CALIFORNIA
BUSINESS AND ECONOMIC DEVELOPMENT

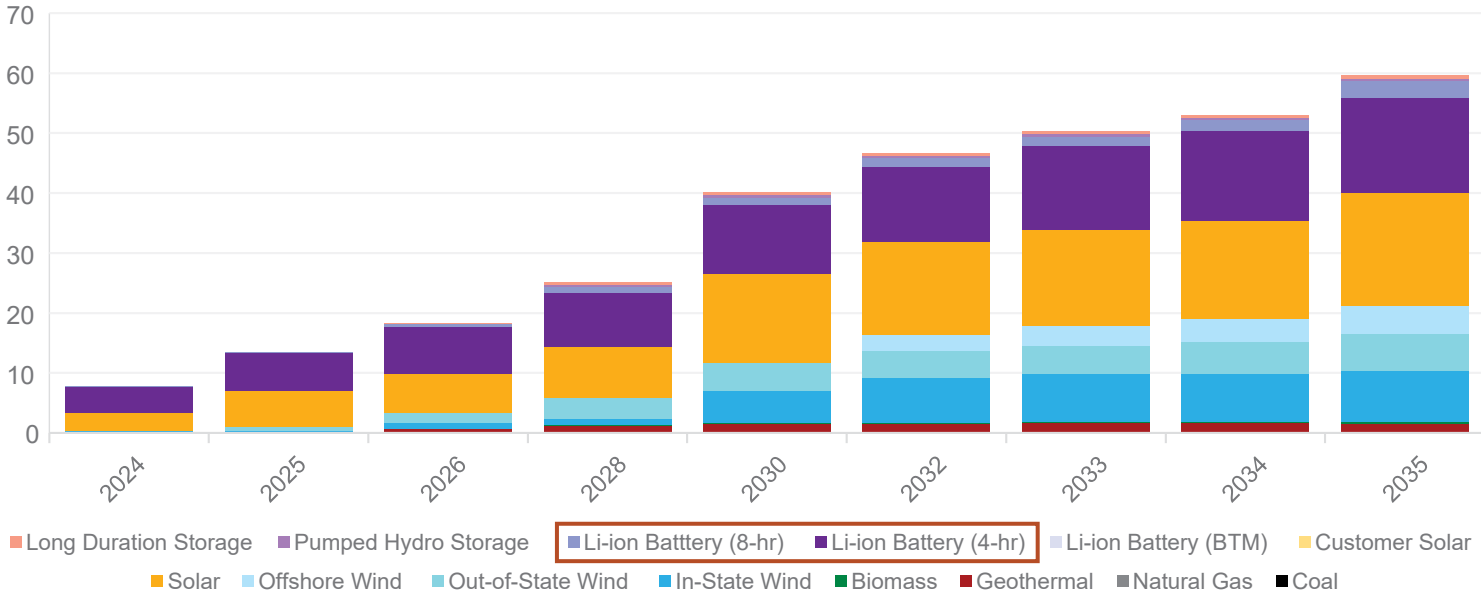
Fact Sheet

Battery Energy Storage Systems (BESS)

Energy storage supports the electric grid by storing excess power – such as midday solar – and delivering it when generation is low, including during cloudy days or calm, windless periods. BESS helps manage the intermittency of solar and wind, balance supply and demand and provide grid services that improve reliability, flexibility, and stability.

California's BESS capacity reached 15.7 GW as of May 2025, which reflects a 1,944% increase from the 0.77 GW that was installed in 2019. The state's installed BESS capacity is on track to grow over three-fold, from 15.7 gigawatts (GW) in 2025 to a projected 52 GW by 2045, reflecting the technology's rapid deployment and increasing role in energy resilience. In addition, California has not issued a Flex Alert since 2022, due in large part to storage, and despite historic heat waves through the 2023, 2024 and 2025 summers.

New Resource Buildout in the California Public Utility Commission's Resource Plan



Source: California Public Utilities Commission. (2024). Fact sheet: Decision Adopting 2023 Preferred System Plan (R.20-05-003).

Benefits

Grid Reliability and Flexibility

- Load shifting and peak shaving.
- Frequency and voltage regulation.
- Reduces power curtailment.
- Spinning reserve and black start support to mitigate blackouts and brownouts.

Resilience and Environmental Impact

- Reduces fossil fuel dependence.
- Supports local critical facilities with power.
- Produces cleaner air with no pollutants or greenhouse gases compared to fossil fuel peaker plants.

