DOCKETED	
Docket Number:	23-ERDD-07
Project Title:	Long Duration Energy Storage Program
TN #:	268282
Document Title:	California Energy Storage Permitting Guidebook
Description:	N/A
Filer:	Alexander Wyckoff
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	1/21/2026 1:21:00 PM
Docketed Date:	1/21/2026

CALIFORNIA ENERGY COMMISSION

California Energy Commission

CONSULTANT REPORT

California Energy Storage Permitting Guidebook

Permitting Guidance for Behind-the-Meter: An Initiative by the California Energy Commission's Electric Program Investment Charge (EPIC) Program

Prepared for: **California Energy Commission**
Prepared by: **Center for Sustainable Energy**

Center for Sustainable Energy®

January 2026 | CEC-500-2023-059

California Energy Commission

Primary Author:

Center for Sustainable Energy
3980 Sherman Street, Suite 170
San Diego, CA 92110
(858) 244-1177
EnergyCenter.org

Contract Number: EPC-19-026

Prepared for:
California Energy Commission

Alexander Wyckoff
Commission Agreement Manager

Reynaldo Gonzalez
Branch Manager
ENERGY SYSTEMS RESEARCH BRANCH

Angie Gould
Cammy Peterson
Deputy Directors

Jonah Steinbuck, Ph.D.
Director
ENERGY RESEARCH AND DEVELOPMENT DIVISION

Drew Bohan
Executive Director

ACKNOWLEDGEMENTS

California Energy Commission
Mike Gravely
Quenby Lum
Robin Goodhand
Caitlin Planchard
Rhetta DeMesa
Alexander Wyckoff

Center for Sustainable Energy
Demetra Tzamaras
Kelly Leathers
Kelsey Albers
Pierre Bull
Rebecca Baptiste
Nicholas L. Cain
Kara Crohn
Meghna Eluganti
Jamie Orose

Project Partners
Jeff Cook, Emily Dalecki, Katie Nissen and Noah Frey, National Renewable Energy Laboratory
California Solar and Storage Association
Matthew Paiss, Pacific Northwest National Laboratory
Warren Wang, Guidehouse

Technical Advisory Committee
Ben Airth, Freedom Forever
Ben Davis, Permit Power
Kelsey Albers, Energy Solutions
Ken Boyce, UL Solutions
Steve Jones, UL Solutions
Howard Hopper, UL Solutions
Robert Marshall, UL Solutions
Brandon Carlson, Solar APP Foundation
Josh Costello, County of Los Angeles Fire Department
Scott Egbert, New York State Energy and Research Development Authority
Peter Jackson, City of Bakersfield
Kendra Kostek, U.S. Department of Energy
Scott Larsen, New York State Energy and Research Development Authority
Richard Lawrence, Interstate Renewable Energy Council
Wrishija Roy, Interstate Renewable Energy Council
Charles Picard, Tesla
Mark Rodriguez, Solar APP Foundation
Crystal Sujeski, CAL FIRE/Office of the State Fire Marshal

Kelly Cunningham, Pacific Gas and Electric
Matt Wheeler, California Building Officials
Nick Otis, California Fire Prevention Officers
Dara Yung, California Solar & Storage Association
Leila Banijamali, Symbium
Abhijeet Mohapatra, Symbium

PREFACE

Energy storage is a key technology that can improve reliability in homes, businesses, and other facilities while helping the electrical grid integrate renewable distributed energy resources and reduce greenhouse gas emissions. The California Energy Commission (CEC), through the Electric Program Investment Charge (EPIC) research program that it administers, funded the development of a resource guide identifying barriers and best practices in energy storage permitting across the state to accelerate wider adoption of behind-the-meter (BTM) energy storage systems, specifically systems less than 1 megawatt (MW).

This guidebook consolidates success stories, lessons learned, and guidance for navigating codes and standards to simplify permitting BTM energy storage systems (ESS) for relevant stakeholders, including authorities having jurisdiction (AHJs), system designers, and installers. The guidebook also incorporates recommendations and insights contributed by a diverse technical advisory committee representing perspectives from municipalities and industries from across the state.

This guidebook is organized into five main chapters:

- **Chapter 1: Purpose and Use of This Guide** — The first section of the guidebook provides introductory information, including background information on its purpose, scope, and research.
- **Chapter 2: Codes and Standards Impacting Energy Storage Permitting** — The second section focuses on the codes and standards that impact energy storage permitting in California. This section includes the state building codes relevant to energy storage, product safety standards, and guidance on navigating these codes and standards.
- **Chapter 3: Energy Storage Permit Process** — The third section covers a typical energy storage permitting process and highlights examples of successful permitting processes implemented by various AHJs across the state.
- **Chapter 4: Electronic and Automated Permitting Systems** — The fourth section offers guidance for implementing electronic and automated permitting systems for residential energy storage systems and provides relevant training resources.
- **Chapter 5: Permitting Resources** — The concluding section consolidates a variety of resources for AHJs and energy storage installers/designers.

This guidebook is a living document that will be updated periodically to reflect changes to codes and standards and in response to user feedback. It highlights best practices for permitting standard residential energy storage systems, provides guidance on navigating applicable codes and standards, and provides step-by-step recommendations on integrating online permitting software into existing permitting processes.

For questions, corrections, or comments, contact the guidebook team at storage.guidebook@energycenter.org. Guidebook training and walkthroughs are available upon request and as grant budget allows.

For a flip-turn version of the guidebook, and to subscribe to further updates from the guidebook team, visit https://www.energystorageca.com/.

ABSTRACT

This guidebook was developed to enable accelerated adoption of behind-the-meter energy storage systems of less than 1 megawatt in size. The guidebook is designed to help building safety agencies and developers, designers, and installers of energy storage systems coalesce around a shared set of best practices so that behind-the-meter energy storage systems can be permitted efficiently and installed safely.

Keywords: California, solar, energy, photovoltaic, PV, cell, panel, building, integrated, BIPV, electricity production, distributed generation, initiative, CSI, emerging, renewables, program, rebate

Please use the following citation for this report:

Center for Sustainable Energy. 2026. *California Energy Storage Permitting Guidebook*. California Energy Commission. Publication Number: CEC-500-2023-059.

TABLE OF CONTENTS

LIST OF FIGURES

Page

LIST OF TABLES

Page

EXECUTIVE SUMMARY

Background

California is working to achieve carbon neutrality by 2045 while ensuring its electricity system remains reliable and affordable. Energy storage is expected to play a significant role in this transition. Driven by a series of targeted legislation and executive orders, California is integrating energy storage into the power system to increase electric system reliability, improve resiliency to extreme weather events (like wildfires and heat waves), reduce greenhouse gas (GHG) emissions, increase the efficiency of grid usage, and lower energy costs for ratepayers.

This Energy Storage Permitting Guidebook (guidebook) aims to support permitting behind-the-meter (BTM) systems that are customer-sited, meaning they are located at homes, businesses, nonprofits, schools, and other locations to provide energy on site and, typically, to the electric grid as well, as shown in Figure 1. Per the Clean Energy States Alliance 2023 States Energy Storage Policy Best Practices for Decarbonization report, BTM energy storage is installed primarily for energy resilience, while front-of-the-meter (FTM) utility-scale energy storage is more often linked to efforts to achieve decarbonization goals.

BTM energy storage also improves energy affordability by making the use of the grid more efficient through load shifting and other flexibility services that reduce the need for peaking power plants and for distribution grid upgrades. The permit process plays a critical role in protecting properties and building occupants by ensuring the design and installation of BTM energy storage systems meet relevant safety codes and standards.

