **Lithium Ion** (currently dominates; mixture of NMC and LFP chemistries)
- Iron-Air
- Sodium-Ion
- Flow Batteries

What's Driving BESS Innovation?

- Safety
- Duration
- Energy Density / Size
- Materials (scarcity, recoverability, circularity)



Intro to BESS: Drivers & Technologies

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
- Numerous safety features: cell balancing/monitoring, thermal management, charge/discharge protection, fault diagnosis/reporting



An aerial photograph showing a landscape with a wind farm in the background and a battery energy storage system (BESS) facility in the foreground. The wind farm consists of several large white wind turbines spaced out across a field. The BESS facility features several large, white, rectangular storage units and a complex of electrical infrastructure, including transformers and power lines. The surrounding area is a mix of forested land and open fields.

Siting & Permitting BESS

Siting & Permitting BESS

Permitting Authority for BESS & Renewables

Technology Type		State Approval (ORES)	Local Approval (SEQR/local regulations)	Combination of State & Local Approvals (PSL §68, SEQR/local regulations)
Renewable Generator (e.g. solar, wind)		≥ 25 MW	< 25 MW	N/A
Battery Energy Storage System (BESS)	Co-located w/ Renewable Generator	All sizes if co-located w/ ≥ 25 MW renewable generator	All sizes if co-located w/ < 25 MW renewable generator	N/A
	Standalone System	N/A	≤ 80 MW	> 80 MW

Key Takeaway: Municipal permitting authority over all standalone BESS!

Siting & Permitting BESS

Residential BESS



5 kW / 14 kWh installation: [Tesla Powerwall 2](#)
(5 kW / 14 kWh/unit); installed in utility space



9.8 kW / 20 kWh installation: [SonnenCore+](#),
(4.8 kW / 10 kWh/unit); installed in garage

Siting & Permitting BESS

Smaller Commercial BESS



50 kW / 250 kWh installation: Commercial project at NYPA HQ in Westchester County.



375 kW / 940 kWh installation: Commercial project at office park in Westchester County.

Siting & Permitting BESS

Larger Commercial BESS



490 kW / 1,856 kWh installation: Co-located with rooftop community solar; sited in parking lot.



750 kW / 2,500 kWh installation: Project at large commercial building (sports arena) in NYC.

Siting & Permitting BESS

Utility-Scale BESS



4.8 MW / 16.4 MWh installation: Project at a commercial shopping center in NYC.



20 MW / 45.6 MWh installation: Sited on underutilized land owned by landscaping business in Erie County.

Siting & Permitting BESS

Well-considered, responsible land-use regulations:

Priorities:

- Promote forward-thinking, responsible planning
- Be pragmatic about siting considerations, incl. locations of grid infrastructure
- Anticipate and understand the needs + use cases for the technology
- Enable community members and businesses to utilize the technology while ensuring safety
- Consider all phases of a project's life, incl. construction, ongoing operations, and decommissioning

Siting & Permitting BESS

Well-considered, responsible land-use regulations:

Recommendations:

