Utility-Scale Battery Energy Storage Systems

MODEL ORDINANCE

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ORDINANCE FRAMEWORK

American Clean Power Association

The American Clean Power Association (ACP) is the leading voice of today's multi-tech clean energy industry, representing over 800 energy storage, wind, utility-scale solar, clean hydrogen and transmission companies. ACP is committed to meeting America's national security, economic and climate goals with fast-growing, low-cost, and reliable domestic power.

About this Document

This document is intended to provide guidance to local governments considering developing an ordinance or rules related to the development of utility-scale battery energy storage systems. The recommendations and considerations included in this framework draw from a variety of sources including: national fire safety standards, guidance established by national energy laboratories, and existing state laws and local regulations.

The American Clean Power Association **supports the adoption of NFPA 855**, the national fire protection safety standard for grid-connected energy storage. This safety standard, developed by firefighters, fire protection professionals, and safety experts, provides comprehensive requirements and guidance on the design, installation, and operation of energy storage facilities for all site and community contexts.

Instructions for Use

This document is designed to inform the development of individual ordinances or state regulations to guide the development of utility-scale energy storage facilities. It may not be appropriate for the Model Ordinance to be adopted precisely as it is written. It is intended to be advisory, and users should not rely upon it as legal advice. Local government officials are urged to seek legal advice from their attorneys before enacting a battery energy storage system ordinance. Local governments must consider how the language in this Model Ordinance may or should be modified to suit local conditions, comprehensive plans, existing land use and zoning provisions.

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Section I: Definitions & Applicability

A. Definitions

"Energy Storage" means any technology that is capable of absorbing electricity, storing the electricity for a period of time, and redelivering the electricity.

"Battery Energy Storage System" (BESS) means electrochemical devices that charge, or collect, energy from the grid or a generation facility, store that energy, and then discharge that energy at a later time to provide electricity or other grid services.

"National Fire Protection Association" (NFPA) is a nonprofit organization dedicated to eliminating death, injury, property, and economic loss due to fire, electrical, and related hazards. Established in 1896, the NFPA develops and publishes over 300 consensus codes and standards intended to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation in the United States and internationally. The NFPA's mission extends beyond code development; it also focuses on research, training, education, and advocacy to promote safety and preparedness.

"National Electric Code" (NEC) also known as NFPA 70, is a set of standards for the safe installation of electrical wiring and equipment in the United States. Its primary purpose is to ensure the safety of electrical installations by setting forth requirements to protect people and property from electrical hazards. The NEC covers the installation of electrical conductors, equipment, and raceways; signaling and communications conductors and equipment; and fiber optics. It is updated every three years to incorporate new technologies and improve safety measures

"NFPA 855" the *Standard for the Installation of Stationary Energy Storage Systems*, provides comprehensive guidelines for the safe installation of stationary energy storage systems (ESS), including those using lithium batteries. This standard addresses various aspects of installation to mitigate fire and explosion risks associated with energy storage technologies. It covers topics such as system design, construction, operation, and maintenance to ensure safety and reliability.

"UL 9540" is a standard for Energy Storage Systems (ESS) and Equipment. It is designed to ensure the safety of these systems and covers their construction, performance, and testing requirements. UL 9540 certification is essential for verifying that energy storage systems, such as batteries and related equipment, meet rigorous safety standards to prevent hazards related to electrical, mechanical, and environmental conditions.

B. Applicability

The requirements of this ordinance shall apply to all battery energy storage systems with a rated nameplate capacity of equal to or greater than 1,000 kilowatts (1 megawatt).

The requirements of this ordinance shall apply to all battery energy storage systems permitted and installed in [County/Village/Town/City] after the effective date of this ordinance.

This ordinance does not extend to the general maintenance and repair of battery energy storage systems permitted, installed, or modified prior to the effective date of this ordinance.

C. Application Approval

Applications for permits shall be approved in accordance with Section [XXX] of [County/Village/Town/City] ordinances.

D. Timeline for Review and Approval

The [County/Village/Town/City] shall complete an initial review of the application to determine compliance with the requirements established within this ordinance and shall provide written approval or issue a notice of deficiency within 30 days of receipt of the application.

The notice of deficiency must include a list of each requirement included in this ordinance with which the applicant has not sufficiently demonstrated compliance and issue a recommendation for achieving sufficient compliance.

