CUSTOMER SUCCESS STORY

FIRE AUTHORITIES ADOPT EARLY THERMAL RUNAWAY DETECTION TECHNOLOGY IN DATA CENTER

Overview

For data centers across the United States, two of the most dreaded words are “down time”. That’s one reason demand for Battery Energy Storage Systems (BESS) is rapidly increasing. Comprised of an interconnected series of batteries, BESS are self-contained, rechargeable units that store energy which can be deployed in the event of a power loss from the primary source. This makes a BESS an ideal backup power source for data centers.

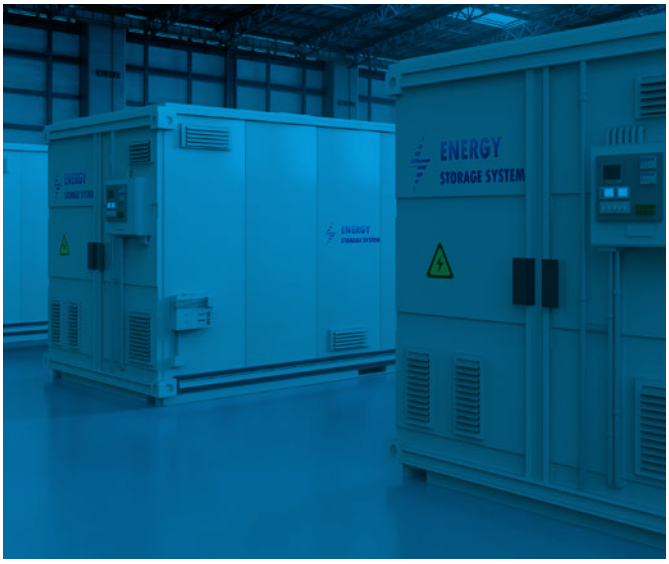
The Challenge

Despite the benefit of potentially saving millions in lost revenue due to power disruptions, BESS are not without hazards since, at their core, they often use rechargeable lithium-ion (Li-ion) batteries. Here, thermal runaway can occur due to thermal abuse or overcharging, which can cause the electrolyte solution inside of a Li-ion battery to begin to turn into a combustible vapor. The smoke and gas detectors currently required in BESS are searching for particles of combustion, which are not present until thermal runaway is already underway.

Now, a growing number of fire authorities and experts are recommending detection technology that provides a warning far earlier than traditional monitoring and detection methods to help stop thermal runaway before it begins, increasing data center safety and reliability.

The needs are:

- Earlier Li-ion battery off-gas detection than required by current codes
- Accurate locating of the source
- Automatic power cutoff to the BESS and mitigation
- Aspirating smoke detection
- Advanced fire panel that can deliver early alerts for occupants and responders



PROJECT:
BESS

END USER/LOCATION:
Phoenix Area Data Center, US

INDUSTRY:
Lithium-ion Batteries

PARTNER:
Progressive Edge Technologies

SOLUTION:
Li-ion Tamer
VESDA Aspirating Smoke Detector

“When combined with VESDA and fire suppression system elements, Li-ion Tamer provides the tools and the interface we need to protect BESS essentially anywhere they are installed.”

Randy Snow
Managing Principal, Progressive Edge Technologies

The Solution

When a Phoenix area data center decided to install a large quantity of Li-ion BESS, the local Authority Having Jurisdiction (AHJ) required that gas detection solutions be retrofitted into the eight existing BESS containers as well as additional BESS containers planned for the site.

To satisfy the requirements for the project, the AHJ contacted Randy Snow, Managing Principal at Progressive Edge Technologies, a Phoenix, Arizona fire and life safety consulting firm. Snow considered code-approved gas detection systems used in BESS, but wishing to provide a more robust solution, he consulted with Kenneth Pope at Pope Technologies, who recommended Li-ion Tamer, a Honeywell detector that specifically targets the off-gas electrolyte vapor characteristic of a Li-ion battery cell vent release.

Li-ion Tamer consists of a controller and a network of off-gas sensors installed above the battery racks. The sensors use sophisticated detection algorithms to monitor Li-ion BESS and provide an early alert to the initial venting of electrolyte solvent vapors.

This early warning helps prevent fires by allowing time to shut down the charge to the affected rack(s) within the estimated 8-15 minutes between initial off-gassing and the beginning of thermal runaway.

The Li-ion Tamer controller is designed to pinpoint the source of the off-gassing, enabling quicker alarm initiation and mitigation measures such as opening vents, engaging exhaust fans, power isolation and alerting occupants and first responders.

Snow states they now use Li-ion Tamer in the data center BESS, along with other fire detection and suppression technologies such as a VESDA aspirating smoke detector for early warning because the heat from a combustion fire in the BESS can trigger a Li-ion thermal runaway event as well.

“Today, the new technology for preventing thermal runaway is ahead of the [NFPA] code and most AHJs are open to technology that satisfies the code’s intent. So, the consensus is moving toward installing Li-ion-specific early warning detection systems over more generalized gas detection technologies.”

***Kenneth Pope** - President Pope Technologies LLC, a fire alarm and smoke control systems designer and installer*

For backup power systems, a new standard of detection is available for BESS to help eliminate the dangers of thermal runaway.

The Outcome

More and more BESS are being installed by utilities, renewable energy producers, and those in the industrial, retail, defense, healthcare, and transportation sectors. So the importance of lithium-ion-specific early warning detection systems will become critical across the economy.