Battery Energy Storage Safety

Frequently Asked Questions

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1. Why do we need battery energy storage systems?

Grid-scale battery energy storage systems are critical to modernizing our electric grid and reducing pollution from fossil fuels. They typically incorporate the same core lithium-ion technology as the batteries that power the phone in your pocket, but at a larger scale, and with their own unique and rigorous set of safety standards, certifications and regulations. These energy storage systems are necessary to achieve a **modernized, affordable electricity grid**, as they:

- **lower utility bills** by helping make the grid more efficient, driving down energy system costs and providing bill discounts;
- **stabilize the grid**, reducing risk of outages during times of stress;
- provide resilient **backup power** in the event of an emergency;
- **clean the air** by directly reducing reliance on peaker plants, which means **improved health** outcomes; and
- **support energy independence** by increasing reliability of local energy sources like wind and solar.

2. What are lithium-ion batteries?

Any product that you own that you can recharge, chances are it uses lithium-ion batteries. The lithium-ion battery is a Nobel-prize winning technology first developed in the 1970s by SUNY Binghamton Professor M. Stanley Whittingham. Not only are lithium-ion batteries good at being recharged, but they are also energy dense, meaning they can hold a lot of energy in a small amount of space, making them lightweight, compact, and versatile.

Lithium-ion batteries have revolutionized modern technologies, enabling portable consumer electronics like laptops, cell phones, and electric toothbrushes; powering electric vehicles from passenger cars to buses, trucks, and helicopters; enabling medical devices like pacemakers, infusion pumps and mobile medical carts; and supplying defense systems, satellites, AI data centers, and the electricity grid itself with critical power supplies.

3. Is battery energy storage a safe and proven technology?

Yes! Stationary battery energy storage systems are rigorously tested, vetted, certified, and built to comply with extensive national and international safety standards. The risks posed by batteries, like all electrical infrastructure, can be mitigated or eliminated with rigorous testing and safety standards. That's why product certifications are so important. The most widely recognized battery energy storage safety standards include Underwriter Laboratories (UL) certification and compliance with National Fire Protection Association (NFPA) standards:

- **Underwriter Laboratories (UL) Certification or equivalent.** UL is a third-party certification company founded in 1894 that develops industry-wide safety standards for a wide range of electrical products and lays out severe testing protocols to demonstrate product safety. While other third-party companies also provide similar standards and certification services, UL is the gold standard and the most common in the U.S. You may have noticed a UL sticker on your toaster, refrigerator, or extension cord. Most consumer electrical products sold in the U.S. are required by law to be tested, listed, and labeled by a third-party certified laboratory such as UL to protect consumers from unsafe products. In New York State, all battery energy storage systems are required to meet the following standards:
    - UL 1642 & UL 1973: evaluate and certify the safety and performance of the battery cells (UL 1642) and modules (UL 1973), which together comprise the building blocks of battery energy storage systems. These certifications test their ability to withstand mechanical stress and electrical faults.

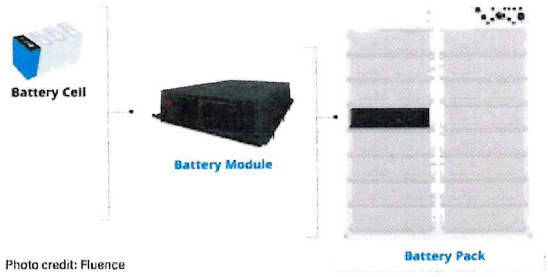
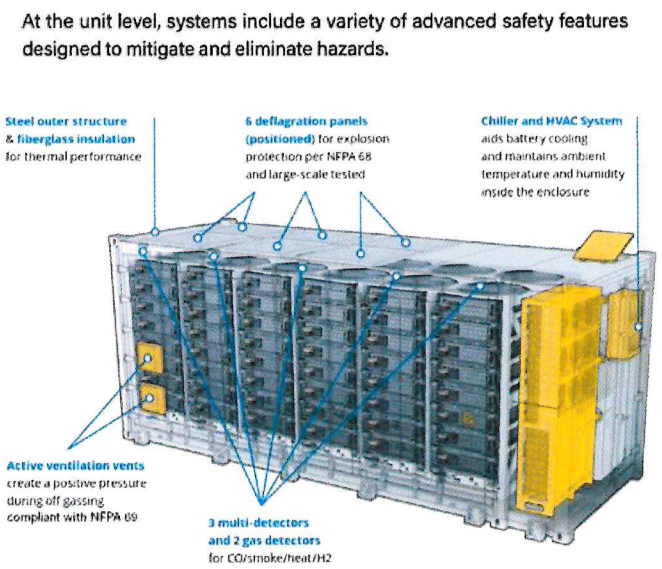