If no written approval or notice of deficiency is provided within 30 days of receipt of the application, the application shall be considered approved.

Section II: Land Use & Siting Standards

A. Land Use Zones

Battery energy storage systems that comply with the requirements established in this ordinance shall be permitted in all land use zones.[1]

Agricultural: Permitted-by-Right

[1] **Land Use Zoning** definitions differ between local jurisdictions, so it is important for each community to assess the right process for permitting energy storage across zones. Because battery energy storage technologies are uniquely flexible and modular, they can be safely sited within any land use context. In some contexts, battery energy storage systems, which serve as critical grid infrastructure and present minimal impacts to adjacent land, can be sited by right – this includes land use zones being utilized primarily for agricultural, industrial, and commercial functions. Energy infrastructure, like substations, are seamlessly integrated into these zones.

Other zones may present contextual considerations that local jurisdictions may wish to consider, thus battery energy storage facilities may be subject to discretionary permitting in public, mixed use, and residential zones. However, similar to transformers and distribution transmission lines, energy storage facilities can provide critical services while safely operating in these land use zones. Battery energy storage systems may also provide important services, such as lowering electricity costs, to residences as part of community energy infrastructure, or provide reliability-focused services to other critical infrastructure such as hospitals,

Industrial: Permitted-by-Right

Commercial: Permitted-by-Right

Public & Institutional: Discretionary Permit

Mixed Use: Discretionary Permit

Residential: Discretionary Permit

B. Setbacks

Battery energy storage systems shall comply with NFPA 855 requirements related to setbacks and buffers.[2]

An applicant may request a waiver of these requirements under circumstances that an engineered solution may satisfy setback requirements outlined in NFPA 855.

C. Lighting Requirements

Battery energy storage systems shall comply with NFPA 855 requirements related to lighting.[3]

Lighting requirements applicable to other infrastructure within the [County/Village/Town/City], or requirements specified in state statute or code for electrical infrastructure are appropriate to apply to BESS so long as they do not conflict with NFPA 855.

D. Security and Screening

Battery energy storage systems shall have a perimeter fence of at least 7 feet in height, consistent with requirements established in NFPA 70.[4]

Battery energy storage systems shall also comply with specifications established in NFPA 855 relating to barriers and buffering.[5]

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[2] **NFPA 855** includes specifications for setbacks and buffering between the energy storage system and property lines, buildings, and other potential exposures. These distances are determined based on type and size of the energy storage system, its energy capacity, and the surrounding environment.

[3] **NFPA 855** and **NFPA 70** identifies lighting requirements for energy storage systems. These requirements are designed to ensure adequate visibility for safe operation, maintenance, and emergency response. Lighting provisions typically cover areas such as access points, equipment locations, and signage. The specific lighting requirements may vary depending on factors such as the size and configuration of the energy storage system, as well as the surrounding environment.

[4] **NFPA 70** requires all large electrical installations, including utility-scale energy storage systems, to have a perimeter fence of at least 7 feet to prevent unauthorized access to the facility.

[5] **NFPA 855** and **NFPA 70** includes requirements for security and barriers to enhance the safety and protection of energy storage systems. These requirements are aimed at preventing unauthorized access, as well as containing and securing the site. Security barriers may involve measures such as fencing, gates, locks, access controls, and

E. Auditory Requirements

The average noise generated from the battery energy storage systems, components, and associated ancillary equipment, measured at the nearest building, lot line that can be built upon, or public way, shall not exceed any auditory limits established for each land use zone.[6]

Section III: Permitting & Environmental Compliance

A. Site Plan Applications

A site plan application shall include the following information:

1. Property lines and physical features, including roads, for the project site.
2. Proposed changes to the landscape of the site, grading, vegetation clearing and planting, exterior lighting, and screening vegetation or structures.
3. Zoning district designation for the parcel(s) of land comprising the project site.

B. Special / Conditional Use Permits

Applications for special use or conditional use permits shall be considered and approved in accordance with Section [XXX] of [County/Village/Town/City] ordinances.

C. Environmental Compliance

An applicant shall comply with, and receive the necessary permits for, relevant state environmental and wildlife laws prior to commencing construction and operation of the battery energy storage system.[7]

D. Review of Augmentation Plans

Battery energy storage system applicants may include a plan for periodic augmentation to maintain the capacity of the system or nominally increase the capacity of the system for approval as part of the site plan application.

