EXAMPLE

TERRA-GEN

Alcazar BESS ERP

Draft Emergency Response Plan

Prepared by:

FIRE & RISK ALLIANCE

05-22-2025

Rev A

EXAMPLE

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1 GENERAL INFORMATION

1.1 Scope

This document is an emergency response plan (ERP) for the Alcazar battery energy storage system (BESS) facility. The ERP provides a facility overview, site design, type of equipment, safety features, suppression and detection information along with response recommendations for failure scenarios that may reasonably occur at the BESS facility.

1.2 Purpose

The purpose of this ERP is to provide information to BESS subject matter experts (SME) and fire department personnel about potential hazards at BESS facilities. This guidance contained herein outlines the size-up and response tactics necessary to ensure safety and mitigate risks during emergency operations.

1.3 Applicant

Site contact: Terra-Gen

437 Madison Ave. Suite 22A

New York, NY, 10022

1.4 Location

430 Hurley Ave, Hurley, NY

1.5 Emergency Contact

Table 1 contains emergency contact information for any emergency that may occur at the Alcazar BESS. The complete emergency communication list can be found in Appendix B.

Table 1 Emergency Contacts

	Telephone Number
Remote Operations Center	(661) 886-9233
Emergency Point of Contact (David Sweet)	(661) 886-9233

1.6 Emergency Services Contact Information

Table 2 Emergency Services Contact Information

Emergency Services Agency	Address
All Emergencies	*Call 911*
Town of Ulster Fire Department	845-382-2765
Alcazar Police Department	845-382-1111
Kingston Hospital	10 Barbarossa Ln, Kingston, NY 12401

2 SITEOVERVIEW

2.1 General SiteOverview

The BESS facility is located at 430 Hurley Ave, Hurley, NY. The Alcazar BESS facility is approximately 15 acres. To the north of the site is an existing Hurley substation. To the east of the site is a residential area. To the south of the site is a highway. To the west of the site is the Central Hudson utility parcel.

The BESS facility is proposed to include the installation of Battery system cabinets. The facility is monitored by the remote operations center (ROC).

Fig 1. Site overview

2.2 Energy Storage System Site Overview

The facility consists of 60 BESS blocks and 4 auxiliary power skids, housing a total of 240 battery units and 60 power conversion systems (PCS). Each BESS block includes four battery units and one PCS.

Each PCS is equipped with an inverter, transformer, disconnect switch, and circuit breaker. The batteries supply DC voltage to the inverter, which converts it to 690 VAC. This output is then fed into a medium-voltage (MV) transformer. The transformer's high side delivers 34.5 kV to the main power substation, where the voltage is further stepped up for grid interconnection.

