

NYC and the Case for Residential Energy Storage

New York Solar Energy Industries Association

March 2024

In 2012, Superstorm Sandy hit the New York City region, giving many New Yorkers their first taste of the severe impacts of climate change. More than [8 million households lost power](#), and for some, it took weeks to fully come back online. Even those who were lucky enough to have backup generators went without power, as many generators were damaged by the flood and/or gasoline was in short supply. In a limited number of cases, solar panels paired with batteries were able to provide critical backup power to NYC residents, from Far Rockaway to Manhattan.

Since Sandy, the cost of solar and energy storage has declined precipitously, and the chemistry of advanced energy storage systems has improved safety and efficiency. Across the United States, hundreds of thousands of residential battery energy storage systems (BESS) provide households with utility bill savings and resilient backup power while reducing the need for polluting fossil fuel power when the batteries discharge to the electricity grid. There are 20 gas-fired power plants in New York City, and local air pollution leads to [2,400 premature deaths per year](#), according to the NYC Department of Health and Mental Hygiene. Solar and BESS can reduce fossil fuel combustion in NYC, supporting progress toward City and State clean energy goals while improving public health and saving lives.

Residential BESS is now commonplace across the country and around the world, with rising BESS attachment rates for solar installations in California, Hawaii, Puerto Rico, Massachusetts and even on Long Island. However, for NYC homeowners, BESS, and the associated utility bill savings, resilient backup power, and the environmental benefits are still out of reach. New York City has adopted a fire code that makes the installation of residential BESS infeasible by imposing requirements that only large-scale BESS can meet in most cases. In essence, New York City's fire code is a de facto ban on the installation of residential BESS in NYC.

In the summer of 2022, New York Solar Energy Industries Association (NYSEIA) met with the FDNY and began advocating for an expedited permitting process for small, residential BESS. The FDNY had been working with the City University of New York, the NYC Mayor's Office of Climate and Environmental Justice, and the NYC Department of Buildings on efforts to improve BESS permitting. FDNY committed to establishing expedited permitting requirements for residential BESS up to 20 kilowatt hours (kWh) in capacity. The expedited process is intended to only apply to rigorously vetted BESS systems. To access the proposed expedited permitting process, the BESS must: 1) undergo UL 9540A testing; 2) be evaluated for safety by a fire protection engineer; 3) apply for and receive a Certificate of Approval (COA) from the FDNY; and 4) be engineered, permitted and installed by licensed professionals in accordance with NYC fire code, building code and the COA.

NYSEIA appreciates the FDNY's efforts to establish an expedited permitting process for residential BESS, however the FDNY's proposal includes several requirements that are infeasible for the industry to meet. NYSEIA and several leading BESS manufacturers provided the FDNY with feedback on their

proposed expedited permitting process raising these concerns in the spring of 2023, and again in the fall of 2023. This brief memo summarizes the elements of the FDNY's proposed requirements that are infeasible and outlines viable alternatives that will enable the installation of residential BESS in New York City, while also providing a high degree of safety to New York City's first responders and residents. NYSEIA and our industry partners welcome the opportunity to meet with the FDNY's code and operational leaders to discuss, and we remain hopeful that NYC can rise to the challenge of establishing BESS requirements that protect public safety while enabling New Yorkers to access clean, resilient backup power.

Part 1: A Safe, Highly Regulated Industry

NYC Solar + Storage Industry Regulations and Credentials

New York City's solar + storage industry is one of the most highly regulated industries in the world. PV + BESS systems are designed by Registered Architects/Professional Engineers and installed by licensed contractors/electricians. In addition to undergoing standard review by the NYC Department of Buildings (NYC DOB), solar + storage projects are also reviewed by New York State Energy Research and Development Authority (NYSERDA) and the electric distribution company (Con Edison or PSEG Long Island in Far Rockaway). It is not uncommon for a residential solar PV + BESS to undergo four inspections in NYC: the DOB building inspection, electrical inspection, utility inspection, and a NYSERDA quality assurance inspection. For additional standards which PV and BESS systems are subject to, please see below.

- NFPA 70®, National Electrical Code® (NEC®) establishes requirements for the safe use of electricity and electrical equipment by reducing or eliminating hazards, such as electric shock and fire. Most jurisdictions, including New York, adopt the NEC into law.
- The International Fire Code® (IFC®) prescribes minimum requirements for PV + BESS systems necessary to establish a reasonable level of safety and protection from fire, explosion, and dangerous conditions. Part of this code's objective is to ensure that firefighters can respond effectively and safely to a fire.
- The International Building Code® (IBC®) provides minimum regulations for the safety of buildings and structures. The IBC requirements ensure that roof-mounted PV systems are securely supported by the building and mounting equipment. In addition, the International Residential Code® (IRC®) has similar requirements for one- and two-family dwellings.
- NFPA 855, Standard for the Installation of Energy Storage Systems provides minimum design, construction, installation, commissioning, operation, maintenance, and decommissioning requirements for BESS, including those in residential occupancies (Chapter 15). Chapter 15 is referenced by NYC Fire Code Section 608 and outlines the regulations for the installation of BESS in one- and two-family dwellings and townhouses.