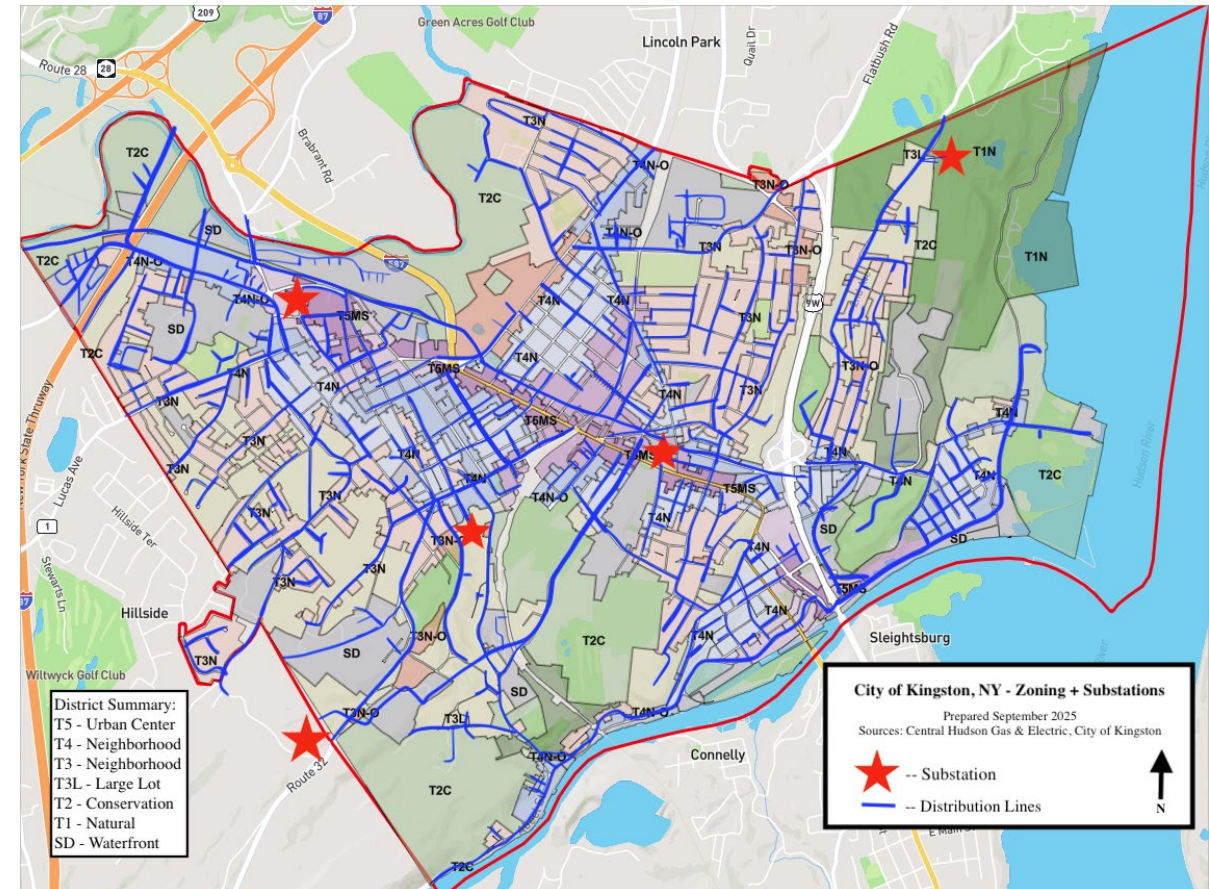
- Take advantage of existing tools, resources, and support:
 - BESS Guidebook: Model Law, Model Permit, Electrical Checklist, etc.
 - NYSERDA workshops and technical assistance
 - Clean Energy Advisor support
- Prioritize reputable information sources

Siting & Permitting BESS

BESS in Your Community – Mapping Assessment

Leverage data resources to understand and plan around energy infrastructure, zoning, proximal land uses, etc.

Example: City of Kingston



Siting & Permitting BESS

BESS in Your Community – Mapping Assessment

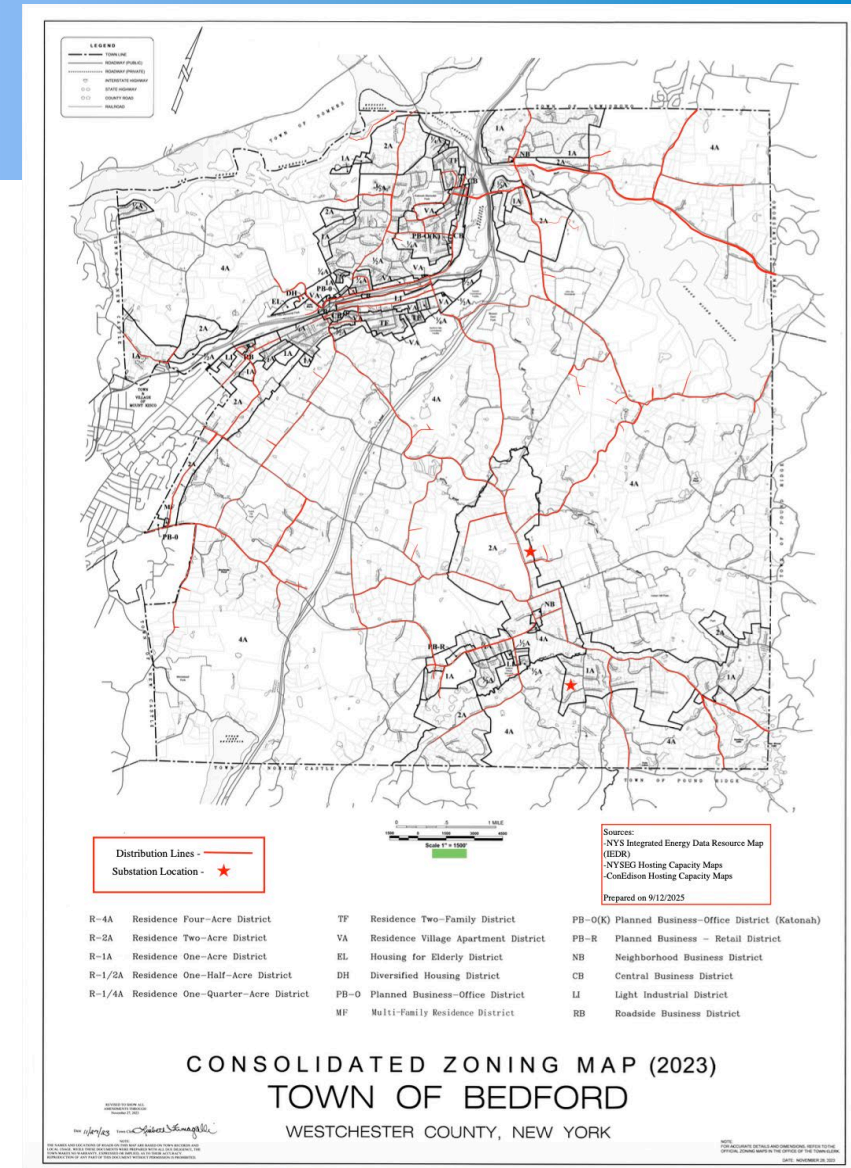
Benefits:

- Visualize, plan around real conditions in your area by overlaying relevant data maps
- Understand tools/evaluations used by developers
- Pragmatically balance technical feasibility, local priorities

Limitations:

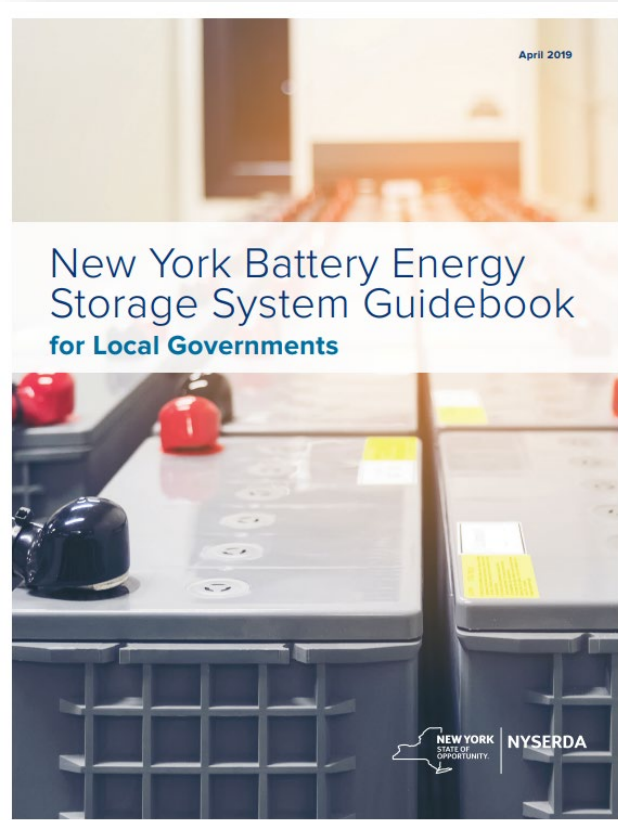
- Hosting capacity changes over time
- Information asymmetry between distribution vs. transmission infrastructure

Example: Town of Bedford



Siting & Permitting BESS

BESS 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

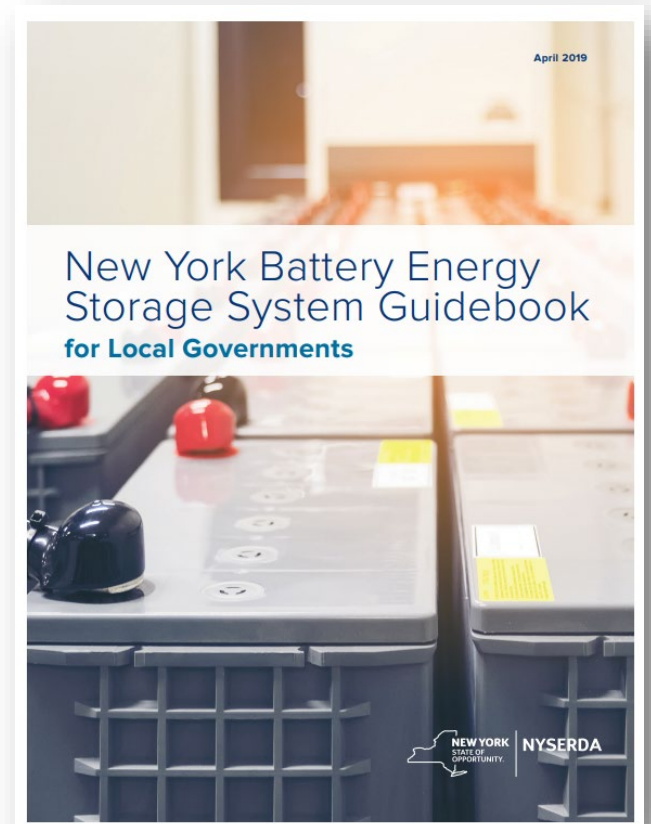
Chapter 5

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

Siting & Permitting BESS

NYSERDA Model Law helps municipalities to:

- Incorporate BESS planning/regulations into **existing zoning laws**
- **Customize** the template ordinance to address local priorities and conditions
- Responsibly regulate BESS across **all system sizes**
- Adequately address key aspects of **project development, operations, and decommissioning**
- Ensure **alignment with the NYS Uniform Code**, which includes nation-leading requirements for safe BESS testing, planning, installation, and operations.