Figure 1: Behind-the-Meter Electrical Equipment

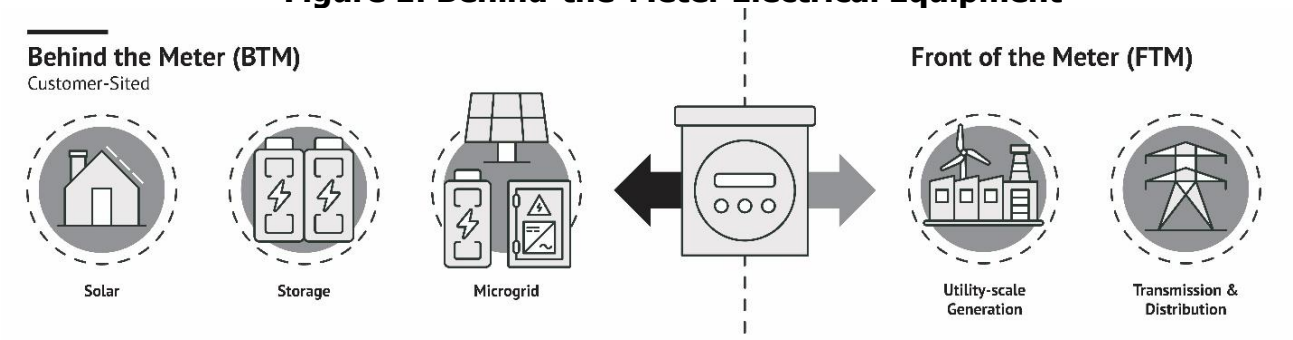


Figure 1 shows behind-the-meter versus front-of-the-meter electrical equipment. Behind the meter, technologies are customer-sited and can include solar, storage, and microgrid systems. Front-of-the-meter technologies include utility-scale generation, transmission, and distribution technologies.

Source: Center for Sustainable Energy (https://energycenter.org/)

In September 2017, Assembly Bill 546 (Chiu, Chapter 380, Statutes of 2017) authorized "the Governor's Office of Planning and Research to provide guidance on energy storage permitting, including streamlining [and] best practices." In September 2022, Senate Bill 379 (Wiener, Chapter 356, Statues of 2022) provided an additional impetus for cities and counties to

automate the permitting of residential, small-scale, stand-alone and paired solar systems. SB 379 requires cities and counties in the state to adopt an "automated permitting platform" for solar installations smaller than 38.4 kilowatts (kW, alternating current [AC]) in nameplate capacity that may or may not also have an attached energy storage system (also with a nameplate rating no greater than 38.4 kW, AC).

To support jurisdictions through the transition, the 2021 California state budget included a $20 million appropriation to the California Energy Commission (CEC) to fund grants for jurisdictions adopting electronic and automated permitting platforms aimed at expediting permitting (discussed further in Section 4). According to legislative findings in SB 379 Section 1(d), such jurisdictions "can and should be required to adopt SolarAPP+ or a similar program for automated permitting in order to promote the development of solar and storage to help meet the state's clean energy needs." As of October 8, 2025, 363 authorities having jurisdiction (AHJs), 35 counties, and 328 cities have adopted automated permitting systems, as self-reported to the CEC. This accounts for well over half of the jurisdictions in California, which has 58 counties and 482 cities.

The Center for Sustainable Energy created this guidebook as part of the CEC's Electric Program Investment Charge (EPIC) grant agreement (EPC-19-026). EPIC invests in scientific and technological research to accelerate the transformation of the electricity sector to meet the state's energy and climate goals. EPIC-funded projects are designed to benefit California ratepayers by improving reliability, lowering costs, and increasing safety. The guidebook intends to serve as a centralized resource for navigating the codes and standards affecting energy storage permitting and to highlight best practices currently implemented across the state from which local governments and industry can learn to create fast, efficient, and safe BTM energy storage permitting processes in their own jurisdictions.

In turn, safe and simple energy storage system permitting practices can:

- Accelerate the deployment of energy storage statewide.
- Reduce peak power demand on the grid.
- Ensure reliable service for customers even in the face of extreme weather events, public safety power shutoffs, and unplanned outages.

The information provided in this guidebook is intended to help California better integrate BTM energy storage systems onto the electric grid — ultimately increasing the volume of renewable energy resources deployed, lowering costs for ratepayers, and helping the state achieve carbon neutrality in the coming decades.

Scope

The Public Utilities Code § 2835 defines an energy storage system (ESS) as a commercially available technology capable of absorbing energy, storing it for a specified period, and then dispatching the energy thereafter.

For this guidebook, "commercially available" technologies are those that have been deployed and proven through successful operation (Technology Readiness Level 9) and are widely available for sale in California for BTM applications as of the publication of this guidebook. The CEC maintains a list of commercially available technology in California on its Solar Equipment List. If a technology is available, but not sold in an appropriate size or form for BTM use, then it is not included in this guidebook.

This guidebook focuses exclusively on battery energy storage systems (BESS) designed to store and discharge electrical energy. Electrical energy stored in these systems can be supplied onsite to the installed location of the system when desired or back to the electric grid distribution network. As of October 2025, lithium-ion (including lithium iron phosphate and nickel manganese cobalt chemistries) BESS dominate this market and are therefore the primary focus of this guidebook. Furthermore, according to the CEC's California Energy Storage System Survey, 99.88% of the nearly 253,000 systems included in the dataset (as of April 2025) are sized less than 1 MW, and more than 98.5% of the installed systems are residential storage systems. The average residential energy storage size across 249,340 systems is 7 kW, with a maximum size of 250 kW.

Accordingly, this guidebook focuses on commercially available, grid-connected lithium-ion BTM BESS with nameplate capacities less than 1 MW.

Further, the guidebook focuses on grid-connected BTM energy storage systems, as these represent most installations and are subject to permitting processes that can be standardized and streamlined. Off-grid systems are outside the purview of the guidebook.

Throughout the stakeholder outreach process of this project, including CEC-hosted public workshops, open comment periods, and Technical Advisory Committee (TAC) meetings, participants raised questions regarding the scope of the guidebook. There is a growing interest in similar guidance for newer technologies, such as saline-based ceramic batteries, and different storage use cases, such as commercial and public facilities, microgrids, and mobile and bidirectional energy systems. Given their still-limited deployment in California, these systems are not considered in this version of the guidebook. However, the CEC recognizes the interest in a broader scope and will consider this feedback in future grant planning.

Figure 2: Scope of the Energy Storage Systems (ESS) Discussed in the Guidebook

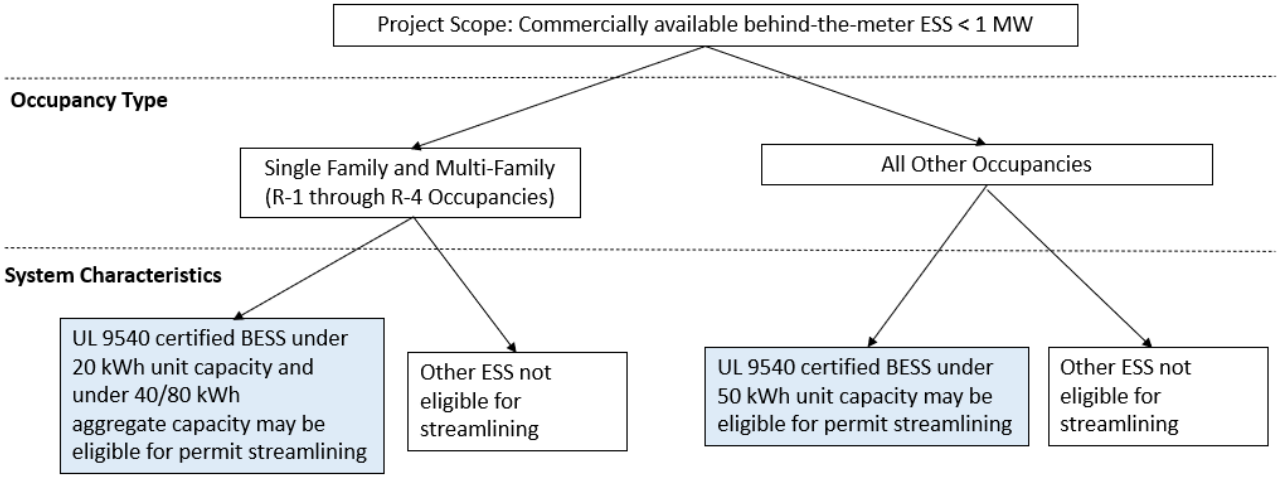


Figure 2 shows the segmentation approach used to identify which energy storage technologies would be covered by the contents of the guidebook. The guidebook focuses on commercially available, behind-the-meter, electrochemical (battery) energy storage systems. The blue boxes indicate the areas of focus for the guidebook. In this image, "other occupancies" refers to nonresidential occupancies such as businesses and schools.

