March 22, 2022
Medway Planning & Economic Development Board Meeting

BESS – Continued Discussion

- Technical Zoning Outline prepared by Arup – Discussed at 3-17-22 Community Forum

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Town of Medway

BESS Technical Zoning Outline

March 17, 2022

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Approach

- Review Benchmark Codes
- Develop Sections Outlines
- Identify Sections with Technical Requirements
- Research National / State Codes & Standards
- Present to Town for Consideration

Overview

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Typical Zoning Content	Technical BESS Content
Authority	
Purpose	
Application	X
Definitions	X
General Requirements	X
Siting Requirements	X
Design Standards	X
Safety and Environmental Standards	X
Monitor and Maintenance	X
Decommissioning	X
Procedures	
Terms of Special Permit	
Permit Time Frame and Abandonment	
Enforcement	
Severability	

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Code Adoption

- Medway PEDB adoption of **NFPA 855** as basis of BESS zoning bylaws
- Compliance with NFPA 855 captures the **latest** industry research and knowledge in BESS installation and safety.
- NFPA 855 is the primary source of information. **527 CMR MA Fire Code** is referenced where information is not covered by NFPA 855

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Code Adoption

Town of Medway PEDB key decision: adoption of most recent available edition of **NFPA 855, Standard for the Installation of Stationary Energy Storage Systems** as the basis for BESS zoning bylaws

Compliance with NFPA 855 captures the **latest** industry research and knowledge in BESS installation and safety.

NFPA 855 is the primary source of information. Where information is not covered in NFPA 855, 527 CMR is referenced

Application

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Example Bylaw

This section applies to energy storage systems exceeding the thresholds contained in NFPA 855

Clause is a candidate for additional input by Medway PEDB that affects technical requirements

Plain Language (reference only)

Applicable to energy storage systems **exceeding the following capacities**:

- Lead-acid > 70 kWh
- Nickel > 70 kWh
- Li-ion > 20 kWh
- Sodium nickel chloride > 20 kWh
- Flow > 20 kWh
- Other battery technologies > 10 kWh
- BESS in one- and two-family dwellings > 1 kWh

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Definitions

Example Bylaw

Terminology contained in this section is as defined by NFPA 855, in addition to the definitions in this section.

Reference to NFPA 855 should be assumed as reference to the latest edition of the code.

Where a term is not defined, they shall be defined using their ordinary accepted meanings within the context in which they are used

Plain Language (reference only)

Terms to be defined:

- 780 CMR, Massachusetts State Building Code
- 527 CMR 1.00, Massachusetts Comprehensive Fire Safety Code
- 527 CMR 12.00, Massachusetts Electrical Code

Battery Energy Storage Facility to be defined per existing Town of Medway

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General Requirements – Code Adoption

Example Bylaw

All energy storage systems shall be designed, constructed, and operated in accordance with the applicable requirements of 780 CMR, 527 CMR 1.00, 527 CMR 12.00, and NFPA 855

Permits shall comply with 780 CMR, 527 CMR 1.00, 527 CMR 12.00 and M.G.L.c.

Plain Language (reference only)

Requires BESS to comply with **NFPA 855**

Building permits will be applied for and obtained through the typical building permit process in Medway

Electrical permits will be applied for and obtained through the typical electrical permit process in Medway

Fire permits will be applied for and reviewed through the typical fire permit process in Medway

Fire permits through the local fire department are required for **BESS exceeding the capacity thresholds** identified in the Application bylaw section.

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General Requirements – Required Documentation

Example Bylaw

Required documentation for the construction of new ESS systems per NFPA 855 will be provided to the AHJ for approval

Clause is a candidate for additional input by Medway PEDB that affects technical requirements

Plain Language (reference only)

Required documentation to be provided to the AHJ during the design and permitting process and the building owner / owner's authorized agent includes, as applicable:

- Construction plans and specifications
- Large-scale fire test data, evaluation information, and calculations
- Modeling data
- Commissioning plan
- Emergency operations plan

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Siting Requirements – Permissible Location Thresholds

Example Bylaw

Energy storage system capacities, including array capacity and separation, are limited to the thresholds contained in NFPA 855

Where energy storage systems exceed the thresholds identified above, the AHJ is permitted to approve installations on the basis of large-scale fire test data and/or hazard mitigation analysis as permitted by NFPA 855

Clause is a candidate for additional input by Medway PEDB that affects technical requirements

Plain Language (reference only)

The BESS applicant can install systems up to the thresholds listed below. For BESS with **larger capacities** than the thresholds, large-scale fire test data and/or hazard analysis are required to support the installation.

ESS thresholds for array capacity is 50 kWh separated by 3 feet.