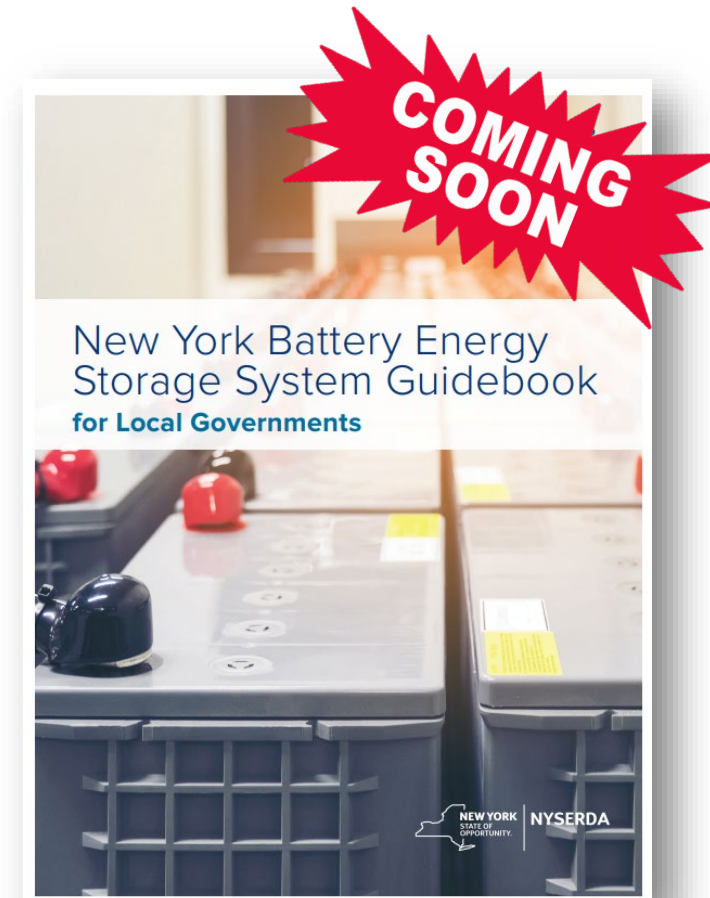


Siting & Permitting BESS

NOTE: BESS Model Law is currently under revision – updated version coming soon!

Anticipated updates include:

- Expanded Tier framework to better and more efficiently regulate different sizes of BESS
- Changes to avoid duplication/conflict with forthcoming 2025 NYS Fire Code requirements
- Expanded instructions + commentary sections for communities looking to adopt or update a BESS law
- Updated accompanying Guidebook chapters, incl. excerpts of relevant 2025 NYS Fire Code requirements



Siting & Permitting BESS

Moving Beyond a Moratorium:

- Grants time for municipal **preparation and action**
- Key factors when considering/navigating a moratorium:
 - 1) Reasonableness
 - 2) Impacts on landowners, residents, businesses
 - 3) Timeline and scope of moratorium
 - 4) Legal standing



Primary Land Use / Planning Considerations for All Clean Energy Technologies

- Infrastructure / grid interconnection
- Appropriate location/zoning
- Bulk/area standards
- Environmental impacts
- Visual impacts
- Agricultural impacts
- Decommissioning
- Taxation



Primary Land Use / Planning Considerations for BESS

- Infrastructure / grid interconnection
- Appropriate location/zoning
- Bulk/area standards
- Environmental impacts
- Visual impacts
- Agricultural impacts
- Decommissioning
- Taxation
- Fire safety
- Incident management training

BESS Model Law Contents

Section 1: Authority

Section 2: Statement of Purpose

Section 3: Definitions

Section 4: Applicability

Section 5: General Requirements

Section 6: Permitting Requirements for Tier 1 Battery Energy Storage Systems

Section 7: Permitting Requirements for Tier 2 Battery Energy Storage Systems

Section 8: Safety

Section 9: Permit Time Frame and Abandonment

Section 10: Enforcement

Section 11: Severability

Section 3: Definitions

System Sizes

Tier 1

Tier 1 Battery Energy Storage Systems have an aggregate energy capacity **less than or equal to 600kWh** and, if in a room or enclosed area, consist of only a single energy storage system technology.



Residential – 20 kWh



Small Commercial – 250 kWh

Section 3: Definitions

System Sizes

Tier 2

Tier 2 Battery Energy Storage Systems have an aggregate energy capacity **greater than 600kWh** or are comprised of more than one storage battery technology in a room or enclosed area.