Source: Center for Sustainable Energy (https://energycenter.org/)

While the guidebook project originally set out to develop a single, streamlined permitting process that could be implemented across the state, research conducted for this project indicated that there is too much nuance in energy storage system installations to create a "one-size-fits-all" permitting approach. For this reason, the guidebook refrains from mandating a specific permitting process for AHJs in California. Instead, the guidebook focuses on consolidating insights that AHJs can use as resources when looking to update and improve their own permitting processes. The guidebook also helps users navigate applicable codes and standards, the complexity of which is often cited as a key barrier to streamlined and efficient energy storage permitting.

This guidebook does not address zoning, environmental reviews, or interconnection.

CHAPTER 1:
Codes and Standards Impacting Energy Storage Permitting

California Building Code

Energy storage systems (ESS) in California must be designed to meet provisions in the California Building Standards Code (CBSC), which is Title 24 of the California Code of Regulations (CCR). Title 24 is reserved for state regulations that cover the design and construction of buildings, associated facilities, and equipment, and it applies to all building occupancies throughout the state. It contains requirements for structural, mechanical, electrical, and plumbing systems. Title 24 is an essential mechanism for ensuring safe construction practices. This guidebook focuses on the 2025 CBSC, published July 1, 2025, which will be effective in practice starting January 1, 2026.

Table 1: Parts of CBSC That Apply to ESS by Building Type

Building Type	Part 2.5 CA Residential Code	Part 3 CA Electrical Code	Part 6 CA Energy Code1	Part 9 CA Fire Code
One- & Two-Family Residential	✓	✓	✓	
Multifamily Residential		✓	✓	✓
Commercial		✓	✓	✓

Source: Center for Sustainable Energy (https://energycenter.org/)

The intent of this guidebook is to provide consistent interpretation of these Title 24 requirements throughout the state. This guidebook is not intended to create, explicitly or implicitly, any new requirements. Updated information regarding new code requirements, as well as the code updating process, is available on the California Building Standards website at www.bsc.ca.gov.

Cities and counties in California may adopt local laws ("ordinances") to modify the state building standards mandated under Title 24. There are limitations to the types of modifications

1 Applies only to ESS in new construction.

that can be made, but this variation from jurisdiction to jurisdiction adds to the variability of ESS permitting across California.

One- and Two-Family Residential

California Residential Code

The California Residential Code (CRC), based on the International Residential Code, includes building provisions for construction of detached one- and two-family dwellings, as well as townhomes that are three stories or less. The CRC, Part 2.5 of Title 24, governs the installation of ESS for these properties.

ESS are covered in Section R330 of Chapter 3 of the CRC, specifically residential ESS having a capacity of 3.6 megajoules (MJ) (1 kWh) or greater. With residential systems accounting for about 98.5% of BESS installations across California as of April 2025, this code applies to the majority of BESS installations in California. This section outlines the following requirements:

- ESS must be listed and labeled per UL 9540.
- ESS must be installed per the manufacturer's instructions.
- Individual ESS units (individual components of the system) must be separated from each other by no less than 3 feet.
    - Except if a smaller distance is permitted by the UL 9540 listing and manufacturer's installation instructions.
        - In the 2025 CRC, this verbiage replaces language in the 2022 CRC referencing the California Fire Code (CFC) and "documented to be adequate based on large-scale fire testing." This verbiage removes the onus from the code official to validate the UL9540A testing and instead relies on the manufacturer's UL 9540 listing and the Nationally Recognized Testing Laboratory (NRTL) that certified the product. Furthermore, as of March 2025, UL 9540 (Annex H) requires residential ESS to include a standardized table detailing information such as allowable unit-to-unit separation distances based on UL 9540A large-scale fire testing, making it easier for code officials to review.
- ESS shall only be installed in the following locations:
    - Detached garages and detached accessory structures.
    - Attached garages if separated from the dwelling unit in accordance with Table R302.6.
    - Outdoors or on the exterior side of exterior walls no less than 3 feet away from doors and windows that directly enter the dwelling unit. The 3-ft requirement does not apply to doors and windows that enter nondwelling spaces.
        - Smaller separation distances are permitted by the UL 9540 listing and manufacturer's installation instructions.

    - Enclosed utility closets, basements, and storage or utility spaces within dwelling units with finished or noncombustible walls and ceilings.
- Rooms and areas within dwelling units, basements, and attached garages in which ESS are installed must include smoke alarms or listed heat alarms, interconnected with smoke alarms, where appropriate.
    - Note: The California Office of the State Fire Marshal (OSFM) issued Information Bulletin 21-004 noting that no heat alarm can explicitly meet the requirement for garages, as an UL listed heat alarm for unconditioned space does not exist. Bulletin 21-004 asks that local jurisdictions consider alternatives, including whether the garage is protected by fire sprinklers. Garages protected by fire sprinklers and interconnected to a heat detector should satisfy the intended requirements of R330.7.
    - Other alternatives that satisfy the intent of the code for occupant notification and egress from the residence should also be considered. For example, a standalone fire alarm system using a fire alarm control panel and a UL 521-listed heat detector installed in the location of the ESS and interconnected to new interior annunciation devices is consistent with the purpose of heat alarms for occupant safety.
- Individual ESS units are limited to 20 kWh; the total aggregate ratings of all ESS on the property are limited to 600 kilowatt-hours (kWh). Larger individual unit sizes and increased total aggregate ratings are permitted under the CFC and must follow the requirements under the CFC.
- Maximum allowable aggregate ESS ratings are limited to 40 kWh in basements, closets, and storage spaces and to 80 kWh when installed in garages or outdoors. Table R330.5 details additional maximum aggregate ratings for systems installed on exterior walls, in detached garages, and outdoors on the ground.
- Vehicle impact protection is required for ESS that are subject to potential vehicle damage.

California Electrical Code

The California Electrical Code, Part 3 of Title 24, governs the installation of the electrical aspects of ESS for all building and property types. Energy storage systems are covered in Article 706, specifically ESS with a capacity greater than 1 kWh.

The California Electrical Code also calls out standards frequently referenced in ESS installations:

- NFPA 855, Standard for the installation of ESS
- NFPA 111, Standard on Stored Electrical Energy Emergency and Standby Systems
- NECA 416, Recommended Practice for Installing ESS
- UL 9540, Standard for Energy Storage Systems and Equipment

In addition, for one- and two-family dwellings, an ESS shall include an emergency shutdown function to stop the export of power from the ESS.

California Energy Code

California's Building Energy Efficiency Standards (Energy Code or Title 24, Part 6) establishes energy efficiency requirements for permitted new construction, alteration, and addition projects. The Energy Code is developed to support increased building energy efficiency that is cost-effective, reduces GHG emissions, and promotes electric grid load flexibility, with battery storage as a key component.

