

Permitting Outdoor Energy Storage Systems in NYC: FDNY Emergency Management Plan Preparation Guide

Overview

The Smart Distributed Generation (DG) Hub, established by Sustainable CUNY of the City University of New York in 2013, is a comprehensive effort to develop a strategic pathway to safe and effective solar and storage installations in New York City. This guidance document was created in collaboration with the New York City Fire Department (FDNY) to capture its requirements for the content required in an Emergency Management Plan (EMP) for Energy Storage System (ESS) permitting applications.

FDNY [Rule 3RCNY 608-01](#) requires that the property owner, manufacturer and/or installer develop an EMP that includes procedures for notifications, technical assistance and response to the incident location in the event of an emergency involving or affecting an outdoor stationary ESS (see 3RCNY 608-01 page 5). For each ESS installation, an EMP must be submitted to FDNY as follows:

- For **Small** systems (as defined in 3RCNY 608-01 page 15): As part of the Certificate of Approval (COA) process, battery manufacturers will be required to include a product-specific (not site-specific) EMP as part of their COA application package (e.g. as contained in the product Safety Data Sheet). Going forward, for small system installations the EMP will then be an integrated component of the product's COA. In the event of an emergency, the site's Certificate of Fitness (CoF) holder is required to expeditiously provide this EMP to FDNY. FDNY will not keep a copy of this EMP on file except as part of the product's COA.
- For **Medium & Large** systems (as defined in 3RCNY 608-01 page 15): The developer must submit an EMP that is both product- and site-specific as part of their FDNY permit application package. The EMP must be developed according to the format and content outlined in this document below. Content from the Certificate of Approval (COA) EMP/Safety Data Sheet can be used where applicable. A copy of the EMP must be retained by the Certificate of Fitness (CoF) holder and must be readily available at site lockbox(es) in the event of an emergency.

The EMP for Medium and Large systems should include the following sections:

0. Cover/Summary Page

1. Introduction

2. Site Description

3. Battery System information

4. Failure and Hazards

5. Fire Protections and Safety

6. Firefighting Considerations

7. Post Incident

8. Annex: Training, Explosion Analysis, and Risk Assessment

The following pages provide detailed instructional information for the content that should be included in each of the sections listed in the table above.

0. Cover/Summary Page

The EMP cover page should be two pages (front and back). Front page information should include:

- EMP Original Issuance date and EMP Revision Issuance date (where applicable)
- Emergency contact information for key contact and company/organization responsible for the ESS
- ESS type, manufacturer, and system size (kWh or MWh)
- Suppression systems (if provided)
- ESS site address and unique identifying number

The back page should consist of a simplified diagram of the site layout (not a detailed site-plan), including labeled container locations, standoff distances, E-stops, smoke/purge overrides, FDC's, hydrant locations, explosion vents, and key exposures (similar to items noted in 1.1.2 below).

1. Introduction

The first section of the EMP should include a high-level description of the purpose of the document and the details of the project, as outlined below.

1.1. High-Level Elements

- 1.1.1. Description of the ESS: High-level description of the ESS itself, including the system type, manufacturer, system size (kWh or MWh). This should also include a description of the criticality of the ESS pertaining to the effects and/or consequences of a full or partial shutdown.
- 1.1.2. Location of the ESS: High-level description of the location of the ESS, including address, lot features, and surrounding facilities. Aerial satellite image of site and surrounding exposures within 100 ft. of footprint of installation, including all enclosures and secondary equipment, as shown in Figure 1.

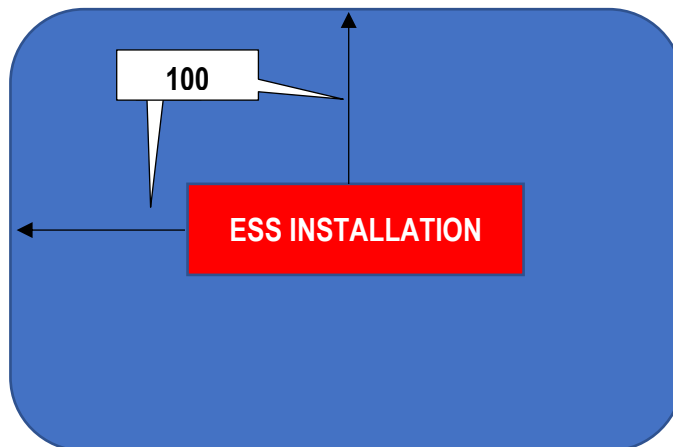


Fig. 1. Example of aerial image layout – must include exposures within 100 feet of all edges of the installation

NOTE: The entirety of Section 1.2 should incorporate the following standardized language from FDNY. If the standardized language below is not consistent with the installation, modifications should be made to reflect the appropriate elements needed for this installation.