Photo credit: Fluence

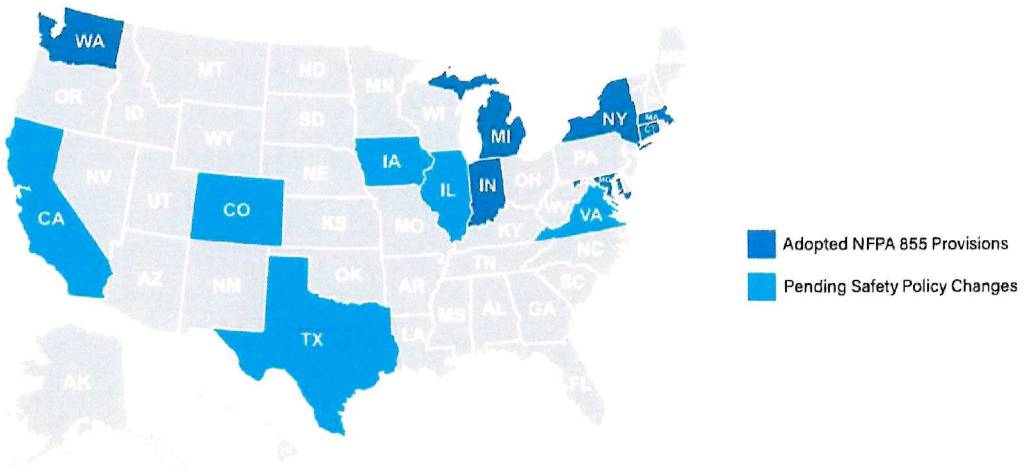
- UL 9540: builds on UL 1642 and UL 1973 by evaluating and certifying the entire battery energy storage system, verifying that it meets rigorous fire, electrical, and functional safety requirements.
- UL9540A: tests performance of the battery energy storage system under failure conditions, to ensure that in the rare case of a fire, the fire will be contained within a single unit located within the secure facility site and won't spread to other units. Data from the testing can inform product design, installation parameters, and code official decisions.



Graphics courtesy of Fluence

These standards take each product several years to obtain, providing a thorough testing framework to minimize risks, protect facilities and communities, and instill confidence in the safety of the technology.

- **National Fire Protection Association (NFPA) requirements.** NFPA is a U.S.-based nonprofit organization that develops and publishes standards relating to fire and building safety that are recognized and respected around the world. The national standard for battery energy storage safety, NFPA 855, provides requirements for the design, installation, commissioning, operation, maintenance, and decommissioning of battery energy storage facilities. It also outlines the necessary collaboration between the battery energy storage industry and local first responders to maximize the safe and reliable performance of battery energy storage as critical grid infrastructure. Adopting and enforcing the latest edition of NFPA 855 is the best approach to ensure safety at all future battery energy storage facilities. New York State has been a national leader in contributing to the development and early adoption of NFPA 855. NFPA 855 includes provisions that comprehensively address fire risks, including venting (NFPA 68), explosion prevention (NFPA 69), electric code (NFPA 70), and fire alarms and signalling (NFPA 72).



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4. How does New York State's Fire Code regulate battery energy storage?

All battery energy storage systems in New York must be designed and installed in accordance with the New York State 2020 Fire Code; the recently adopted 2025 Fire Code goes into effect Statewide January 1, 2026. New York State Code aligns with and exceeds NFPA 855, the national standard for battery energy storage safety, and incorporates additional expertise from bodies such as the New York City Fire Department, a national leader on safety standards for battery energy storage in dense urban environments.