The Energy Code governs many elements of a new construction building, including but not limited to installing a battery energy storage system or meeting battery readiness requirements. Newly constructed single-family buildings with one or two dwelling units are required to be energy storage-ready, also known colloquially as "battery readiness requirements." This readiness requires that new construction includes components that allow for easy future installation of energy storage systems without requiring further upgrades. Additions and alterations to an existing building are not required to meet the battery readiness requirement nor installed battery energy storage system requirements.

Newly constructed single-family homes are not required to install a battery energy storage system, but the battery readiness requirements apply. The requirements dictate the design and installation of features in support of a battery energy storage system being easily installed in the future. New construction, single-family projects can consider installing a battery energy storage system to gain flexibility in showing compliance with the Energy Code, but only when using the performance approach rather than the prescriptive approach. If a battery energy storage system is installed, it exempts the single-family project from the battery readiness requirements.

Refer to the Energy Code Ace in Section 5: Resources for more guidance and support on the California Energy Code.

California Fire Code

The California Fire Code is generally not applicable to one- and two-family dwellings and townhomes covered by the California Residential Code. Section 102.5 of the fire code specifies that construction permits are required only when required by Section 105.6. Section 105.6.6 states that a construction permit is required for ESS regulated by Section 1207. While Section 1207 covers Group R-3 and R-4 residential occupancies, the Group R residential classification only applies to buildings and structures not regulated by the California Residential Code, per CFC Section 203.9.

One- and two-family dwellings built to the California Residential Code are therefore not covered under the California Fire Code.

Multifamily Residential and Commercial

California Electrical Code

The California Electrical Code, Part 3 of Title 24, governs the installation of the electrical aspects of ESS for all building and property types. Energy storage systems are covered in Article 706, specifically ESS with a capacity greater than 1 kWh.

The California Electrical Code also calls out standards frequently referenced in ESS installations:

- NFPA 855, Standard for the installation of ESS
- NFPA 111, Standard on Stored Electrical Energy Emergency and Standby Systems
- NECA 416, Recommended Practice for Installing ESS
- UL 9540, Standard for Energy Storage Systems and Equipment

The California Electrical Code includes provisions for commissioning and maintenance for systems that are not installed in one- and two-family homes.

California Energy Code

California's Building Energy Efficiency Standards (Energy Code or Title 24, Part 6) establishes energy efficiency requirements for permitted new construction, alteration, and addition projects. The Energy Code governs many elements of a new construction, including but not limited to installing a battery energy storage system and meeting the battery readiness requirements when not installing a battery energy storage system. Additions and alterations to an existing building are not required to meet the battery readiness or installed battery energy storage system requirements. Photovoltaic solar and battery storage system requirements are prescriptively required for many types of new construction commercial buildings and all new construction high-rise multifamily buildings (four habitable stories or more).

Refer to the Energy Code Ace in Section 5: Resources for more guidance and support on the California Energy Code.

California Fire Code

The California Fire Code, Part 9 of Title 24, governs the installation of ESS for commercial and multifamily buildings and properties. Chapter 12 covers energy systems, and specifically, Article 1207 covers requirements for energy storage systems. Table 1207.1.3 includes threshold quantities for which an ESS must comply with the requirements of this section.

Required construction documentation per the California Fire Code includes:

- Location and layout diagram of the room or area in which the ESS will be installed.
- Details on the hourly fire-resistance ratings of assemblies enclosing the ESS.
- Quantities and types of ESS to be installed.
- Manufacturer's specifications, rating, and listings of each ESS.
- Description of energy (battery) management systems and related operation.

- Location and content of required signage.
- Details on fire suppression, smoke or fire detection, thermal management, ventilation, exhaust, and deflagration venting systems (if applicable).
- Support arrangement associated with installation.
- A commissioning plan.
- A decommissioning plan.

In the instance of more than one type of ESS in a single room or enclosed area, where there is potential for an adverse interaction between the technologies, the installer is required to provide a failure modes and effects analysis or other approved hazard mitigation analysis (HMA) as part of the permitting process. HMAs typically encompass a product-specific analysis and a site-specific analysis. Requirements of the HMA are outlined in Article 1207.1.4.

The CFC also includes protection provisions including spacing, sizing, and quantity restrictions on groups of ESS. These provisions are available in Article 1207.5.

Fire Safety Standards

Fire safety in energy storage systems is paramount due to the potential risks associated with high-energy density technologies like lithium-ion batteries. The rise in the number of ESS installations necessitates a heightened understanding of the hazards involved and more extensive measures to reduce the risks. Ensuring safety requires adherence to stringent standards and regulations such as UL 9540, UL 9540A, and NFPA 855. UL standards are updated regularly to keep pace with evolving safety, security, and sustainability needs. The UL standards development process involves a technical committee made up of a group of experienced individuals who represent a variety of interest categories and who review, vote, and comment on standards proposals and revisions. NFPA standards are revised and updated every three to five years.

It is important to remember that ESS certified to UL 9540 are carefully designed and highly regulated. The highest incidence of lithium-ion battery hazards occurs with consumer products and e-mobility devices, which are not subject to the same code requirements or permitting approvals that UL 9540 listed ESS are.

The current installation codes and standards requirements for ESS in the United States related to fire and explosion testing are the 2026 edition of NFPA 855 and the 2024 edition of the International Fire Code (IFC), which require fire and explosion testing to be conducted in certain situations. Both editions reference that such testing shall be conducted on a representative ESS in accordance with UL 9540A, the Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems.

Key considerations for fire safety and installation of ESS, primarily for commercial and multifamily systems, include:

- Location and installation: NFPA 855 recommends that ESS be installed in locations compliant with applicable building and fire codes. Systems should be installed away

from combustible materials and in areas with proper ventilation to dissipate combustible gases.

- Battery chemistry: Different battery chemistries have varying risks and requirements. Lithium-ion batteries, commonly used in ESS, require specific handling and safety precautions because of the thermal runaway risks.
- Thermal management: Effective thermal management systems are crucial for preventing overheating and thermal runaway in ESS.
- Fire detection and suppression: NFPA 855 recommends the installation of fire detection or suppression systems, such as smoke detectors and automatic fire sprinkler systems, to quickly detect and address fire incidents.
- Emergency response plans: Developing comprehensive emergency response plans is essential for effectively managing fire incidents involving ESS. These plans include training personnel on proper response procedures and coordinating with local fire departments.
- Compliance and certification: ESS must undergo rigorous testing and certification processes to ensure compliance with safety standards such as UL 9540 and NFPA 855. Compliance with these standards is often a requirement for obtaining permits for installation and operation.

By adhering to these standards and best practices, stakeholders can lower the risks associated with ESS and protect the safety of occupants, responders, and surrounding environments. Effective regulation and compliance play a critical role in promoting the widespread adoption of energy storage technologies while maintaining high standards of safety and reliability. (For more information on UL 9540, 9540A, and NFPA, 855 please see the training on Resources page.)

UL 9540 Certification

UL 9540, the Standard for Safety of Energy Storage Systems and Equipment, covers electrical, electrochemical, mechanical, and other types of energy storage technologies for systems intended to supply electrical energy. The standard covers a comprehensive review of ESS, including charging and discharging, protection, control, communication between devices, fluids movement and other aspects. UL 9540 was introduced in 2016 and has undergone revisions.

The current edition of UL 9540 referenced in the California Electrical Code is the second edition dated February 2020 with revisions through April 2021. NFPA 70, the National Electric Code® (NEC®), the International Residential Code (IRC), the IFC, and NFPA 855 Standard for the Installation of Stationary Energy Storage Systems all require ESS to be listed and labeled in accordance with UL 9540. Although the standard itself is voluntary, BESS installed in California since January 1, 2020, must be permitted and certified to UL 9540.

