CALIFORNIA ENERGY COMMISSION

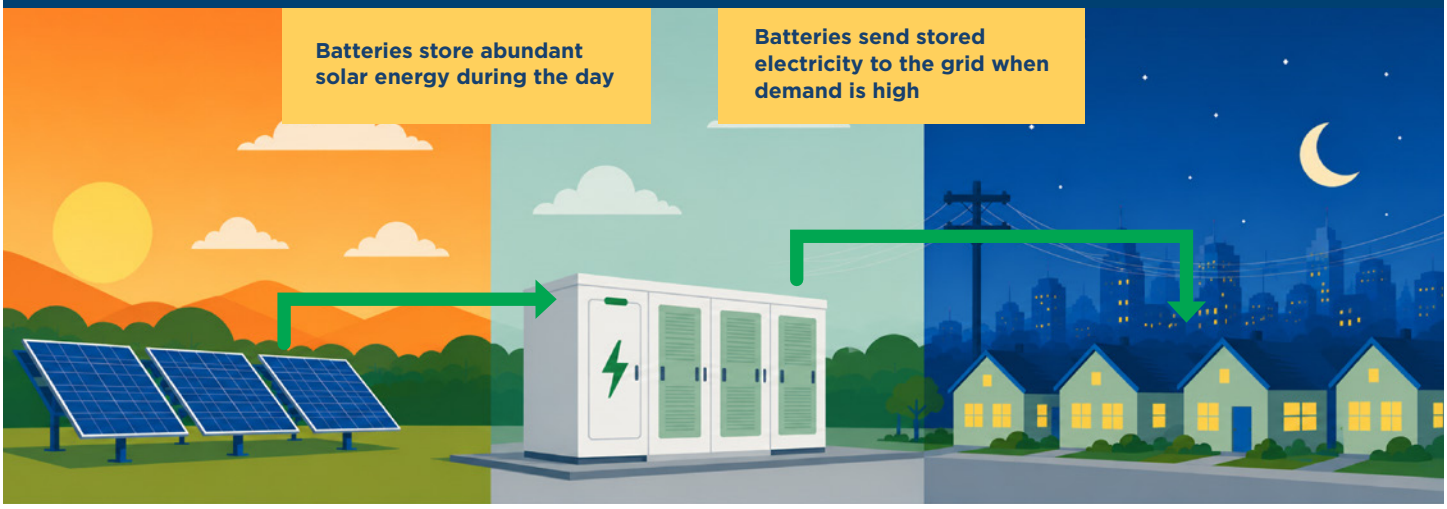
Understanding Battery Energy Storage

FACT SHEET

Battery energy storage systems are an important part of California's transition to 100 percent clean electricity. Batteries store electricity when it is plentiful and make it available when it is needed most. For example, they can store excess solar electricity produced during the day and deliver it back to the grid in the evening, when solar production declines but electricity demand remains high. They can also store wind energy generated overnight when demand is low. By shifting electricity from times when it is abundant to times when it is needed, battery storage helps keep the grid reliable, reduce the risk of power outages and make greater use of California's renewable energy resources.

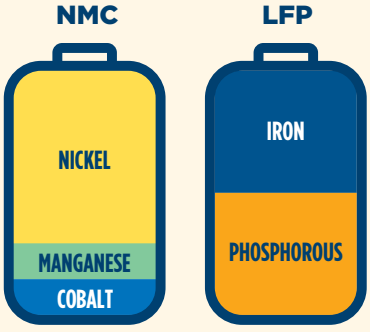
The state now has 21,000 megawatts (MW) of battery storage capacity, up from less than 700 MW in 2019. Of this, 18,000 MW comes from utility-scale battery storage facilities and the rest from smaller residential and commercial systems. The combination of battery storage and renewable energy resources has significantly reduced the state's reliance on fossil fuels, which pollute the environment, harm wildlife, and affect human health.

How Battery Storage Works Throughout the Day



What Is a Battery Energy Storage System?

A battery storage system stores electricity like the battery in a phone or electric vehicle, but on a much larger scale. Currently, most battery storage systems use lithium-ion batteries, although other battery technologies exist or are in development. Older battery storage facilities used nickel-manganese-cobalt (NMC) lithium-ion batteries, but newer projects are increasingly using lithium iron phosphate (LFP) batteries. Compared with older NMC battery versions, current LFP battery technology has greater thermal stability and a higher threshold temperature for thermal runaway.