Economic and Market Benefits

- Reduces energy costs by storing energy when prices are low and discharging during high demand.
- Cost savings through providing flexible storage, which can defer or reduce grid infrastructure upgrades and prevent costly damage from power outages.
- Local job creation in clean energy technology, construction and operations – over 80,000 US clean storage jobs.
- Boosts local economies and broadens tax base – rapidly growing market valued at about $3B in the US.

Types of BESS

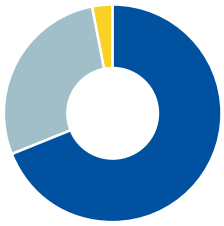
4-hour: Typically used for load shifting and managing evening peak demand.

8-hour: Provides extended support during prolonged periods of low renewable generation or system stress.

10+ hour: Long duration BESS for extreme weather events or widespread grid emergencies.

Context: If a home uses 1 kilowatt (kW) of power at any moment, a 4-hour, 1 megawatt (MW) BESS system can power 1,000 homes for 4 hours, delivering 4,000 kilowatt-hours (kWh) of energy.

Most CA BESS installations over 50 MW use lithium-ion technology with the following chemistries:



- 69% Lithium Iron Phosphate (LFP): most common in California.
- 28% Nickel Manganese Cobalt (NMC).
- 3% Nickel Cobalt Aluminum (NCA): least common in California.

Source: California Public Utilities Commission. (2025). 2025 battery energy storage system facility survey. https://www.cpuc.ca.gov

BESS are most commonly placed outdoors as a best practice for fire safety considerations.

- Over 90% of BESS in California are installed outdoors.
- Each project requires different design, installation, enclosure and safety requirements and operational constraints.

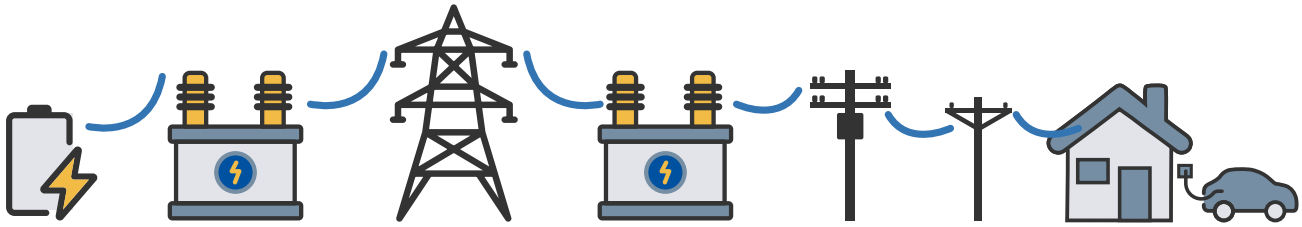
Standards & Regulations

- The CPUC enforces safety standards through General Order 167-C, requiring utilities to maintain safe, reliable, operation and undergo inspections.
- The Office of the State Fire Marshal (OFSM) develops California Fire Code (CFC) adopted triennially including CFC Title 24, Part 9, Chapter 12, that addresses requirements for energy systems.
- Local jurisdictions can also implement building and safety requirements for energy storage in local fire code and ordinances (as long as requirements comply with CFC).
- SB 283 (Laird, 2025) requires applicants to meet with local fire departments to review design, potential fire risks and emergency response plans.

Additional Resources for BESS

- NFPA safety training for energy storage systems
- EPRI Storage Safety Documentation and Database of Events
- ACP: What is Energy Storage?
- ACP: Claims vs Facts: Energy Storage Safety
- BESS Safety FAQs
- UL Solutions BESS
- NREL Energy Storage Research
- PNNL Energy Storage Research

Utility-scale BESS provides power to customers through the transmission and distribution systems. Unlike small-scale behind the meter BESS that can provide power directly to customers on-site, utility-scale BESS provides power to customers similar to other large generating facilities like solar and wind plants. When the batteries discharge, electricity is stepped up in voltage and injected into the transmission system, which carries the power at high voltage across long distances. From there, the electricity flows into the distribution system, where voltage is stepped down, and delivered through local distribution lines to homes and businesses. In this structure, utility-scale BESS can supply reliable power to the grid during times of high demand, provide backup support during outages, and enhance grid flexibility by balancing fluctuations from renewable resources.



CALIFORNIA
BUSINESS AND ECONOMIC DEVELOPMENT

The Governor's Office of
Business and Economic Development

Energy Unit energyunit@gobiz.ca.gov