If a product is UL 9540-listed, this means the ESS meets a specific set of standards for safe operation. UL 9540 is a system-level evaluation of ESS. It ensures that all components of the ESS are compatible with each other, as well as the environment in which they are installed. Individual components must also comply with the respective safety standards. For example,

lithium battery cells must be certified to UL 1642; inverters and controllers must be certified to UL 1741. ESS can be configured as AC ESS where the battery, battery management system (BMS), and inverter are housed within a single manufactured package. It can also be configured as DC ESS where the battery and BMS are in a UL 9540-listed enclosure, but the inverter is a separate component.

UL 9540 also requires UL 9540A large-scale fire testing for specific installation locations and applications. For example, the minimum separation distances to adjacent units and allowable indoor/outdoor installation locations established by UL 9540A fire testing are reflected in the manufacturer's installation instructions (MII). The MII is a controlled document under the supervision of the Nationally Recognized Testing Laboratory (NRTL). The NRTL is responsible for evaluating the UL 9540A test results and only under their oversight, the MII may reflect less than 3 feet of separation between ESS units as part of the UL 9540 listing.

UL 9540A Test Method

UL 9540A, the Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems, is the American and Canadian national standard for assessing fire propagation related to thermal runaway events in battery energy storage systems (ESS). Testing to these national standard requirements is an essential element of due diligence. UL 9540A provides a method for testing the safety-related behavior of a system when the design or installation conditions of an ESS exceed the limits set by the NFPA 855, NFPA 1, the IFC, or the IRC.

UL 9540A assesses the thermal runaway propagation of a given battery technology and evaluates the fire and explosion hazard characteristics. The test exposes ESS to a thermal event, mechanical damage, or both to determine the ability to contain and prevent the propagation of thermal runaway and fire. To pass the test, there must not be flaming outside the ESS enclosure. Testing does not rely on integral safety features or the battery management system.

UL 9540A is the only consensus standard explicitly cited in NFPA 855 for large-scale fire testing and the only national standard in the United States and Canada for fire safety testing methods for battery ESS.

NFPA 855 Standard

NFPA 855 Standard for the Installation of Stationary ESS "applies to the design, construction, installation, commissioning, operation, maintenance, and decommissioning of ESS, including mobile and portable ESS installed in a stationary situation and the storage of lithium metal or lithium-ion batteries." NFPA 855 provides guidelines for the design, installation, operation, and maintenance of these systems to reduce fire hazards and ensure the safety of occupants and responders.

Additional Standards

The following standards are also relevant to ESS installation:

- UL 991/1998 Functional and Software Safety — These standards pertain to safety-related functionality in the use of software and electronics and are most relevant in product design.
- UL 1973 Battery Packs for Stationary Use — This is a safety standard for rechargeable batteries (specifically those used in stationary applications). It tests the ability of the battery system to withstand simulated damage conditions and verifies safety against hazards such as fire and leakage.
- UL 1642 Standard for Lithium Batteries — This safety standard is specific to testing and certifying lithium battery cells. Compliance with this standard is important for manufacturers who want to demonstrate the safety of their lithium battery cells to potential customers and regulatory bodies.
- UL 1741/IEEE 1547PCS Interconnection Safety All ESS With Inverters — This is a safety standard for inverters, converters, controllers, and interconnection equipment used with distributed energy resources like solar generation and battery energy storage.
- NEMA ESS-1-2019 Performance & Safety Test Matrix Grid-Tied ESS — This standard identifies general information and technical specifications relevant to describing an ESS and defines test, measurement, and evaluation criteria to assess the performance of electrical ESSs intended for energy or power intensive stationary applications.
- UN 38.3 Transportation Testing for Lithium Batteries and Cells — To be safely transported (by air, sea, rail or roadways), lithium batteries must meet the requirements laid out by Standard UN 38.3 This protocol includes identifying and classifying lithium batteries and testing systems to ensure the relative safety of batteries and cells during transport.

CHAPTER 2:
Energy Storage Permit Process

Typical Permit Review

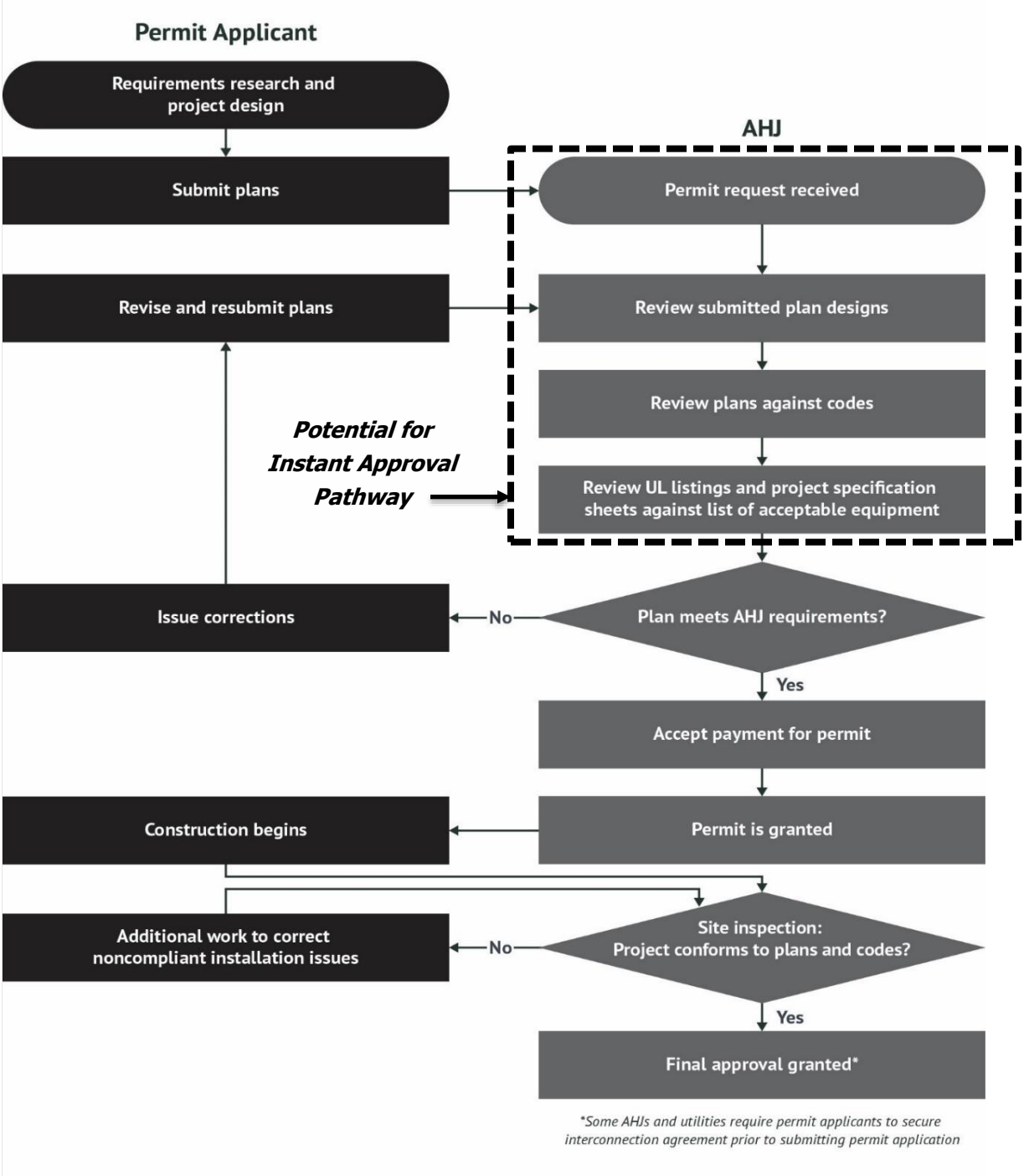
The building permit process exists to protect public health, safety, and welfare. The process ensures that buildings, and certain kinds of installed equipment, such as ESS, meet the standards set out in California's Building Standards Code. More details on the building codes and standards that affect ESS are included in the previous chapter.