LFP = Lithium Iron Phosphate

NMC = Nickel Manganese Cobalt

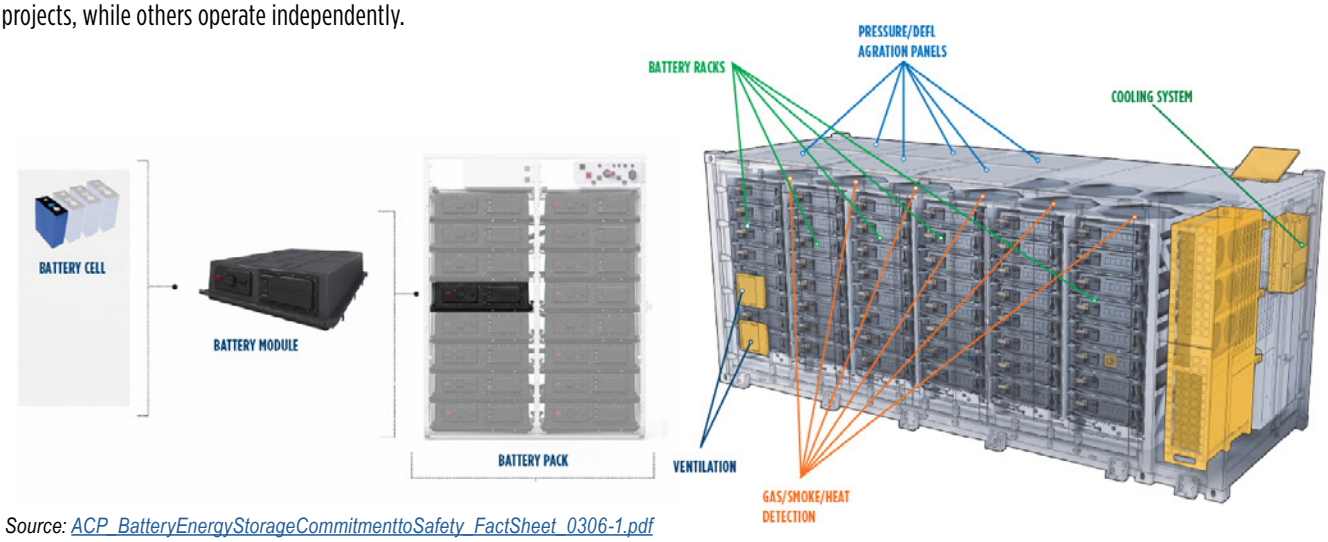
Source: Mayfield Renewables accessed at: https://www.mayfield.energy/technical-articles/comparing-nmc-and-lfp-lithium-ion-batteries-for-ci-applications/

How Are Battery Storage Facilities Installed?

Today's battery storage technology differs from earlier installations. Newer battery storage facilities use batteries housed in separate containers located outdoors rather than inside buildings. A main reason for this change is that containerization helps to isolate battery units and reduce the potential for thermal runaway or fire to propagate from one unit to another.

Older Units Indoors → **New Units Outdoors**

Inside a battery storage container are several integrated components that store, monitor, and deliver electrical power. Individual battery cells are assembled into modules. These modules are assembled and placed in packs. The current practice is to put these packs onto racks and then into containers located outdoors. Containers are equipped with advanced safety features designed to mitigate and eliminate hazards. Some battery storage facilities are built alongside solar or wind projects, while others operate independently.



Source: ACP_BatteryEnergyStorageCommitmenttoSafety_FactSheet_0306-1.pdf

Why Does California Need Battery Storage?

- **Supports grid reliability:** Batteries provide electricity when demand is high, helping reduce the risk of power outages during periods when the grid is under stress.
- **Makes better use of clean energy:** Batteries can store excess renewable electricity produced during the day and make it available later, including after the sun goes down.
- **Reduces reliance on fossil fuels:** Stored clean electricity can reduce the need for natural gas and other fossil-fueled power plants to meet electricity demand.
- **Helps reduce air pollution:** By reducing fossil-fueled electricity generation, battery storage can help reduce greenhouse gas emissions and air pollutants that can harm human health.

September 2026