Large-scale fire test data per UL 9540A is required for BESS > 50 kWh as a requirement of the UL 9540 BESS listing

Battery Technology	Threshold Capacity
Lithium ion	600 kWh
Sodium nickel chloride	600 kWh
Flow batteries	600 kWh
Other battery technologies	200 kWh

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Siting Requirements – Required Setbacks

Example Bylaw

Setbacks for outdoor ESS shall be in accordance with NFPA 855

Clause is a candidate for additional input by Medway PEDB that affects technical requirements

Plain Language (reference only)

A **minimum of 10ft** must be maintained between ESS and the following:

-Lot lines;

-Public ways;

-Buildings;

-Stored combustible materials;

-Hazardous materials;

-High-piled storage;

-Personnel means of egress;

-Other exposure hazards not associated with electrical grid infrastructure

This setback distance may be reduced by implementing one of the alternative measures contained within NFPA 855

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Siting Requirements – Emergency Access

Example Bylaw

Fire department access must be provided in accordance with 527 CMR 1.00

Clause is a candidate for additional input by Medway PEDB that affects technical requirements

Plain Language (reference only)

Fire department access roads, knox boxes, and other access features must be provided as is required by the State fire code

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Design Standards

Example Bylaw

Provide signage in accordance with NFPA 855

Commissioning of ESS systems shall be in accordance with NFPA 855

System interconnections into utility grids shall be in accordance with NFPA 855

Provide means for disconnecting the ESS per NFPA 855 and 527 CMR 12.00

Plain Language (reference only)

Signage should be provided on doors to rooms, entrances to ESS facilities, and on ESS outdoor containers. Signage shall be in accordance with ANSI Z535.

The system installer or commissioning agent shall prepare a **commissioning plan** prior to the start of commissioning. A report documenting the commissioning process and results shall be prepared and a **copy provided to the AHJ** prior to final inspection and approval and included in the ESS facility manual

Depending on the location of the ESS in relation to and its interaction with the electrical grid, **interconnection** will be completed per 527 CMR 12.00 (NEC) or IEEE C2

An **accessible disconnect** is required per 527 CMR 12.00 (NEC)

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Design Standards – UL Listing Requirements

Example Bylaw

ESS systems, including required equipment listings, must be in accordance with NFPA 855

For any of the following, UL 9540A fire test data must be made available to the AHJ for review:

- BESS systems > 50kWh in capacity

- BESS systems with spacing between arrays of < 3 ft

Plain Language (reference only)

ESS systems are required to be **listed per UL 9540**, Energy Storage Systems and Equipment

For BESS > 50kWh in capacity listed per the 2nd edition of UL 9540, **UL 9540A (large scale fire) testing** is required and should be available for AHJ review

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Safety and Environmental Standards

Example Bylaw

ESS sites should be protected from unauthorized access per NFPA 855 and 527 CMR 12.00

Vegetation around the ESS site must be maintained in accordance with NFPA 855

Provide specialty safety systems in accordance with NFPA 855 as applicable for the battery chemistry and installed location

Clause is a candidate for additional input by Medway PEDB that affects technical requirements

Plain Language (reference only)

ESS sites must be **protected from unauthorized access**

Security barriers, fences, landscaping, and other enclosures must not inhibit required air flow to or exhaust from the ESS and components

Electrical equipment greater than 1,000V require a means to restrict access

Areas within 10ft of outdoor ESS containers must be cleared of **combustible vegetation**. Single specimens of trees or manicured ground cover such as green grass may be permitted if it does not constitute as a source to readily transmit fire

NFPA 855 requires **specialty safety systems** to be provided based on the ESS chemistry and installed location.

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Safety and Environmental Standards – Emergency Response Plan

Example Bylaw

An emergency operations plan shall be created for the ESS system in accordance with NFPA 855 and be provided to the AHJ for review

Clause is a candidate for additional input by Medway PEDB that affects technical requirements

Plain Language (reference only)

Emergency operations plans are required to be **provided to the AHJ** and must include the following at a minimum:

- **Safe operation** procedures, including shut-down
- Inspection and testing procedures for **alarms, interlocks, and controls**
- **Battery management system** response procedures
- Fire, explosion or release of liquids or vapors **emergency procedures**
- **Safe removal** procedures for damaged ESS equipment
- Other procedures as determined necessary by the AHJ to provide for **safety of occupants and emergency responders**
- Procedures and schedules for **conducting drills** of these procedures

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Monitor and Maintenance

Example Bylaw

Maintenance shall be in accordance with NFPA 855 and documented in Operations and Maintenance documentation per NFPA 855

Plain Language (reference only)

Maintenance provisions will be driven by **manufacturer requirements** for the specific listed system.

Maintenance plans will be documented in the **Operations and Maintenance manual**, required by NFPA 855

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Decommissioning

Example Bylaw	Plain Language (reference only)
Decommissioning of ESS systems shall be in accordance with NFPA 855	Decommissioning shall be documented in a **Decommissioning Plan**. The AHJ shall be notified prior to decommissioning of an ESS system and shall be provided with a **Decommissioning Report** following decommissioning process and results