A wide range of permitting agencies exist in California. These range from AHJs affiliated with municipalities (that is, city and county governments) to AHJs located within special districts (for example, independent fire districts that provide permitting to state and federal agencies). Along with AHJs, other permitting agencies in the state include:

- The Division of the State Architect, which provides oversight for primary and secondary schools, community colleges, and other state facilities.
- CAL FIRE Office of the State Fire Marshal Plan Review Section, which provides construction plan review for buildings used by certain state agencies.
- The California Department of Health Care Access and Information (which was formerly known as the Office of Statewide Health Planning and Development), which provides permitting for hospitals and certain kinds of healthcare facilities.
- California Department of Housing and Community Development, which provides registration for mobile homes and inspections of mobile home parks.
- Water districts, which provide self-permitting for infrastructure related to water delivery.
- Federal agencies for federally managed properties, such as military bases, which typically follow their own federal building code.

Building permits must be reviewed following the state's requirements, but AHJs structure the permitting process for their areas of oversight. They have significant influence over the codes that govern construction and how projects are reviewed against these codes and standards. A standard process follows a flow as shown in Figure 3. AHJs seeking to expedite their permitting process may be able to automate the plan review for typical residential solar plus storage installations using an online automated permitting software.

Figure 3: Energy Storage Permit Review Process



Flow chart illustrating the typical permit application and review process from submission to final approval post inspection.

Source: Center for Sustainable Energy (https://energycenter.org/)

Initial Permit Application and Project Development

The process typically begins with an applicant researching project requirements and developing a design for ESS installation. They then submit the permit application to the relevant AHJ with the project plans. The AHJ's approval steps flow from this point to the step of confirming proper installation during site inspection and providing a final approval post inspection.

Permit Application Review by AHJ

For most AHJs, the permit review varies according to the type of project to be permitted. This variation is important because the requirements for permitting ESS installations in residential structures are different from the requirements for permitting ESS in commercial buildings. Some AHJs offer an expedited channel that may apply to both residential and commercial projects. Larger or more complex projects require more detailed review and take a different path through an AHJ's process. The review is typically split into residential and commercial lanes so that building officials with specialized knowledge of either the residential or commercial code can focus on those specific projects.

In some cases, permit applications also may be reviewed by building department staff with detailed knowledge of electrical, mechanical, plumbing, or other systems. In addition, AHJs may require additional permits, such as coastal development permits or California Coastal Commission review.

Depending on AHJ rules and the type of project under review, building officials may be required to obtain approval for permits from other agencies, such as the fire department and the electric utility. Figure 4 shows a set of reviews often required for large or complex projects. Aside from building safety, some projects may require review by the fire department, zoning and planning department (which may be integrated with building safety in some locations), and a public works or transportation department if the project affects public infrastructure or roadways. If a municipality also runs a public utility, the utility will also typically require review of the project. For projects served by investor-owned utilities, the development of an interconnection agreement typically occurs outside the municipal permit review.

It is important to note that the processes and reviews described above cannot always be completed simultaneously and may need to be completed sequentially. For example, it is possible that the fire department review must be completed before building department review, or that the utility interconnection agreement must be provided prior to building permit issuance. The timing and interaction of these processes and handoffs contribute to the complexity of navigating ESS permitting across California.

Figure 4: Municipal Agency Reviews Often Required by Large Projects

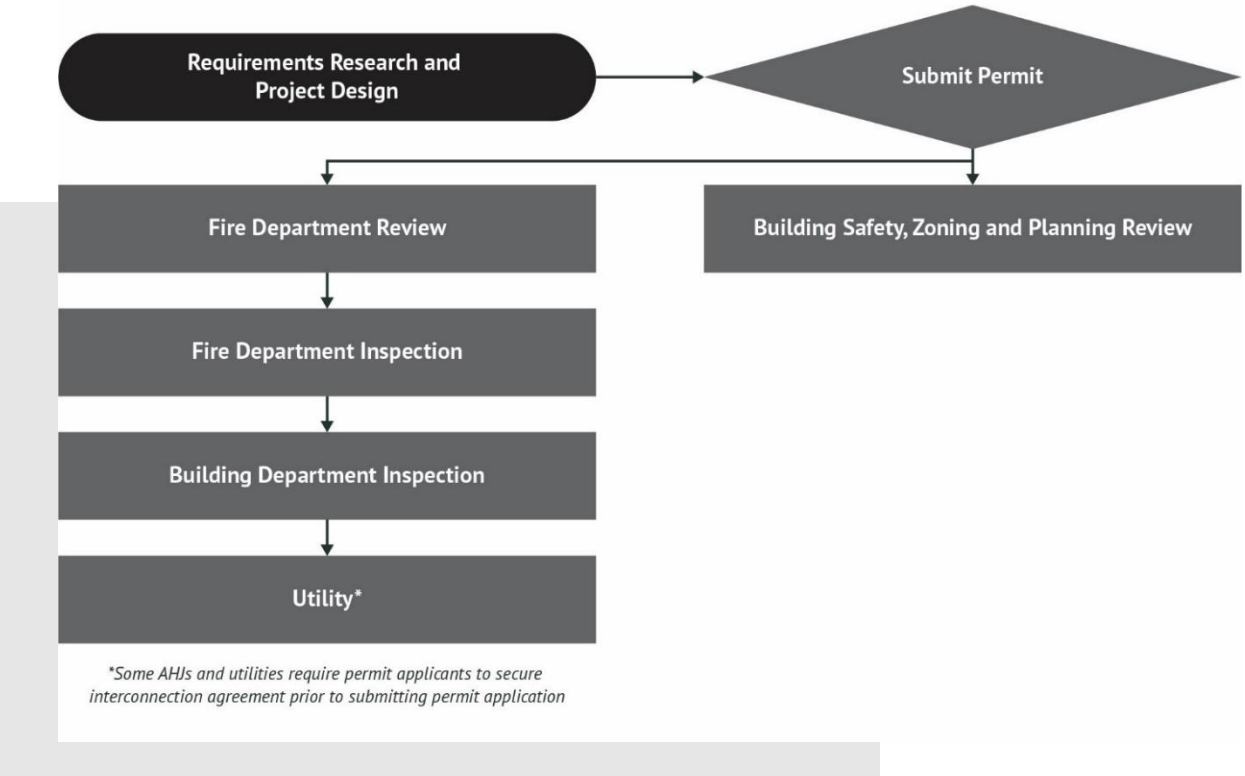


Figure 4 is a flow chart illustrating a typical large ESS approval process from fire department and building department review to utility inspection with a parallel review from building safety, zoning, and planning departments.

Source: Center for Sustainable Energy (https://energycenter.org/)

Permitting Best Practices Across California

Efficient permitting of ESS systems will continue to be a challenge for both AHJs and ESS designers and installers as the adoption rate of ESS continues to increase in California, actors in the energy industry shift, and ESS technologies rapidly evolve. From various discussions with and feedback from AHJs, ESS designers and installers, and ESS manufacturers, the following potential barriers to ESS permitting were identified. This is not a comprehensive list of challenges, and some items included on the list may not be viewed universally as a barrier.

- While codes and standards, such as the NEC, are updated frequently to keep up with the rapidly evolving ESS technologies, in practice, the latest iteration of the codes is often not enforced until years after development. California codes requirements that regulate ESS across the state thus often do not keep pace with the rapidly changing technologies.
- Multiple complex codes and standards affect ESS, and it may be unclear how these codes and standards interact.
- Problems or questions can arise from a lack of transparency or clarity in the inspection and permit application processes.
- The ESS designer or installer personnel may not be a "qualified person" and may not understand what is required. (Per NEC and NFPA, a qualified person is one who has

demonstrated skills and knowledge related to the construction and operation of electrical equipment and installations and has received safety training to identify the hazards and reduce the associated risk.)