Additionally, most original equipment manufacturers (OEMs) have an installer certification process. Tesla, for example, is a well-known OEM with such a process. A Tesla Certified Installer is an electrician, or other trade/installer, certified by Tesla who can install Tesla charging and energy products. Once an individual or organization is approved to partner with Tesla, Tesla provides training and product resources on how to install and service Tesla products. In some cases, Tesla will offer in-person training or visit you to help staff learn about installing Tesla products. For more information, see [here](#).

UL 9540 and 9540A Certification/Testing Process

Underwriters Laboratory (UL) 9540, the Standard for Energy Storage Systems and Equipment, is the international safety standard to evaluate BESS. The Standard covers a comprehensive review of energy storage systems, including testing of electrical functionality and the product's ability to withstand electrical abnormal/abuse conditions, charging and discharging, protection, control, communication between devices, and fluids movement. The listing also requires mechanical and environmental safety/abuse/stress tests for strength, impact, moisture, and some production/manufacturing tests. UL 9540 provides a basis for safety of energy storage systems and includes reference to other critical technology safety standards and codes. It includes additional criteria to address materials, enclosures, including walk-in enclosures, controls, piping, utility grid interaction, including special purpose interactive systems, hazardous moving parts, signage, and instructions. A BESS is then analyzed and certified to the UL 9540 listing. BESS certification can be achieved through a product testing engagement, typically utilized for off-the-shelf BESS products, such as a residential BESS, or through an on-site, nondestructive field evaluation for unique systems.

UL 9540A, the Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems was developed to address safety requirements contained in U.S. building and fire codes (such as the IBC, IRC and IFC mentioned above). One primary concern with BESS is the potential fire and explosion hazards associated with lithium-ion batteries. Therefore, the UL 9540A test method evaluates the system's potential for thermal runaway, fire, and explosions. The test includes a series of progressively complex fire tests, beginning at the cell level and progressing to the module level, the unit level, and finally the installation level, as shown below. Each test generates data to evaluate thermal runaway characteristics and fire propagation. Code authorities use the complete data package to evaluate BESS risk profile and installation requirements. Please see this chart below, which provides more specifics on the UL 9540A testing methods.

Level	Activities
Cell	Develop cell thermal runaway initiation technique and characteristics including gas composition
Module	Determine propagation behavior within module and thermal energy release outside of the module.
Unit	Open test configuration of unit to unit fire spread with heat release rate and gas analysis to determine potential for explosion
Installation	Closed room test configuration of unit to unit fire spread with fire mitigation equipment

Both a UL 9540 listing and the UL 9540A test method are required by New York City for a battery to receive a Certificate of Approval. We believe that providing this documentation to New York City is reasonable and appropriate, as it allows the FDNY to evaluate product safety and to only grant Certificates of Approval to demonstrably safe BESS products.

FDNY Certificate of Approval Process

As mentioned above, before any BESS technology can be installed in New York City, the product must first receive UL 9540 listing, complete UL 9540A testing, and undergo vetting by the FDNY through the Certificate of Approval (COA) review process. FDNY thoroughly evaluates all BESS technologies, and has sole discretion to approve technologies for installation in NYC. The COA process provides the FDNY with full visibility into and control over what technology is installed and how it is installed, enabling the agency to mitigate risk for the public and first responders. While the FDNY has approved several commercial-scale BESS, only one residential battery storage product has completed the COA process, largely due to the challenge of securing permission to install residential BESS even *after* receiving a COA. Additional residential BESS products are undergoing FDNY review in anticipation of future process improvements, and others may apply once an effective expedited process is established.

Part 2: Industry Requests to Improve Expedited BESS Permitting

Certificate of Fitness requirements

According to FDNY fire code, every residential BESS in NYC must have a [Certificate of Fitness](#) (CoF) holder, a professional who is responsible for general supervision of the BESS.

Specifically, 601.4.3 Stationary Energy Storage Systems states:

Stationary energy storage systems subject to compliance with the requirements of FC608 shall be supervised by a person holding a certificate of fitness in accordance with FC608.7.

We support the intent of this rule, provided that it applies to the company that completes the installation, or a licensed third party, rather than the homeowner.