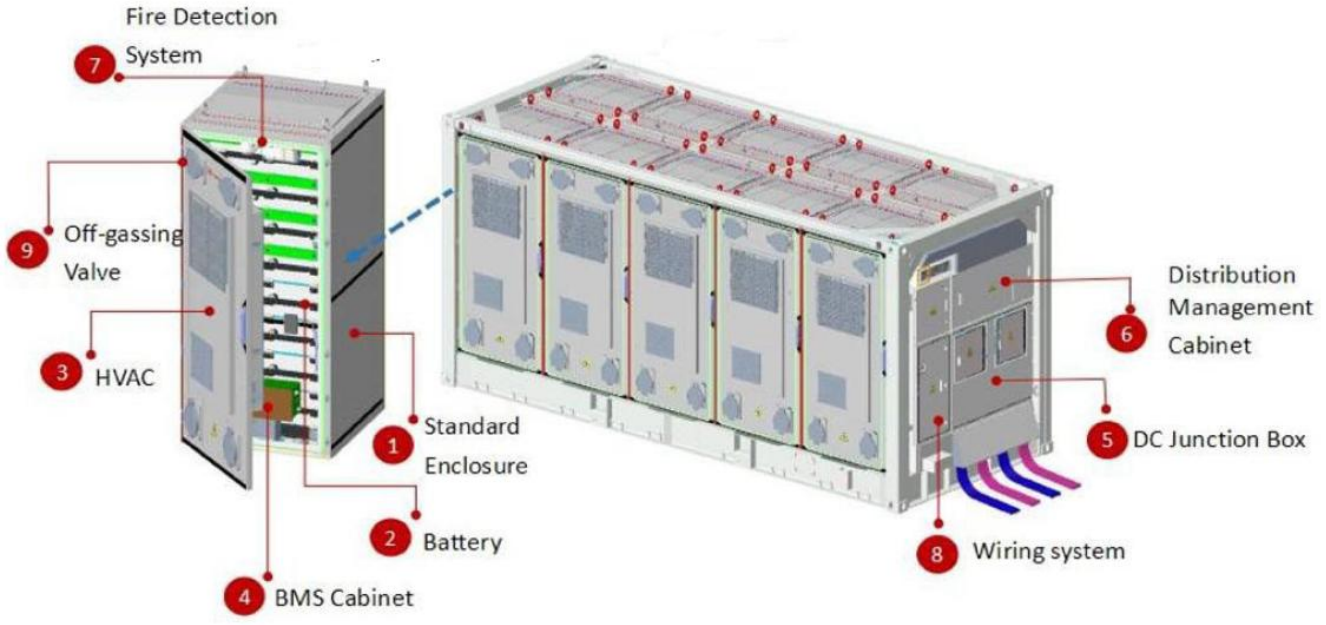
Figure 2 General Equipment Arrangement

3 MITIGATION

3.1 Battery Cabinet Equipment Overview

The smallest anatomy of a BESS is a cell. Cells are combined into modules which are combined into racks. Cabinets contain multiple racks and additional protection, monitoring and isolation features powered by on–site auxiliary power.

Each battery cabinet contains Battery system strings each containing multiple modules. Batteries are lithium–iron phosphate (LFP) chemistry.



Fire Alarm and Detection System and components in cabinet (Fig 3)

Each cabinet is equipped with a smoke detector, heat detector, and two flammable gas detectors. Cabinet devices are monitored by one of the nine fire alarm control panels (FACP) located around the site. Each FACP has a horn/strobe and manual pull station adjacent to it. FACP alarms are monitored by the ROC.

3.2.2 First Command Center

A graphic annunciator panel is located at the northernmost FACP as shown in Figure 2. This panel will display alarms from the site fire alarm system. Personnel should not make entry into the site to view this panel without guidance from the BESS SME.

3.2.3 Fire Suppression System

The cabinets are not equipped with a suppression system. There is no agent listed for the interruption or suppression of thermal runaway. Attempts to suppress battery fires will not stop the battery failure event.

3.2.4 Fire Protection Water Supply

Fire Protection Water will come from a 30,000–gallon tank located at the front of the site. The water tank is outside of the wall and easy to access.

Figure 4 Site Water Supply

3.3 Explosion PreventionSystem

Each battery container is equipped with a mechanical ventilation system for explosion prevention. The typical system contains two inlets with fans at the bottom and two outlets at the top to exhaust gases, as illustrated in Figure 5. The system is activated by the combustible gas detector and is designed to keep the concentration of gas within the container (during a failure event) from reaching the flammable range.

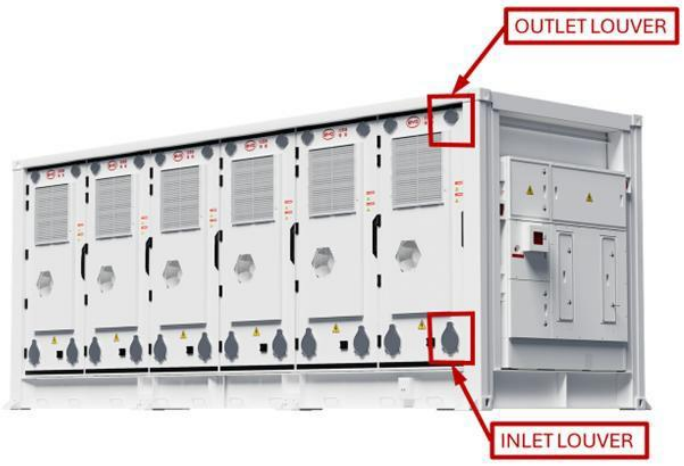


Figure 5 Explosion Prevention System

3.4 Battery ManagementSystem

The battery management system (BMS) monitors, protects, and manages the BESS, ensuring battery health parameters are maintained for efficient and continual operation.

Table 3 BMS Functions

Monitoring	The BMS continuously monitors key parameters such as voltage, current, temperature, and state of charge (SOC).
Protection	The BMS protects the battery from over-charging, over-discharging, over-current, over-temperature, and short circuits by isolating batteries that exceed predetermined operating parameters.
Balancing	The BMS helps to equalize the SOC across all cells.
Thermal Management	The BMS regulates the battery temperature by controlling heating or cooling systems, keeping the battery within the predetermined temperature range.
Power Control	The BMS regulates the power in and out of the batteries.
Communication	The BMS remotely communicates the status of monitored parameters and autonomously performed functions.

