



LANGDON MILLS SOLAR

Battery Energy Storage Systems (BESS)

What is energy storage?

Energy storage is the capture of energy produced and stored for use at a later time to reduce imbalances between energy production and energy demand. Batteries are a form of energy storage.

What type of battery is commonly used for energy storage?

Although there are different kinds of battery chemistries, lithium-ion batteries (similar to the ones in phones and laptops) have been the most commonly used technology for both residential and utility applications in the United States because they offer the best combination of price, operational characteristics, reliability, and safety.

What is the value of large battery storage?

The electric grid functions by constantly matching supply and demand for electricity. Demand for power fluctuates which means the grid requires significant flexibility to manage those fluctuations. Adding batteries to the electric grid provides flexibility, offering energy and capacity at times when generation is not otherwise available.

- **Bolster Grid Resilience**

Batteries can help shorten customer outage time and provide backup power during grid outages. They can also deploy power during times of high electricity demand, which can happen during periods of high temperatures.

Batteries can help support the grid during unpredictable weather patterns where energy sources such as wind or solar may have shortened windows to generate clean, renewable energy – i.e., cloudy weather, calm winds, snowstorms, shortened days, etc.

- **Provide Grid Stability**

Energy storage can create better load management and less frequent interruptions to the power supply. Distributed grid-scale storage at critical transmission ‘intersections’ can help avoid disruptions by stabilizing capacity on a large scale.

- **Support Grid Sustainability**

When paired with renewables, which have variable production, batteries can help allow for more renewables on the grid by allowing power to be used at different times than production.

- **Strengthen Grid Flexibility**

Batteries are particularly valuable because they can respond quickly to changes in energy demand, turning on and off in fractions of a second.

Why are large storage systems paired with solar farms?

While solar does not need to be paired with batteries to be beneficial and cost effective, co-location (having both on the same site) can be advantageous. 36% of solar projects connected to the grid in 2020 were paired with batteries. (Lawrence Berkley National Laboratory). Of the 14.5 gigawatts of battery storage capacity planned to come online in the US from 2021-2024, 63% of it will be co-located with solar power plants. (Energy Information Administration)

The predictability and relatively regular generation patterns of solar arrays effectively pair with battery storage because battery systems are limited in the length of time they can discharge power before needing to recharge. Having a ready source of energy from the solar arrays and a 24/7 ability to use it from the batteries results in an optimized large-scale project.



Are batteries safe?

Yes. Batteries have been in use for years, and when properly designed, built, and operated to industry safety standards, present no abnormal safety risks

Leaking

Unlike flooded lead-acid batteries, lithium-ion batteries cannot leak acid because they do not contain acid. In rare cases, lithium-ion batteries can leak if they experience catastrophic failure and most of the leakage would be in the form of gasses.

Enclosures

The purpose of a battery enclosure is to protect batteries from the elements, including heating, cooling, and other weather events, and to ensure that in the unlikely event of failure, damage to the system is contained. Containerized battery storage units are generally sealed, automated, and constantly monitored.

Fires

Preventative features exist to reduce the risk of fire, including a management system that continuously monitors sensors for temperature, voltage, and current at the individual battery module level. This technology automatically shuts down the string of batteries if failure is a risk or if communication with the sensors is lost.

Battery Energy Storage Systems incorporate a fire suppression system which typically consists of a fire alarm, smoke and heat detectors, heat activated sprinkler system, fire rated insulation, strobe lights, and horns. A clean agent fire suppression can be used for assistance in suppressing a potential fire. HVAC systems are also incorporated in the battery systems to keep the batteries from experiencing overheating. The HVAC system will keep the batteries cool during the summer and at an appropriate temperature during the winter, to optimize battery production.

Noise

The noise emitted from utility batteries is no louder than most electrical transformers, and battery projects are designed to comply with applicable sound limits. Batteries themselves emit no noise; the ambient noise comes from cooling or heating systems.

BESS Quick Facts

- Lithium-ion batteries used for battery energy storage systems have an 85-95% rate of efficiency.
- Battery storage can help shorten customer outage time and can help provide backup power during outages.
- Battery storage combined with renewable energy has become more widely accepted and used in the last decade – as of 2021, 34% of proposed solar projects are to be paired with battery storage systems.
- Partnering batteries with solar in the U.S. has grown from 47 megawatts (MW) in 2010 to 6,471 MW as of 2022.
- Pairing renewable energy and battery energy storage systems can reduce energy costs.

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