The 2020 Fire Code currently requires, among other specifications:

- All relevant **permits** to be obtained from the local Authority Having Jurisdiction (AHJ);
- Redundant safety features for **fire prevention and mitigation** (in accordance with NFPA 855);
- **Hazard Mitigation Analyses**, which evaluate the consequences of potential worst-case failure scenarios and prescribes mitigation measures to ensure any impacts are strictly contained;
- Rigorous **testing and certification** (UL1973, UL9540), including **large-scale fire testing** (UL9540A), which demonstrates that any worst-case failure scenario involving a fire in one unit will not spread to an adjacent unit;
- Advanced **monitoring and controls** to enhance system safety;
- **Fire mitigation personnel** to be immediately dispatched in the event of an emergency, at the system owner's expense; and
- A detailed **commissioning plan** that documents the people who are qualified to service, maintain, and decommission the system, and respond to any incidents.

The 2025 Fire Code additionally requires:

- Independent **peer reviews** for all projects.
- **Special inspections** for BESS installations to ensure thorough safety and compliance.
- Battery Management System (BMS) data to be **monitored by 24/7 staffed Network Operations Center (NOC)**, including immediate communication of critical failure notifications.
- **Monitoring of fire detection systems** by a central station service alarm system to ensure timely, proper notification to the local fire department.
- Submission of an **Emergency Response Plan (ERP)**, including an annual **local first responder training.**

5. Are battery energy storage fires common?

The short answer is no; fire-related incidents at battery energy storage facilities connected to the electric grid are incredibly rare. There have been 23 incidents in the last 10 years at U.S. operating utility-scale battery energy storage facilities, despite battery energy storage deployment growth of more than 25,000% nationally since 2018. In comparison, NFPA estimates that there were more than 210,000 fuel-based vehicle fire incidents in 2023 alone.

Notably, e-bike battery fires have raised significant concerns in New York in recent years, with over 250 e-bike fires in New York City in 2023. E-bikes are not yet regulated as strictly as stationary battery energy storage systems, with many off-market products made with improperly manufactured or modified parts that lack proper testing and UL certification, causing dangerous situations for consumers. To address e-bike battery safety, New York State leaders have launched initiatives to prevent fires caused by uncertified batteries, with initiatives like the "Buy Safe, Charge Safe" campaign and legislation requiring e-bike battery UL testing certification. In contrast, UL testing and certification is already a foundational component of permitting for stationary battery energy storage systems.

While any risk of fire raises legitimate community concerns, there has never been a fire incident at a battery energy storage facility that has spread beyond the secure site of the grid-scale facility. In fact, systems designed in accordance with NFPA 855, which in turn requires compliance with UL 9540 and testing to UL 9540A, have mitigations in place to limit and contain any fire to a single battery cell or module within an energy storage system container. Further, laboratory and real-world testing of emissions from lithium-ion cells during a fire, such as this report from Escondido, California, shows that emissions are similar to those found in plastics, couch, or automobile fires.

6. Given all the safety standards, why have there been fires at grid-facing battery energy storage installations?

Past safety incidents have mainly been due to faulty designs or equipment that would not have satisfied current safety regulations in place in New York. Below is an overview of two high-profile fire safety events at battery energy storage facilities, why they occurred, and lessons learned.

Location	Surprise, Arizona	Moss Landing, California
Size of system	2 MW	300 MW
Year of installation	2016	2020
Date of incident	April 19, 2019	January 16, 2025
Why it happened	The battery container did not have proper ventilation, leading to a buildup of gases. When first responders opened the enclosure door, introducing oxygen, the accumulated gases ignited, resulting in an explosion. This has been the only U.S. grid-scale battery storage incident resulting in reported injuries.	The energy storage system was sited in a 75-year-old gas turbine facility not designed to house modern battery energy storage systems. The batteries were not compartmentalized, so the fire was not prevented from spreading from one unit to the next. This resulted in a fire that was 240 times larger than what would have been seen in a single unit fire in a standard containerized unit. The investigation into the root cause of the fire is still ongoing.
Injuries	Four firefighter injuries	No injuries
Lessons learned	Following this event, explosion prevention was a top priority integrated into the 2023 updates to NFPA 855. Proper venting is now required to prevent the accumulation of flammable gases, and deflagration vent panels are required to provide an engineered pathway in a worst-case scenario for expanding pressure to escape in a predetermined direction. A system like this would not be allowed to be built in New York State.	The system was not designed to NFPA 855 standards, which require all facilities to (a) compartmentalize the batteries and (b) undergo large-scale fire testing to demonstrate that in a worst-case scenario, the fire will not spread. Compliance with NFPA 855 ensures that all battery energy storage facilities are sited only in buildings or enclosures that were specifically designed to safely house them. Because New York State has already adopted NFPA 855, a system like the one built at Moss Landing would not be allowed to be built in New York State.