3.5 EmergencyStop

An emergency stop (E-Stop) button is usually located at each end of the cabinet. The operation of a BESS E-Stop isolates the BESS cabinet. Though isolated, the BESS batteries still maintain their SOC. Never approach a trouble cabinet for manual activation of the E-Stop.

4 PREPAREDNESS

4.1 Chemical Hazards

4.1.1 Combustion Gas

During a failure event, battery cells produce toxic gases that have the potential to be harmful to site personnel and first responders. If the failure spreads to other BESS components, it can produce additional toxic gases similar to those released during the combustion of ordinary manufactured products. Although outdoor BESS cabinets are not occupiable, site personnel and first responders can still be exposed to these toxic gases while operating near a BESS during a failure or fire event. In the event of a gas release, these toxic gases are expected to be diluted by the entrainment of outside air. Fire department personnel should wear the appropriate PPE, as outlined in Section 4.5.

4.1.2 Hydrogen

When the temperature of a cell reaches the venting stage, the primary hazard is the production of hydrogen gas (H2). The gas is odorless, colorless, and requires internal sensors or external meters for detection. H2 is flammable and lighter than air.

Table 4 Hydrogen Characteristics

Appearance	Colorless Gas
Odor	Odorless
LFL	4%
UFL	76%
Auto Ignition	500˚C/932˚F
25% LFL	1% or 10,000 ppm
Vapor Density	0.69

4.1.3 Carbon Monoxide

CO is an odorless, colorless, and requires internal sensors or external meters for detection. CO is produced during incomplete combustion and/or cell failure.

Table 5 Carbon Monoxide Characteristics

Appearance	Colorless Gas
Odor	Odorless
LFL	12.5 %
UFL	74.2%
Auto Ignition	607° C (1125° F)
25% LFL	3.125% or 31,250 ppm
Vapor Density	0.97 (Air = 1)

4.1.4 Transformer Dielectric Fluid

Dielectric fluid is used to insulate and cool site transformers such as PCS transformers and auxiliary power transformers. During a transformer failure, arcing and sustained fire can lead to heat retention in the windings and metal cabinet of the transformer, making this a persistent fire.

4.1.5 Refrigerant

Refrigerant is commonly used within the BESS thermal management system. Typically, refrigerants are nonflammable under normal operating conditions. However, refrigerants are pressurized and can become combustible when mixed with air at elevated temperatures and pressures. Refrigerants can also release toxic by-products as a result of heating and decomposition. In high concentrations, refrigerants can also become an asphyxiation hazard.

Table 6 Refrigerant Characteristics

Appearance	Colorless Liquid
Odor	Faintly Sweet

4.2 Electrical Hazards

OSHA requires a safe standoff distance of 10 feet from exposed energized conductors of 50,000 volts or less to prevent casual contact. An additional 4 inches of clearances is required for each 10,000 volt increment over 50kV.

BESS products contain batteries that are **ALWAYS energized** and present an electrical hazard even when disconnected from an electrical source.

During standard conditions, there are limited exposed conductors in a BESS facility. However, equipment that is not normally energized may become energized if protective shielding or insulation is damaged. DC stray voltage testing should be conducted on equipment until stray voltage from stranded energy can be safely ruled out.

Non-contact devices are only capable of identifying AC. A multi-meter is required to detect DC within a BESS facility.

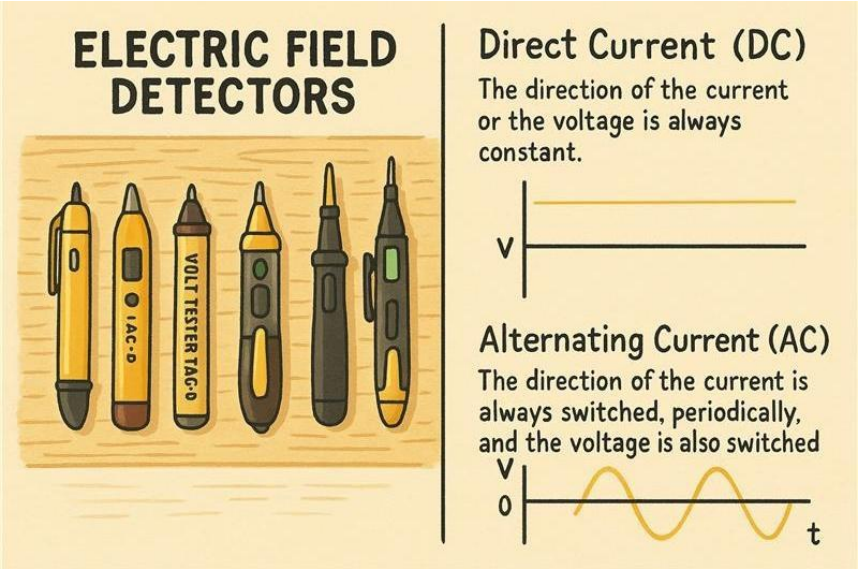


Figure 7 E-Field Detectors & AC/DC Illustration

4.3 Thermal Runaway and Fire Hazards

During thermal runaway, flammable gas and heat is produced. Failure may spread to adjacent cells or modules and the gas may ignite. Due to the high pressure at which these gases vent and the lack of a listed suppression agent, no attempt should be made to suppress this fire.