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surveillance systems. Some barriers may be designed to compartmentalize and contain the energy storage system and in the rare case an incident occurs on site. The specific requirements for security and fire barriers outlined in NFPA 855 may vary depending on factors such as the size, type, and location of the energy storage system.

[6] BESS have demonstrated minimal or limited auditory impact on adjacent properties. At close distances, sound caused by BESS can range from 60 to 80 decibels, equivalent to the sound of a conversation (60db) and the sound of being inside a car (80db). Beyond property lines, and with the setbacks and screening specifications in **NFPA 855**, neighboring properties should experience minimal impact. For more information, consult the Pacific Northwest National Laboratory publication on Energy Storage in Local Zoning Ordinances.

[7] During normal operations, battery energy storage systems do not create any emissions or discharge any pollutants. During rare instances of an incident or operational errors, **NFPA 855** details requirements related to the containment of any potential hazards, including spill control measures. Historical investigations into the effects of fire-related incidents have determined there were no harmful levels of toxins detected at the site, adjacent properties, and there was no risk to the broader community.

The owner of an operating battery energy storage system shall provide notice to the [County/Village/Town/City] at least 90 days prior to the commencement of augmentation activities at the site of the battery energy storage system.

The owner shall also provide an updated site plan that identifies any changes resulting from augmentation of the battery energy storage system. Augmentation modifications that require the issuance of a building permit may be considered under the special / conditional use permitting process in accordance with Section [XXX] of [County/Village/Town/City] ordinances.

Section IV: Commissioning, Safety Standards & Certifications

A. Commissioning Plan

Prior to issuance of a building permit, battery energy storage system Applicants shall submit a commissioning plan that contains:

4. A electrical diagram detailing the battery energy storage system layout, associated components, and electrical interconnection methods, with all National Electrical Code compliant disconnects and over current devices.
5. A preliminary equipment specification sheet that documents the proposed battery energy storage system components, inverters and associated electrical equipment that are to be installed. A final equipment specification sheet shall be submitted prior to the issuance of the building permit.
6. Name, address, and contact information of proposed or potential system installer and the owner and/or operator of the battery energy storage system. Such information of the final system installer shall be submitted prior to the issuance of building permit.
7. A commissioning report meeting the requirements of NFPA 855 section 6.1.5 shall be submitted prior to final inspection.

B. Safety Requirements

Battery energy storage systems shall comply with the latest published version of the National Fire Protection Association (NFPA) 855, *Standard for Installation of Stationary Energy Storage Systems,* at the date of the submission of the application.[8]

Prior to issuance of a building permit, battery energy storage system Applicants are required to:

[8] **NFPA 855**: is the standard developed by the National Fire Protection Association (NFPA) that addresses the design, installation, and operation of energy storage systems (ESS). The purpose of NFPA 855 is to ensure the safety of ESS installations and provides prescriptive requirements including, but not limited to: site plans, equipment designs and specifications, fire protection, emergency response, training, maintenance, testing and certifications. Local jurisdictions can comprehensively address safety by simply requiring applicants to comply with the latest version of NFPA 855. The **International Fire Code** (IFC) is harmonized with NFPA 855.

i. Submit an emergency response plan as an appendix to the project application.
ii. Submit a plan as an appendix to the project application for offering site-specific training to the fire service and emergency personnel of jurisdiction prior to commencing operation.
iii. Conduct hazard mitigation analyses if specified by NFPA 855.

C. Equipment Certification

All batteries integrated within the battery energy storage system shall be listed under UL 1973. The battery energy storage system shall be listed in accordance with UL 9540, either from the manufacturer or by field evaluation.[9]

Section V: Decommissioning

A. Decommissioning Plan

A decommissioning plan that is consistent with agreements reached between the applicant and other landowners of participating properties and that ensures the return of all participating properties to a useful condition, including removal of above-surface facilities and infrastructure that have no ongoing purpose, shall be provided by the applicant.

The decommissioning plan shall include, but is not limited to, financial assurance in the form of a bond, a parent company guarantee, or an irrevocable letter of credit, but excluding cash, to be determined by applicant. The amount of the financial assurance shall not be less than the estimated cost of decommissioning the energy facility, after deducting salvage or recycling value, as calculated by a third party with expertise in decommissioning, hired by the applicant.