Commercial – 940 kWh



Large-Commercial –
2.5 MWh



Utility-Scale – 45.6 MWh

Section 6-7: Permitting Requirements

Section 6: Tier 1 Battery Energy Storage Systems

- BESS Permit
- Inspection Checklist
- Applicable fire code

Section 7: Tier 2 Battery Energy Storage Systems

- Special Use Permit
- Site Plan Review
- Applicable fire code

Section 6: Tier 1 Permitting Requirements

Recommendation:

Tier 1 BESS shall be permitted in all zoning districts, subject to the Uniform Code and “BESS Permit,” and exempt from site plan review.

In Action:

Village of Black River, Jefferson County

Section 175-102: Permitting Requirements for Tier 1 Battery Energy Storage Systems

Tier 1 Battery Energy Storage Systems shall be permitted in all zoning districts, subject to the Uniform Code and Building Permit, and exempt from site plan review.

Section 175-103: Permitting Requirements for Tier 2 Battery Energy Storage Systems

BESS Model Permit

For Permitting Tier 1

PROPERTY OWNER

Property Owner's First Name

Last Name

Title

Property Address

City

State

Zip

Section

Block

Lot Number

EXISTING USE

☐ Residential

☐ Commercial

PROVIDE THE TOTAL SYSTEM CAPACITY RATING

Total System Capacity Rating:_____ kWh

Power Rating:_____ kW (Select One) ☐ AC or ☐ DC

SELECT SYSTEM CONFIGURATION

☐ AC Coupled

☐ DC Coupled

☐ Standalone

SELECT BATTERY TYPE

☐ Lithium ion, all types

☐ Lead-acid, all types

☐ Nickel-cadmium (Ni-Cd)

☐ Flow batteries

☐ Other: _____

SELECT INSTALLATION TYPE

☐ Indoor

☐ Outdoor

☐ Attached/Detached/Open Garage

☐ Rooftop

☐ Dedicated Use Building

BATTERY ENERGY STORAGE SYSTEM INSTALLATION CONTRACTOR

Contractor Business Name

Contractor Business Address

City

State

Zip

Contractor Contact Name

Phone Number

Contractor License Number(s)

Contractor Email

EXISTING USE

☐ Residential

☐ Commercial

PROVIDE THE TOTAL SYSTEM CAPACITY RATING

Total System Capacity Rating:_____ kWh

Power Rating:_____ kW (Select One) ☐ AC or ☐ DC

SELECT SYSTEM CONFIGURATION

☐ AC Coupled

☐ DC Coupled

☐ Standalone

SELECT BATTERY TYPE

☐ Lithium-ion, all types

☐ Lead-acid, all types

☐ Nickel-cadmium (NI-Cd)

☐ Flow batteries

☐ Other: _____

SELECT INSTALLATION TYPE

☐ Indoor

☐ Outdoor

☐ Attached/Detached/Open Garage

☐ Rooftop

☐ Dedicated Use Building

Section 7: Tier 2 Permitting Requirements

Recommendation:

Tier 2 BESS are permitted through the issuance of a [*special use permit*] within the [XYZ, XYZ, XYZ] zoning districts, and shall be subject to the Uniform Code and site plan application requirements set forth in this section.

In Action:

Town of Madrid,
St. Lawrence County

7. Permitting Requirements for Tier 2 Battery Energy Storage Systems

Tier 2 Battery Energy Storage Systems are permitted through the issuance of a special use permit within the RA, CI, OS, LC, PD zoning districts, and shall be subject to the Uniform Code and the site plan application requirements set forth in this Section.

Section 7: Tier 2 Permitting Requirements

Process for Approval

- Choose which zoning district(s) to permit systems.
- Applications shall be reviewed for completeness within 10 business days.
- Applications shall be subject to a public hearing and a notice shall be published in the official newspapers 5 days in advance.
- Referred to the [County Planning Department] pursuant to General Municipal Law § 239-m as required.
- Upon closing the public hearing, the reviewing board shall have 62 days to take action on the application. The 62-day period may be extended.

Requirements for Approval

- B. Utility Lines and Electrical Circuitry
- C. Signage
- D. Lighting
- E. Vegetation and Tree-cutting
- F. Noise
- G. Decommissioning**
- H. Site Plan Application**
- I. Special Use Permit Standards**
- J. Ownership Changes

Section 7: Tier 2 Permitting Requirements

G: Decommissioning

Decommissioning Plan

- i. Anticipated life of system;
- ii. Estimated decommissioning costs;
- iii. How estimate was determined;
- iv. **Method of ensuring available funds for decommissioning and restoration;**
- v. **Method to keep decommissioning cost current;** and
- vi. Manner in which system will be decommissioned and Site restored.