4.4 Explosion Hazard

The failure of a cell will begin with the venting stage; this is the pre-cursor to thermal runaway. Accumulation of flammable gases within a confined space, such as a BESS cabinet, can lead to an explosive atmosphere. An explosion occurs when accumulated cell vent gases have a delayed ignition. While safety features are present to decrease the risk of an explosion, always assume that they are non-operational. Maintain an exclusion zone from the trouble equipment for the duration of the incident.

4.5 Recommended PPE

The recommended PPE is NFPA 1971 structural firefighting gear and the use of a self-contained breathing apparatus (SCBA). All chemicals associated with the failure of BESS equipment and ancillary electrical components present dermal and respiratory hazards.

Note: The PPE recommendation is for emergency response operations and life safety. PPE recommendations for the post-fire removal of damaged modules will be defined by conditions found at the time of decommissioning. In addition, structural firefighting ensembles are not designed to provide protection from arc flash hazards.

5 RESPONSE

5.1 Command andControl

5.1.1 BESS Subject Matter Expert

Typically, a BESS SME is a person or group familiar with the battery system, the site layout and equipment, installation guides and manuals, the BMS architecture, passive and active protection systems, notification sequencing, and this ERP.

5.1.2 Unified CommandStructure

Low frequency high hazard incidents, such as a BESS emergency, may not be managed by a single incident commander. The unified command concept may be employed to ensure all stakeholders collaborate to achieve the operational goals. Responding fire department personnel shall follow jurisdictional command structure Standard Operating Procedures (SOPs).

The BESS SME, equipment owner, and site operator play a critical role guiding fire department personnel responding to a BESS emergency by coordinating the following:

- Ensuring security of the site and limit access to only authorized personnel
- Ensuring accountability of non–fire department personnel inside the facility.
- Ensuring authorized personnel have PPE that is appropriate to their assigned role/task.
- Reviewing and interpreting BMS data including SOC, state of health (SOH), temperature, and status of equipment.
- Locating and isolating trouble equipment.
- Ensuring an exclusion zone has been established around the trouble equipment.
- Expanding exclusion zone in the event additional battery cabinets sustain alarms or direct fire impingement.
- Evaluating the status of the explosion control and prevention system (if applicable)
- Identifying need for exposure protection.
- Leading post–incidentoperations.
- Administering decommissioningplan.

5.2 Tactics

DO NOT FORCE ENTRY

Fire department personnel should not encroach within 100 feet of the facility fence line until the trouble battery cabinet has been identified.

Upon arrival, fire department incident command should contact the ROC to obtain preliminary information including the following:

- Accountability
  - Were any personnel present at the site?
  - If personnel are present, what is the status of their accountability?
- Location of Equipment in Alarm
  - What is the type and location of the trouble equipment
- Alarm Type
  - What type of alarm has generated the initial response and have any other alarms been received that would suggest conditions are deteriorating?
- Isolation of Trouble Equipment
  - Has trouble equipment should be isolated autonomously?
- Explosion Control and Prevention Systems
  - What is the status of the explosion control and prevention system?

5.2.1 Life Safety

BESS facilities are normally not staffed and are observed and controlled remotely. However, facility personnel may be on-site periodically for inspection, testing and maintenance of equipment. Accountability shall be confirmed with the remote monitoring facility.

Obvious line of site rescues is the priority for responding fire department personnel. Fire department personnel shall not enter the facility for recovery operations.
Air monitoring shall be established outside the facility to evaluate gas dispersion from equipment failure. If conditions warrant, consider evacuating affected areas.

5.2.2 Exclusion Zone

Once the trouble equipment is identified, establish a 100-foot exclusion zone. Expand the exclusion zone if failure conditions spread to adjacent equipment.