1.2. *Scope of the EMP*

1.2.1. Purpose: *The purpose of this Plan is to provide guidance regarding the roles/responsibilities and chain of communication and command of the Certificate of Fitness (CoF) holder, Developer, Site Host, and/or other Subject Matter Experts (SMEs) during emergency response.*

1.2.2. Timeframe: *This EMP covers the timeframe from when the ESS reaches the installation location to when the decommission and removal process begins.*

1.2.3. Activation: *This plan will be activated during any emergency response as outlined in Section 6 below.*

1.2.4. Agency Jurisdiction: *This plan has been strictly developed for FDNY, and will not cover multi-agency response.*

1.2.5. Incident Command: *The CoF holder will integrate into incident command structure for an emergency as per FDNY [Certificate of Fitness Training B28/W28](#).*

Sections 1.3–1.6 of the EMP should include detailed information on the following:

1.3. Original Equipment Manufacturer (OEM) recommendations for fire safety equipment and facilities: A written procedure for inspecting, testing, controlling, and maintaining all protective devices, including but not limited all ESS-related alarms, shutdowns, and other safety features, as per the OEM recommendations, where regulations do not address it.

1.4. Definitions: A list of definitions specific to the ESS and the EMP itself, keeping consistent (as closely as possible) with FDNY definitions (including but not limited to 3RCNY 608-01 and the CoF)

1.5. Applicable codes and standards: A list of all standards, codes, permitting documents, and other regulations applicable to this product and/or installation, according to 3RCNY 608-01.

1.6. Plan update process: Overview of how the EMP will be updated, if needed, and how frequently the EMP review will occur. This should include:

1.6.1. Issuance and revision dates – dates of original EMP and any subsequent revisions

1.6.2. Update responsibilities – outline of the role of the CoF holder, system owner, and any other relevant entities in updating the EMP in the event that any changes are made to the ESS installation

1.6.3. Annual EMP review – description of annual review process by CoF holder and system owner.

1.6.4. Retirement – overview of plan for system retirement. This must reflect decommissioning date and include notification to FDNY by CoF holder and/or system owner.

2. Site Description

The second section of the EMP should provide a detailed understanding of the site on which the ESS will be installed. It should include descriptive language, pictures, drawings, and/or images of the following items where applicable. This information can be adapted from the Site Plan submitted as a part of the FDNY Installation Approval requirement for large energy storage systems, as per 3RCNY 608-01, Section (e).

- 2.1. Location
- 2.2. Flood zones, as delineated in [FEMA](#) flood maps
- 2.3. FDNY site access (apparatus and/or roof, including perimeter access and bulkheads)
- 2.4. Adjacent buildings (all four sides), including HVAC/Window openings/intakes
- 2.5. Hydrant locations
- 2.6. ESS shut off locations, including picture or diagram
- 2.7. Smoke/Gas Purge Switch location, including picture or diagram, with outlet location
- 2.8. Fire Department Connection (FDC) Locations (and/or standpipe outlet), including picture or diagram. These should be clearly distinguished from those that do not serve the ESS.
- 2.9. Signage, including picture (see [Energy Storage Permitting and Interconnection Process Guide for New York City: Lithium-Ion Outdoor Systems](#), page 24)
- 2.10. Rooftop covering materials including description of combustibility
- 2.11. Rooftop dunnage

3. Battery System information

The third section of the EMP should include a thorough description of the ESS and its components, including pictures of components where possible.

- 3.1. Energy Storage Capacity (MW and MWh)
 - 3.1.1. Battery Cell type
 - 3.1.2. Battery Module/Rack
 - 3.1.3. Racks/Enclosure
 - 3.1.4. Chemistry
- 3.2. Battery Management System (BMS) – manufacturer, BMS product name, fault and alarm list, and a description of whether/how the BMS will operate in the event of an ESS shut-down.
- 3.3. HVAC System – manufacturer, model, capacity, how ventilation is designed to function under normal or abnormal conditions
- 3.4. Inverters – manufacturer, model, certification
- 3.5. DC Disconnects (e-stop) – location and quantity
- 3.6. Connection to solar PV or other distributed/renewable energy generation and rapid shutdown functionality (if provided)
- 3.7. System grounding location(s)

4. Failure and Hazards

The fourth section of the EMP should include a list of hazards with a description of each, as well as causative factors as they pertain to this installation during an emergency, as identified in battery Safety Data Sheet (SDS) and ESS risk analyses. The following are the most commonly known hazards associated with ESS battery technology, but the EMP should include all of the hazards listed for the proposed battery technology as outlined in section 2.3 of the [FDNY Certificate of Fitness for Supervision of Outdoor Stationary ESS](#), along with any other relevant hazards, as applicable.

- 4.1. Electric shock
- 4.2. Arc Flash
- 4.3. Fire
- 4.4. Toxicity
- 4.5. Explosion
- 4.6. Liquid Spills
- 4.7. Stranded Energy
- 4.8. Re-ignition due to incomplete extinguishment
- 4.9. Other

5. Fire Protections and Safety

The fifth section of the EMP should include a brief description, including any applicable code references, of all fire protections and safety systems that apply to this installation, including but not limited to those listed below.