Decommissioning Fund

Applicant to continuously maintain a fund or bond payable to the city/town/village for removal of the system for the life of the facility

- Form and amount approved/determined by the city/town/village
- May consist of a letter of credit from a State of New York licensed-financial institution
- All costs of financial security borne by the applicant

Section 7: Tier 2 Permitting Requirements

G: Decommissioning

In Action:

Town of Conquest,
Cayuga County

Key Topics:

- Fund value
- Method for ensuring adequacy of funds over time

TOWN OF CONQUEST LAND USE REGULATIONS LAW

10. A Decommissioning Plan signed by the owner and/or operator of the Solar Energy System shall be submitted by the applicant. The decommissioning plan shall address the following:
- a. The time required to decommission and remove the Solar Energy System and any ancillary structures.
 - b. The time required to repair any damage caused to the property by the installation and removal of the Solar Energy System.
 - c. The cost of decommissioning and removing the Solar Energy System, as well as all necessary site remediation or restoration.
 - d. The provision of a decommissioning security which shall adhere to the following requirements:
 - i. The deposit, executions, or filing with the Town Clerk of cash, bond, or other form of security reasonably acceptable to the Town attorney and/or engineer, shall be in an amount sufficient to ensure the good faith performance of the terms and conditions of the permit issued pursuant hereto and to provide for the removal and restorations of the site subsequent to removal.
 - ii. The amount of the bond or security shall be 115% of the cost of removal and site restoration for the Tier 3 Solar Energy System and shall be revisited every 5 years and updated as needed to reflect any changes (due to inflation or other cost changes). The decommissioning amount shall be reduced by the amount of the estimated salvage value of the Solar Energy System.
 - iii. In the event of default upon performance of such conditions, after proper notice and expiration of any cure periods, the cash deposit, bond, or security shall be forfeited to the Town, which shall be entitled to maintain an action thereon. The cash deposit, bond, or security shall remain in full force and effect until restoration of the property as set forth in the decommissioning plan is completed.

Section 7: Tier 2 Permitting Requirements

H: Site Plan Application

1. Property lines and physical features of site
2. Proposed changes to landscape, grading, vegetation, lighting, etc.
3. A one or three-line electrical diagram showing layout, equipment components and associated National Electric Code compliant mechanisms
4. Equipment specification sheet for the proposed battery energy storage system components
5. General information including name, address, and contact info of system installer and owner/operator
6. Name, address, phone number and signature of the project applicant and owners, demonstrating their consent to the use of the property for the system
7. Zoning district designation
8. **Commissioning plan**
9. **Fire safety compliance plan**
10. **Operations and maintenance plan**
11. Erosion and sediment control and storm water management plans
12. Signed and sealed engineering documents by a NYS Licensed Professional Engineer, or Registered Architect
13. **Emergency operations plan**

An aerial photograph of a utility site, likely a substation or data center, featuring several large, rectangular metal enclosures arranged in rows. Workers in high-visibility vests are visible near the enclosures, and two white utility vehicles are parked in the foreground. The site is surrounded by a chain-link fence, and a residential neighborhood is visible in the background.