In 2023, New York experienced three incidents at battery energy storage facilities in Jefferson, Orange, and Suffolk Counties. While these incidents resulted in no injuries, Governor Hochul convened the Interagency Fire Safety Working Group, which evaluated both preventive and reactive standards and practices for battery system fire safety, in addition to analyzing the impacts of the fires. Based on available analyses of air quality, soil, and water data collected by a third-party in the days following the incidents, **the Working Group concluded that there were no harmful levels of toxins detected.**

The Working Group also partnered with subject matter experts to inspect all operational battery energy storage systems above 300 kW in New York to ensure compliance with current safety standards. Finally, the Working Group reviewed all relevant and current Codes, Standards, and Regulations and provided a summary of recommendations to the NYS Fire Prevention and Building Code Council, which were incorporated in the 2025 Code update.

7. Are New York's local fire departments able to respond to a battery fire in the event of an emergency?

Developers of battery energy storage projects in New York State work closely with local fire departments to ensure safe system design, provide training, and share information about risks to ensure first responders are prepared to respond appropriately in the event of an emergency. Indeed, all projects receiving NYSERDA incentives must maintain a safety and emergency response plan tailored to the specific project, developed in collaboration with local fire officials. This is now also required in the 2025 Fire Code.

The industry is committed to ensuring regular, high-quality training for first responders, preparing them for coordinated responses that prioritize safety. Further, the industry supports integrating battery safety experts into the State's emergency response infrastructure to ensure that all local jurisdictions have the support they need to respond in the event of an emergency.

Notably, energy storage systems in New York are required to be designed to: 1) prevent propagation of any fire to adjacent systems or properties, through use of firewalls, clearances, and/or setbacks, and 2) minimize the possibility of personal injury in the event of an emergency. Battery energy storage systems are monitored 24/7, with immediate notifications to local authorities in the event of an incident. No specialized equipment is required to respond to a battery fire as compared to a standard structure fire.

8. What legislative initiatives will help ensure the successful development of energy storage in New York?

Legislator support for the following two initiatives is critical to unlock energy storage in New York and ensure we stay on track to achieving the climate and equity mandates of the Climate Leadership and Community Protection Act:

a. Sales Tax Exemption for commercial energy storage: Fossil fuel equipment, solar, and fuel cells already receive a Sales Tax Exemption. Adding an exemption for commercial energy storage has **bipartisan support** in the robust co-sponsorship of S.1527 (Parker) / A.313 (Paulin). A Sales Tax Exemption for commercial energy storage will accelerate deployment, helping to **support a modernized, reliable grid,** while **reducing costs** to ratepayers and having **minimal fiscal impact** to the State.

b. State permitting process for energy storage 25MW or greater: The permitting process for large energy storage systems can be technically complex, and not all local jurisdictions enforce regulations consistently. To **standardize** this process across the State and to ensure that all large battery energy storage systems built in New York are **consistently held to the highest safety standards**, the industry supports a statewide permitting process for energy storage systems 25 megawatts or greater under the Office of Renewable Energy Siting and Electrical Transmission (ORES), in line with the treatment of renewables and electric transmission infrastructure, as described in S.5506 (Kavanagh) / A.8378 (Levenberg).

For more information, please visit:

- New York's Inter-Agency Fire Safety Working Group
- NY-BEST
- American Clean Power
- Alliance for Clean Energy New York

You can also reach out to us directly with any questions at info@ny-best.org.