Additionally, the CoF requirements are inappropriate for residential BESS, as compared with larger systems, because residential BESS are small and simple, and the B28 CoF examination covers a lot of content that is not pertinent to residential BESS. An additional concern is that the CoF application is site specific, implying that every system needs to apply for a CoF. In the fall of 2023, industry stakeholders proposed that a residential solar company should be able to have one or two CoF holders for many residential BESS. We were encouraged by FDNY Code Counsel Julian Bazel's seeming openness to this approach.

The industry wants to ensure that residential BESS requirements are readily available, and that they clearly articulate the responsibility of the CoF holder during and after an incident. We believe that real-time responses for residential BESS should be handled solely by FDNY. While residential BESS installers have unique knowledge of the products they install, FDNY firefighters have years of training and expertise in emergency response and firefighting. In light of this, there is no additional value that a CoF holder would bring to an emergency response situation by being physically present on site. Any informational needs that arise during firefighting operations could effectively be resolved by phone. Industry is prepared to support FDNY with any training required to extinguish fires involving residential BESS, but believes that the CoF role should be more limited in scope for residential BESS.

Real-time monitoring and alerts requirements

The FDNY's proposed requirements include real-time automated notifications to FDNY from a residential BESS. Specifically, 608.11.1 Remote Monitoring of Energy Storage Management System and Reporting states,

Except for telecommunications equipment subject to the exception set forth in FC608.9, the owner of a stationary energy storage system shall arrange for data transmissions from the energy storage system's energy storage management system to be continuously monitored (on a 24/7 basis) by a remote monitoring facility staffed by trained and knowledgeable persons retained by the manufacturer or installer of the energy storage system. The remote monitoring facility shall, without delay, make all necessary notifications, as required by the rules and the emergency management plan, including notifications to the department, the certificate of fitness holder and the subject matter expert, in the event a stationary energy storage system installed in New York City exceeds or appears likely to exceed thresholds at which fire, explosion or other serious adverse consequences may result.

While this rule appears to make sense for large-scale battery installations, the industry believes that this requirement is not feasible for residential BESS for a variety of reasons. First, and most critically, commercially available residential BESS do not have the monitoring functionality that the FDNY is

proposing. Unlike commercial scale batteries, residential products have fewer sensors, and they typically only have one Battery Management System which is limited to monitoring voltage, current, and temperature. The level of advanced detection being proposed by the FDNY is not required by existing national product standards for residential battery products, and is not economically viable at the residential scale. Developing customized AHJ-specific software and integrations would make the residential batteries cost prohibitive and is not an option for the manufacturers. Second, we believe that a significant number of 'false-positive' alerts would be generated and lead to FDNY rolling trucks unnecessarily. Furthermore, real-time monitoring relies on a customer's internet connection staying online, which is not always reliable. We believe that the volume of alerts would be of limited value to the FDNY, and nuisance alerts could result in the FDNY ignoring such alerts. It is also worth noting that in New York City, residential fire alarm systems are not required to have central station monitoring because it is expensive and often infeasible for homeowners. Residential home security systems with fire alarm integrations also are not required by the building code to provide an automated notification directly to the fire department, so the requirement being proposed by the FDNY far exceeds current established code for residential properties.

Proximity to fire hydrant requirement

The draft expedited rules require fire hydrants within 250 ft of residential BESS. Specifically, 3RCNY 608-01 (g)(B) states,

“Stationary storage battery systems located more than 250 feet from a hydrant shall be provided with a private hydrant or other approved water supply for firefighting operations in accordance with FC508”

Residential solar + storage systems provide meaningful utility bill savings and backup power to residents. However, most homeowners will not be able to justify the cost of installing a fire hydrant to enable their solar + storage project to proceed. Additionally, screening for proximity to fire hydrants is not something that can easily be incorporated into a residential solar + storage sales process; the locations of fire hydrants are not specified on commercially available maps, and this screen would be a bespoke requirement for NYC that most solar companies would not be able to implement. In discussion, the FDNY has indicated that the vast majority of homes are within 250 ft of a hydrant, and also that the FDNY is equipped to fight fires that are more than 250 feet from a hydrant. Therefore, the residential solar + storage industry does not believe that this requirement is necessary for small residential BESS and requests that this proposed requirement be waived.

Conclusions and a Path Forward

The residential solar + storage industry remains committed to serving New York City residents, and ensuring that the most rigorous safety standards are applied to protect first responders and the New Yorkers we serve. We look forward to working collaboratively with the FDNY and other stakeholders to advance a viable permitting pathway for residential BESS in NYC, so that the city and its residents can benefit from this clean energy technology. We remain open-minded to creative solutions and we are eager to find opportunities to partner with the FDNY, DOB and other agency partners to ensure the safe deployment of this critical clean energy technology. NYSEIA thanks the FDNY for their consideration and collaboration to enable residential BESS in NYC.