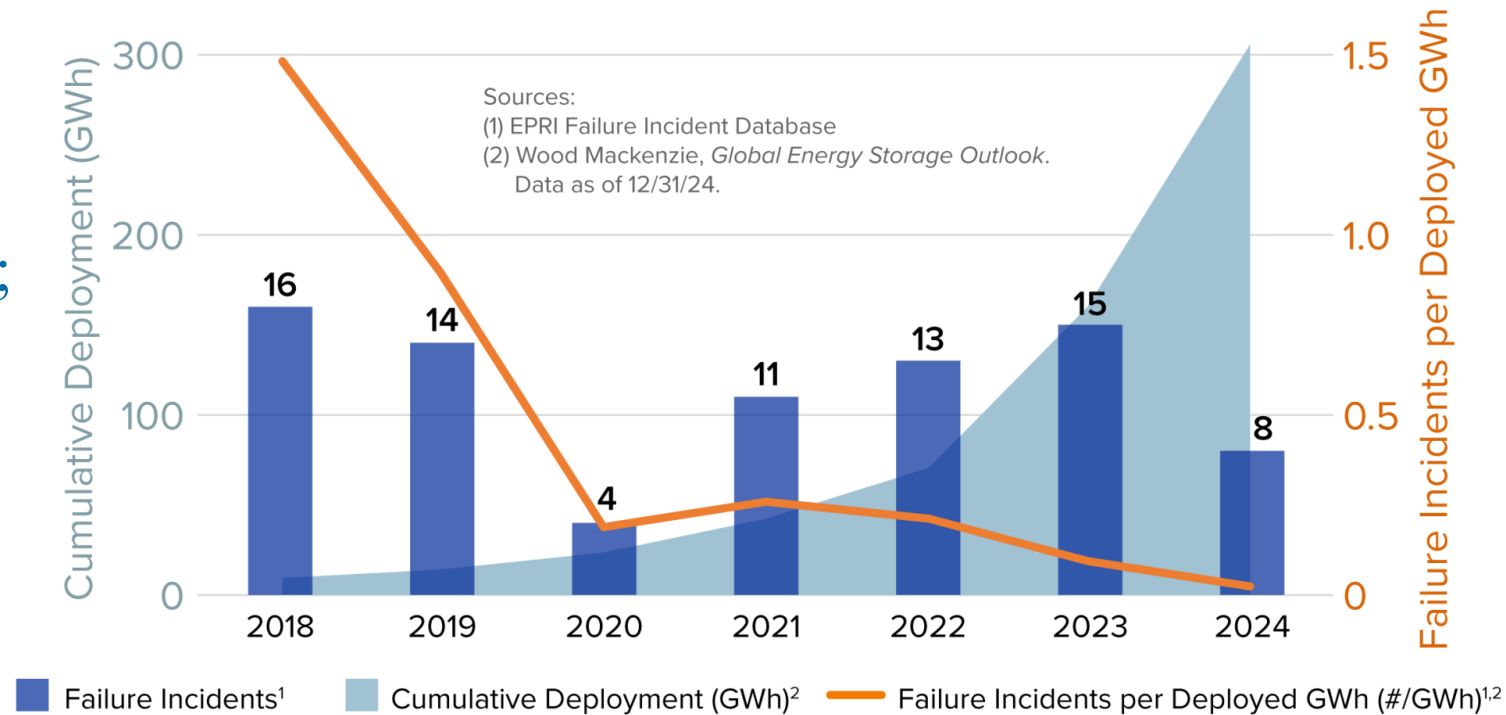
Fire Safety & the 2025 NYS Fire Code



Fire Safety & the 2025 NYS Fire Code

BESS failure incident rates continue to decline year-over-year; fire safety and code compliance remain critical!

Global Grid-Scale Storage Deployment and Failure Statistics



Fire Safety & the 2025 NYS Fire Code

NYS Inter-Agency Fire Safety Working Group

In July 2023, in response to fires at three BESS sites, Governor Hochul convened an Inter-Agency Fire Safety Working Group (Working Group).

Agency Participants

- Division of Homeland Security 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)/ fire protection engineering firms, national labs, and New York Power Authority

Fire Safety & the 2025 NYS Fire Code

NYS Inter-Agency Fire Safety Working Group

- ✓ 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. State-wide **Webinar for local communities**. Q2 2025
- 5. Accessing and examining Root Cause Analysis.
- 6. Compiling all preliminary working group findings, data, and other relevant materials and send to National Labs to review.

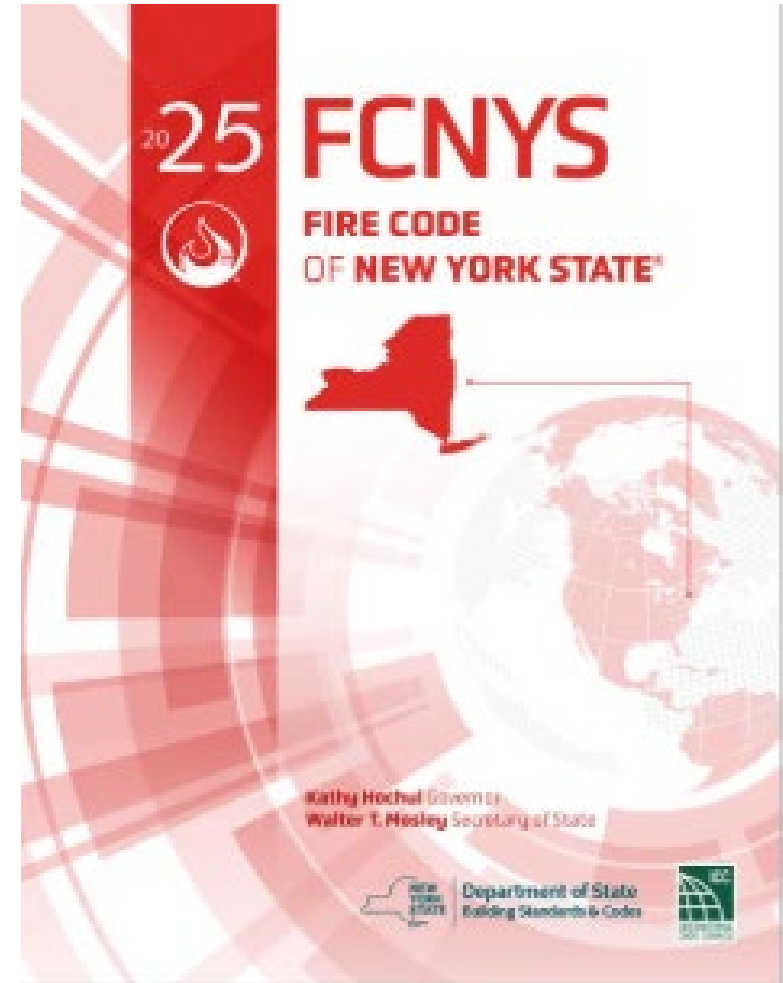
Fire Safety & the 2025 NYS Fire Code

2025 NYS Uniform Fire Prevention & Building Code

Adopted: July 26, 2025

Effective: January 1, 2026

- Includes updates to Fire Code, Residential Code, and others.
- Codifies recommended modifications + additions from the Fire Safety Working Group