- Inconsistencies in how codes and standards are interpreted by different AHJs across California can make the permitting process difficult.
- Errors, missing information, or failure to meet AHJ requirements for permit applications submitted by ESS installers cause delays in the review process.
- Outdated plan review processes that require manual submissions create long delays in receiving permits.
- Duplicative permit reviews (for example, multiple agencies, such as the buildings and fire departments, may require review of ESS installed on a one- or two-family dwelling) can create competing requirements and lead to delays and confusion.
- The system proposed and approved during the permit application process may not be equivalent to what is ultimately installed in the field.

To help improve ESS permitting processes across California while recognizing that no single approach is likely to work for every jurisdiction, this guidebook has compiled a variety of best practices and processes that have been successfully implemented in the state. Understanding what has worked well in one jurisdiction could help other jurisdictions identify opportunities for improvement in their processes. These best practices and processes include efforts to:

- Develop public data and dashboards — In San Joaquin County, county officials improved transparency and communication in their permitting process with a live dashboard on the Community Development Department website that displays current building inspections and a daily list of the planned inspections.
- Streamline communication channels — A midsized city in Central California recommends ensuring that each party (both the AHJ and the ESS installer) has a single point of contact to improve efficient and effective communications between parties.
- Clearly publish processes and requirements — AHJs should clearly publish their processes and requirements online and provide an example plan set. For example, the City of Mountain View in the San Francisco Bay Area has clear guidance on its website detailing what type of solar and storage projects are eligible for expedited review. Instructions are also provided for projects that are required to go through traditional plan submittal and review.
- Leverage educational resources — One best practice suggested by an AHJ in the San Francisco Bay Area is to leverage UL's publicly-accessible, online educational resources to gain clarity in interpreting UL 9540 certification and UL 9540A test results. Getting additional guidance directly from standards developers can help AHJs correctly interpret results and reduce delays caused by internal disagreement over test outcomes.

CHAPTER 3:
Electronic and Automated Permitting Systems

Several AHJs in California have implemented systems that enable electronic submittal and approval of building permit applications, an approach that has steadily been growing in popularity. Automated plan review tools are distinct from electronic document systems (although they may sometimes be integrated into one platform) and use automatic review approaches to check that project plans meet code requirements. AHJs can then use the results of the automated plan review to trigger permit issuance.

Senate Bill 379 (Wiener, Chapter 356, Statues of 2022) requires cities and counties to "implement an online, automated permitting platform" that can verify code compliance and issue a permit "in real time" for residential solar systems of less than 38.4 kW and for residential ESS paired with such solar systems. Furthermore, it requires nonexempt cities and counties to report the number of permits issued to the CEC annually. Cities with fewer than 5,000 residents and counties with fewer than 150,000 residents are exempt. A city or county can comply with SB 379 requirements to implement an automated permitting platform by adopting qualifying software or developing their own software to meet the requirements. The bill also requires that AHJs report the number of permits issued to the CEC.

Electronic Permitting System Examples

The following sections describe two existing electronic permitting systems available in California. It is recommended that each AHJ research and determine which software is most appropriate for its specific needs.

SolarAPP+ Electronic Permitting System

SolarAPP+ is a standardized plan review software that runs compliance checks and processes building permit approvals for residential rooftop solar and energy storage systems. SolarAPP+, which stands for "Solar Automated Permit Processing plus other clean energy technologies," was developed by the National Renewable Energy Laboratory (NREL), a project partner for this guidebook. Today, the SolarAPP Foundation, a nonprofit organization, manages and develops the SolarAPP+ product. The SolarAPP Foundation has teams working directly with AHJs and installers to provide onboarding, training, and support services. While the SolarAPP Foundation leads day-to-day management, the foundation's board of directors — made up of industry and government stakeholders — advises on the strategic approach for safe automated permitting.

Additional information on the platform is available on the SolarAPP+ website at https://gosolarapp.org/.

Symbium Electronic Permitting System

Symbium is an online permitting and plan review platform developed at Stanford's artificial intelligence Lab to conduct regulatory and code compliance checks with guaranteed accuracy and determinism. The platform performs instant compliance and completeness checks for solar PV, solar building-integrated photovoltaics (BIPV), and ESS, as well as all other residential alterations, such as reroofs, heat pumps, and EV chargers. It guides contractors and owner-

builders through project requirements step by step, ensuring all necessary information is captured while providing real-time feedback on code compliance before applications are submitted to jurisdictions. Through direct integrations with jurisdictions' permit tracking systems, Symbium offers a seamless end-to-end workflow, eliminating the need for applicants to use a two-step process to first secure an approval through a platform and then separately submit a permit application.

Additional information on the platform is available on the Symbium website at https://symbium.com/.

CHAPTER 4:
Resources

Energy Code Ace: California Energy Code Guidance

Energy Code Ace™ offers no-cost tools, training, resources, and technical support to help industry professionals comply with the California Energy Code and Appliance Standards (Title 20). Some of Energy Code Ace's offerings include:

- **Technical Support:** Use "Submit a Question" on the Energy Code Ace website to connect with code experts or scroll through Q&Ace to find answers to commonly asked questions.
- **Tools:** Use the Virtual Compliance Assistant to create Certificates of Compliance and Certificates of Installation for nonresidential, hotel/motel, high-rise multifamily (NRCC, NRCI), and low-rise multifamily (LMCC, LMCI) projects.

Projects submitting for building permits through December 31, 2025, are subject to the 2022 Building Code:

- **Training Opportunities:**
  - 2022 Nonresidential & High-rise Multifamily Standards: Solar & Battery Storage
  - 2022 Single-family & Low-rise Multifamily Standards: Solar and Battery Storage
- **Available Resources:**
  - 2022 Single-family & Low-rise Multifamily Solar and Battery Storage Fact Sheet
  - 2022 Nonresidential & High-rise Multifamily Solar and Battery Storage Fact Sheet

Projects submitting for building permits as of January 1, 2026, are subject to the 2025 Building Code:

- **Training Opportunities:**
  - 2025 Nonresidential Standards: What's New
  - 2025 Residential Standards: What's New
- **Available Resources:**
  - 2025 Single-family & Low-rise Multifamily Solar and Battery Storage Fact Sheet *(coming soon)*
  - 2025 Nonresidential & High-rise Multifamily Solar and Battery Storage Fact Sheet *(coming soon)*

Fire Safety Standards

- UL 9540A Test Method for Battery Energy Storage Systems (BESS): UL 9540A Test Method for Battery Energy Storage Systems (BESS) | UL Solutions

- Energy Storage System Testing and Certification: Energy Storage System Testing and Certification | UL Solutions
- Informational Bulletin on the UL 9540 Safety Standard and the UL 9540A Test Method: Informational Bulletin on the UL 9540 Safety Standard and the UL 9540A Test Method | Sustainable Energy Action Committee (SEAC)

Permitting Tool Kit: One- and Two-Family Residential ESS

The following documents form an optional tool kit that AHJs can use to ensure a predictable and efficient process for permit applicants. The templates can be adopted with minor administrative adjustments by a jurisdiction, as needed. Building officials should review the template documents and their assumptions and make modifications as necessary to meet the specific needs of their jurisdiction.

Permit Application Requirements Template

This template is intended to guide applicants through the necessary components for a streamlined permitting process for one- and two-family residential ESS projects.

