

SunBug Solar

Electrical Code Requirements Pertaining to Battery Energy Storage Systems

The Massachusetts Board of Fire Prevention Regulations, which falls under the jurisdiction of the Commonwealth's Executive Office of Public Safety and Security, issued an official interpretation in May 2022 that classifies an energy storage system as an *Optional Standby System* that employs *Automatic Transfer Equipment*, and is therefore governed under the provisions of Article 702 of the National Electrical Code (NEC). Prior to the Board's recent interpretation, energy storage systems had also already been classified as *Stand-Alone Systems* governed under NEC Article 710. This document briefly outlines the key components of those code requirements as they pertain to battery energy storage systems, as well as SunBug Solar's standard measures to ensure code compliance for the systems that we implement for our customers.

Optional Standby Systems (NEC 702.2)

NEC defines Optional Standby Systems as *Those systems intended to supply power to public or private facilities or property where life safety does not depend on the performance of the system. These systems are intended to supply on-site generated or stored power to selected loads either automatically or manually.* This definition is therefore applicable to both backup generators and battery storage systems.

Automatic Transfer Equipment (NEC 702.4(B)(2))

Battery energy storage systems paired with solar photovoltaic energy arrays contain automatic transfer equipment that detects the presence of electric utility grid power (or lack thereof) and automatically switches to local, onsite backup power (solar + storage) when the grid goes down. NEC 702 stipulates that automatic transfer equipment in this context must comply with one of the following two provisions:

- (1) Full Load.** *The standby source shall be capable of supplying the full load that is transferred by the automatic transfer equipment.* In the absence of load management (provision 2 below), a circuit breaker panel that is automatically supplied with backup power when utility power fails cannot contain backup loads whose simultaneous usage will exceed the rated power discharge capacity of the storage batteries.
- (2) Load Management.** *Where a system is employed that will automatically manage the connected load, the standby source shall have a capacity sufficient to supply the maximum load that will be connected by the load management system.* Load management devices allow pre-configured and manual software control of whether and when selected circuit breakers in a backup panel are supplied with backup power. Load management systems therefore permit the occasional and periodic backup of multiple circuits in the home, but typically not all at the same time to avoid exceeding the capacity of battery discharge power.

Stand-Alone System Supply Output (NEC 710.15(A))

The capacity of the stand-alone supply shall be equal to or greater than the load posed by the largest single utilization equipment connected to the system. With or without load management, no individual load's circuit breaker may be installed within the backup panel if it draws more power than the battery's discharge can deliver.

SunBug Solar's standard storage installations will therefore rely extensively on the use of load management devices to ensure code compliance. A backup breaker panel could either be the main electrical service panel (MSP) supplying the entire home, or alternatively an "essential loads" subpanel that contains only those loads that might potentially be operated during a utility power outage. In either case, many/most storage installations will be equipped with load management, plus the largest load in the backup breaker panel (even with load management) cannot exceed the power output of the storage batteries supplying the backup loads.