However, the financial assurance may be posted in increments as follows:

i. At least 25% by the start of full commercial operation.
ii. At least 50% by the start of the fifth year of commercial operation.
iii. 100% by the start of the tenth year of commercial operation. (s) Other information reasonably required by the commission.

[9] **UL 9540 Certification**: When a battery energy storage system is listed under UL 9540, it means that it has been tested and certified by a Nationally Recognized Testing Laboratory (NRTL) to meet the safety requirements outlined in UL 9540, which specifically covers energy storage systems and equipment. This certification indicates that the battery has undergone rigorous testing to ensure it meets safety requirements related to fire, electrical, and other potential hazards associated with energy storage systems. UL 9540 listing provides assurance to consumers, regulators, and insurers that the battery meets recognized safety standards for use in energy storage applications.

Section VI: Resources

As state and local jurisdictions consider the recommended framework for siting and permitting battery energy storage facilities outlined in this model ordinance, ACP seeks to provide communities with resources and technical guidance. ACP encourages the review of the following materials:

NFPA 855: Guiding Energy Storage System Safety: NFPA 855 (2023), the Standard for the Installation of Stationary Energy Storage Systems, provides mandatory requirements for, and explanations of, the safety strategies and features of energy storage systems (ESS). Applying to all energy storage technologies, the standard includes chapters for specific technology classes. The depth of this standard makes it a valuable resource for all Authorities Having Jurisdiction (AHJs). The focus of this fact sheet is on how the standard applies to electrochemical (battery) energy storage systems in Chapter 9 and specifically on lithium-ion (Li-ion) batteries.

U.S. Codes & Standards for Battery Energy Storage Systems: This document provides an overview of current codes and standards (C+S) applicable to U.S. installations of utility-scale battery energy storage systems. This overview highlights the most impactful documents and is not intended to be exhaustive. Many of these C+S mandate compliance with other standards not listed here, so the reader is cautioned not to use this document as a guideline for product compliance. This guide provides a graphic to show the hierarchy and groupings of these C+S, followed by short descriptions of each. This document also summarizes some of the changes in the 2023 edition of one of the most important standards, NFPA 855, and provides a more detailed bibliography of the featured documents.

First Responders Guide to Lithium-Ion Battery Energy Storage System Incidents: This document provides guidance to first responders for incidents involving energy storage systems (ESS). The guidance is specific to ESS with lithium-ion (Li-ion) batteries, but some elements may apply to other technologies also. This guide provides recommendations for pre-incident planning and incident response. Additional tutorial content is provided for each of the hazard categories. The Bibliography provides references to applicable codes and standards, and other documents of interest.

Energy Storage Emergency Response Plan Template: This document is the result of a collaborative effort to develop a standardized template to guide the development of project-specific emergency response plans, informed by the latest evidence-based strategies and recommendations established by the National Fire Protection Association. This document is intended to be adapted by users as needed to be appropriate to the conditions, environment, staffing, structure, technologies, and blueprint of a given site.

Energy Storage & Safety: Safety is fundamental to all parts of our electric system, including energy storage, and the safe operation of our energy infrastructure is critical to provide the electricity that keeps our lights on, our refrigerators running, our homes air conditioned and heated, and our businesses operating. This fact sheet provides a brief overview of how energy

storage is safe by design, with built in features and strategies used to promote and maintain safe operation.

Frequently Asked Questions (FAQs) about Energy Storage Systems: ACP has compiled a comprehensive list of Battery Energy Storage Safety FAQs for your convenience. Read ACP's FAQ document to learn more in detail.

The Role of Energy Storage on the Electric Grid: Energy storage technologies are uniquely positioned to reduce energy system costs and, over the long-term, lower rates for consumers by: optimizing the grid; bolstering reliability; and enabling a clean grid. Energy storage is, at its core, a resilience enabling and reliability enhancing technology. Across the country, states are choosing energy storage as the best and most cost-effective way to improve grid resilience and reliability.

Claims vs. Facts: Energy Storage Safety: Because energy storage facilities are generally newer than most other types of critical grid infrastructure like substations and transformers, communities may have questions about the safety and reliability of the technology. Amidst these questions, some inaccurate claims have been made about energy storage – this resource addresses some of the most common inaccurate claims about energy storage safety.