1. Approval Requirements
    - **[LIST STEPS REQUIRED TO OBTAIN PERMIT APPROVAL]**
        - Steps should include criteria for streamlined permitting and instructions for projects that do not fall within those criteria. For example, "Projects located in the historical district require planning review" or "ESS units over 20 kWh are required to follow the California Fire Code and require fire review."
    - The following permits are required to install a residential ESS:
        - **[LIST TYPE(S) OF PERMIT REQUIRED BY LOCAL JURISDICTION]**
    - Planning review **[IS/IS NOT]** required for ESS installations of this size.
2. Submittal Requirements
    - Completed permit application form (available at **[WEB ADDRESS]**).
    - A completed Standard Electrical Plan that includes the following:
        - Site diagram showing the arrangement of the ESS and the distance from property lines and adjacent buildings/structures (existing and proposed).
        - Location of main service or utility disconnect.
        - Make and model of ESS.
        - Total number of battery modules.
        - One-line diagram of system.
- Specific grounding/bonding, conductor type and size, conduit type and size, and number of conductors in each section.
- If paired with solar PV, inclusion of solar PV in the diagram with their locations.
        - Equipment cut sheets.
- Equipment labeling, as required.

3. Fees

- **[PROVIDE CLEAR FEE SCHEDULE]**

4. Inspection Requirements
    - **[PROVIDE INSPECTION CHECKLIST]**

Additional Trainings and Resources

Training for AHJ staff and project contractors/installers can help ease the transition to using automated permitting systems and ensure that permitting documentation is submitted correctly the first time to reduce time and frequency of resubmissions. Trainings are categorized by audience and topic on the Resources page of the Energy Storage Permitting Guidebook website.

GLOSSARY

ALTERNATING CURRENT (AC)	An electrical current that periodically reverses direction, unlike direct current (DC) which flows in only one direction. Utility power delivered by the grid is AC.
AUTHORITIES HAVING JURISDICTION (AHJs)	Agencies that issue building permits. AHJs in California include cities and counties, which oversee most of the permitting in their area, and state and federal agencies, which oversee permitting for certain kinds of facilities or properties, such as schools or military bases.
BATTERY ENERGY STORAGE SYSTEM (BESS)	A specific type of energy storage system that uses electrochemical means to store electrical energy.
BEHIND-THE-METER (BTM)	Electricity end users almost always have a meter at their site that calculates the amount of energy consumed from the grid. A behind-the-meter installation refers to any equipment that is connected to circuits on the customer's side of the meter.
CARBON NEUTRALITY	A balance between the amount of carbon emitted and the amount of carbon absorbed, achieving a net-zero balance.
COMMERCIAL SECTOR	Businesses and other organizations that provide services or goods.
DIRECT CURRENT (DC)	A form of electric current where electrons flow in only one direction. It is the type of energy produced by sources like solar panels and batteries.

DC-COUPLED BATTERY	Part of an energy storage system consisting of matched components with a DC output.
ENERGY STORAGE SYSTEMS (ESS)	A system that is capable of receiving, storing and then distributing energy (primarily electrical energy in the context of this guidebook).
GREENHOUSE GAS (GHG)	Greenhouse gases contribute to global climate change by altering the heat balance of the atmosphere.
INDUSTRIAL SECTOR	Businesses that manufacture or distribute capital-intensive goods.
KILOWATT (KW)	One thousand (1,000) watts (W). A unit of power measuring the rate at which energy is used, produced or transferred.
KILOWATT-HOUR (KWH)	A common unit of energy measuring the amount of power used or stored over time (specifically, one kilowatt for one hour, or one thousand (1,000) watt-hours (Wh)).
LITHIUM IRON PHOSPHATE (LFP)	A type of lithium-ion battery, referencing its cathode material, LiFePO4.
LOAD SHIFTING	A form of electrical load management. Load shifting is the practice of moving energy consumption from high-demand times (on-peak times) to low-demand times (off-peak times) to reduce strain on the electrical grid.

MEGAJOULES (MJ)	A Joule is a unit of work or energy equal to the amount of work done when the point of application of force of 1 newton is displaced 1 meter in the direction of the force. A megajoule is 1 million Joules (it takes roughly one megajoule to make a pot of coffee).
MEGAWATT (MW)	One-thousand kilowatts (1,000 kW) or one million (1,000,000) watts.
MEGAWATT-HOUR (MWh)	One-thousand kilowatt-hours (1,000 kWh) (or roughly the amount of electrical energy that would supply 1,370 typical homes in the Western U.S. for one month).
NAMEPLATE ENERGY CAPACITY	Energy capacity is a measurement of the maximum amount of energy an ESS is designed to store, typically measured in kilowatt-hours (kWh). It provides an indication of the amount of usable electrical power that can be supplied by a specific system over a given amount of time. It is often paired with the power output capacity, measured in kilowatts (kW).
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)	A non-profit organization that develops and promotes fire and electrical safety codes and standards.
NATIONAL LAB OF THE ROCKIES (NLR)	Previously the National Renewable Energy Laboratory (NREL).
PERFORMATIVE APPROACH	A flexible, computer-modeled compliance pathway for the California Energy Code (Title 24) that allows system designers to trade off energy efficiency features to meet an overall building energy budget rather than following strict rules for each component of the building.

PRESCRIPTIVE APPROACH	A straight-forward, "recipe book" compliance pathway for the California Energy Code (Title 24) that requires designers to meet specific mandatory minimum efficiency standards for each building component.
RESIDENTIAL SECTOR	Households located in single-family or multifamily dwellings.
TECHNICAL ADVISORY COMMITTEE (TAC)	The technical advisory committee (TAC) is a group of industry experts that volunteer their time to participate in project discussions, review draft content and provide subject matter expertise and insight. The TAC members for this project are listed in the Acknowledgements section of this report.
TECHNOLOGY READINESS LEVEL (TRL)	A system developed by NASA to provide a consistent framework for assessing the maturity of an emerging technology, with TRL 1 being the basic research stage and TRL 9 being full operational deployment.
UNDERWRITERS LABORATORIES (UL)	A global company that performs safety testing, inspection, and certification for products to meet scientific safety, quality, or security standards.

APPENDIX A:
Stakeholder Interview Profiles

To gather insights from stakeholders experienced with permitting ESS, the guidebook team cast a wide net. Nearly 1,500 industry contacts were invited to complete an online survey and/or join two virtual workshops held in July and August 2021. The survey drew 57 complete responses, and 60 people took part in the workshops. From these groups, 52 individuals expressed interest in being interviewed. After screening, the team conducted 24 interviews (21 by video and three by phone) with a diverse mix of stakeholders, including AHJs, designers/installers, developers/end users, and advocacy organizations. After reviewing transcripts and confirming permitting experience, 14 key interviews were used to inform the lessons learned and best practices discussed in this guidebook.

Organization Type	Respondent Title	Organization Detail	Area of Focus
AHJs	Building Inspector	City, South Coast Region	Residential
AHJs	Chief Building Inspector	County, Central Region	Residential
AHJs	Electrical Plan Checker/Inspector	County, South Coast Region	Residential
AHJs	Chief Building Official	Small City, Bay Area	Residential
Designer/Installer	Director of CAD Services	Mid-sized designer/installer 1	Residential
Designer/Installer	Design Manager	Mid-sized designer/installer 2	Residential
Designer/Installer	Senior Jurisdiction Specialist	Large designer/installer 1	Residential
Designer/Installer	Permitting and Inspections Team	Large designer/installer 2	Residential
AHJs	Chief Electrical Inspector	Mid-sized City, Central Region	Commercial
AHJs	Deputy State Fire Marshall	State Fire Agency	Commercial
Designer/Installer	CEO	Small designer/installer	Commercial

Organization Type	Respondent Title	Organization Detail	Area of Focus
Designer/Installer	Director	Large designer/installer 1	Commercial
Designer/Installer	Permitting Team	Large designer/installer 2	Commercial
Designer/Installer	Director of Strategic Initiatives	Large nonprofit designer/installer	Tribal/Rural

Source: Center for Sustainable Energy (https://energycenter.org/)