- 5.1. Fire suppression system information (water-based and alternative *if provided*) and zones
- 5.2. Fire detection system(s) linked into fire alarm, such as:
 - 5.2.1. Smoke detection
 - 5.2.2. Gas detection
 - 5.2.3. Flame detection
 - 5.2.4. Other
- 5.3. Deflagration/Explosion control
- 5.4. Manual smoke/gas purge
- 5.5. Other

6. Firefighting Considerations

The sixth section of the EMP should provide guidance for FDNY on emergency response and considerations based on test data, manufacturers' Safety Data Sheets, and analyses of the ESS.

- 6.1. Emergency Contact List: Roles, responsibilities, and contact information for:
 - 6.1.1. Certificate of Fitness (CoF) holder
 - 6.1.2. ESS Owner
 - 6.1.3. Subject Matter Expert (SME) if separate from CoF holder

6.1.4. Other (if applicable)

6.2. APIE (Analyze, Plan, Implement, and Evaluate) Framework:

APIE is a framework commonly used for emergency incident preparation and development of appropriate response protocol(s). The four elements of the framework are Analyze (or Assess), Plan, Implement, and Evaluate. An example APIE framework with simplified sample details pertaining to an Explosion incident is as follows:

- **Analyze:** provide signs and monitoring signals that indicate an explosion might take place that first responders should be aware of
- **Plan:** delineate the danger zone to mitigate risk to first responders and bystanders (pedestrians, vehicular traffic, etc.)
- **Implement:** enforce evacuations, street closures, reduced pedestrian and first responder exposure, and other impact areas that have a life safety concern, as applicable
- **Evaluate:** provide continuous monitoring and feedback of the incident, and adjust accordingly to ensure ongoing safety of any bystander or responder in the impact area

Section 6.2 of the EMP should describe the appropriate response protocol for each of the incident types listed below. For each incident type, please include:

- a) A narrative describing the anticipated potential impacts of the incident to the building and/or surrounding areas of an installation during an emergency.
- b) Relevant information about the participation and responsibilities of key personnel in the event of an incident (including the CoF Holder, ESS Owner, Operator, and any other SMEs with responsibility for the system), in accordance with the APIE format, or equivalent. Be sure to incorporate any hazard mitigation and fire protection features, as applicable.

6.2.1. Explosion Incident

6.2.2. Fire Incident

6.2.3. Thermal Runaway Incident

6.2.4. Mechanical Damage Incident

6.2.5. Thermal Exposure (external fire) Incident

6.2.6. Alarm Incident. This incident narrative should include situations with potentially erroneous alarms or alarms with no visual evidence of failure.

7. Post Incident

The seventh section of the EMP should refer to the Decommissioning Plan post-incident, regarding handling and provision. Note that the purview of this Emergency Management Plan document covers the period of the emergency situation only. Upon Fire Department hand-off, the Decommissioning Plan goes into effect. The Decommissioning Plan will be submitted and filed with FDNY as part of the project permit application/plan review. The CoF holder should be familiar with and have access to the Decommissioning Plan, and must be able to provide a copy to the FDNY Incident Commander (IC) upon request. A copy of the Decommissioning Plan is not required to be located/stored on file on site.

NOTE: The following boilerplate language below may be incorporated into section 7.1 of the EMP:

7.1 Activation of the decommissioning plan:

- *Upon notification, the CoF holder for the energy storage system will arrive on the scene within a 2-hour time frame*
- *Upon determination by the FDNY IC, when the IC deems the energy storage system site to be safe, the CoF holder will safeguard the scene until the damaged system is removed/repaired/replaced based on the approved decommissioning plan filed with FDNY.*
- *Based on FDNY IC assessment of the failure, full or partial shutdown of the energy storage system installation may be required.*

8. Annex: Training, Explosion Analysis, and Risk Assessment

The final section of the EMP should include copies of external documentation and analyses relevant to training, explosion analysis, and risk assessment, as described below.

- 8.1. Training and training materials: Description and inclusion of any training documentation and/or materials provided for emergency personnel, as applicable.
NOTE: In-person training may be required in FDNY's Letter of Approval for large systems. Reference to this EMP should be included in emergency personnel training and during the in-person site familiarization drill.
- 8.2. Explosion analysis (if applicable): Description and inclusion of any available analyses of explosion, safe standoff distance, and gas dispersion, conducted specific to the system and site that the EMP is intended for.
- 8.3. Risk assessment: Description and inclusion of any risk assessment analysis conducted specific to the system and site that the EMP is intended for. This could include Failure Modes Effects Analysis (FMEA), Hazard Mitigation Analysis (HMA), a Hazard and Operability Study (HAZOP) or Hazard Identification Study (HAZID), etc.