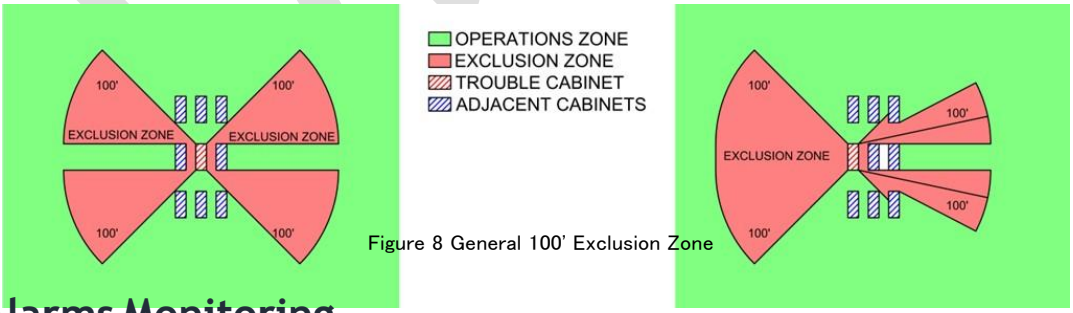


Figure 8 General 100' Exclusion Zone

5.2.3 Alarms Monitoring

Monitor input alarms from the FACP and the BMS for the trouble equipment. Evaluate alarms in adjacent

equipment to determine if failure is propagating.

5.2.4 Isolation of Trouble Equipment

Confirm trouble equipment has been autonomously isolated. If recommended by the BESS SME, remotely isolated adjacentequipment.

Fire Department personnel should never operate equipment or controls within the site. The BESS SME will coordinate all operational requests.

Never approach a trouble cabinet for manual activation of the E-Stop.

5.2.5 Condition Monitoring

From outside the exclusion zone, visually and audibly monitor the conditions of the trouble cabinet. Look for the presence of white gas, smoke, fire, and damage to the cabinet. Even if there are no visible or audible indications of failure, hazards to responding fire department personnel may still be present.

5.2.6 Exposure Assessment

Assess the adjacent equipment to determine if exposure protection is necessary. Evaluate the following:

- Are there any alarms in adjacent equipment?
- Based on thermal imaging camera readings, is there any increase in temperature on adjacent equipment?
- Is there any direct flame impingement on adjacent equipment?

5.2.7 Exposure Protection

If necessary and recommended by the BESS SME, exposure protection shall be performed. While maintaining the exclusion zone, establish a continuous water supply. From outside the exclusion zone, using a rain down method, lob water in a fog pattern to cool the exposure equipment. Do not use a solid or straight stream to ensure fire department personnel safety and limit water intrusion into uninvolved equipment.

5.3 Incident Stabilization

5.3.1 Under Control

The incident may be considered under control when:

- Fire is contained to the equipment involved with no exposure concerns
- No new alarms have been generated
- The volume of fire or gas has decreased

Once the incident has been placed under control the facility shall be under continuous fire-watch.

6 RECOVERY

Recovery focuses on equipment assessments for determining repair, replacement, or restoration as part of the facility owner/operator's recovery plan. Implementation of the recovery plan is the responsibility of the facility owner/operator and should be overseen by the BESS SME. Fire department involvement in the recovery plan is at the discretion of the BESS SME and the facility owner/operator.

Typical facility recovery plans can include:

- Facility fire watch
- Post-incident equipment assessment
- Lock out/Tag out
- Decommissioning
- Installation of new equipment
- Recommissioning

7 REVISION SHEET

Rev. No.	Date	Written By	Reviewed By	Approved By	Notes

A. INCIDENT MANAGEMENT TEAM CONTACT LIST

Name	ICS Role	Cell Phone Number
Ward Scobee	Qualified Individual	(917) 912-8720
Amy Roth	Qualified Individual	(312) 813-2159
David Sweet	Incident Commander (IC)	(661) 886-9233
Cole Berman	Incident Commander (IC)	(661) 713-2655
	IC Scribe	

Command Staff		
Amy Roth	Public Information Officer (PIO)	(312) 813-2159
Simon Day	Public Information Officer (PIO)	(415) 404-0807
Mark Turner	Public Information Officer (PIO)	(916) 835-8119
Whitney Goller	Liaison Officer(LNO)	(661) 979-4785
Mike Tran	Liaison Officer(LNO)	(562) 506-5514
Vanessa Newmarker	Asst Liaison Officer (LNO)	(858) 585-1607
Michael Roberson	Safety Officer (SOFR)	(760) 953-1458
Cesar Guerra	Safety Officer (SOFR)	(760) 984-8096
Carlos Vera	Asst Safety Officer (SOFR)	(661) 633-4505

Operations Section		
TBD		

Planning Section		
TBD		

Logistics Section

Finance/Administration Section		
Susan Padilla	Finance Section Chief (FSC)	(775) 741-7369

B. EMERGENCY COMMUNICATIONS LIST

TBD

EXAMPLE