Fire Safety & the 2025 NYS Fire Code

2025 NYS Fire Code Updates & Additions



	2020 Fire Code	2025 Fire Code
1) Peer Review	At the discretion of the AHJ	Require*
2) Hazard Support Personnel	At the discretion of the AHJ	Require/Enhance
3) Signage	Required	Enhance
4) Emergency Response Plans, Regular Fire Department Training	Not required	Require*
5) Exemptions for BESS Cabinets	Ambiguity in code	Clarify

*NYSERDA incorporating into incentive program rules

Fire Safety & the 2025 NYS Fire Code

Key Fire Code Takeaways for Local First Responders:

- Requires **application peer reviews**, to ensure subject matter experts are involved in all approvals
- Requires **project-specific Emergency Response Plans** to be developed in conjunction with local fire department
- Requires project owners to provide **annual on-site trainings, Plan reviews**
- Requires project owner to furnish **Hazard Support Personnel** to support and collaborate with local first responders

Fire Safety & the 2025 NYS Fire Code

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](#)



Resources for Communities

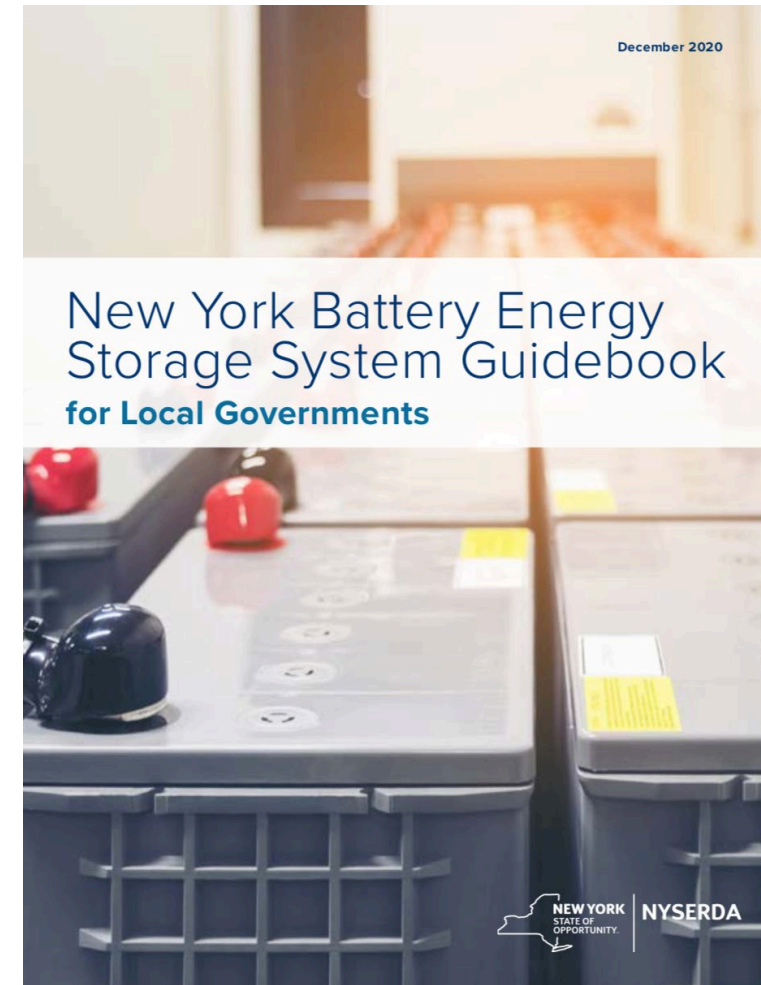
Resources for Communities

NYSERDA Clean Energy Siting Team:

- BESS Guidebook for Local Governments
- Education & training opportunities (incl. municipal meetings, Land Use Leadership Alliance [LULA] programs, etc.)
- 1:1 Technical assistance and local law support
- Access to Contractor Pool support

NOTE: Upcoming Mid-Hudson LULA in Montgomery, NY on November 10-12; Capital Region coming soon!

Reach out to Eva for more info or to register – limited spots available for Mid-Hudson



Resources for Communities

Clean Energy Advisors:

Territory-based Advisors are available to support municipalities with:

- Clean energy mapping & zoning exercises
- Support on drafting or updating local laws, community plans
- Informational presentations and trainings for municipal boards/staff
- Other 1:1 technical assistance as needed



Q&A

Clean Energy Siting Team
cleanenergyhelp@nyserda.ny.gov
www.nyserda.ny.gov/Siting

