



Battery Energy Storage Systems (BESS) Definition

A BESS is a type of energy storage system that uses batteries to store and distribute energy in the form of electricity.

These systems are commonly used in electricity grids and in other applications such as electric vehicles, solar power installations, and smart homes.

At its most basic level, a BESS consists of one or more batteries that store electrical energy for use at a later time. This stored energy can then be drawn upon when needed to meet various demands for power across different applications.

BESS can also provide advantages over other energy storage systems, including greater efficiency and flexibility, faster response times when powering equipment or devices, and lower costs overall.

How BESS Works

BESS relies on one or more batteries to store energy, which can then be used at a later time.

These batteries may be charged using excess electricity generated by wind or solar farms, for example, or by grid connection during periods of low demand.

Once the battery is full, it stores the electricity until it is needed.

BESS Technology

Battery Energy Storage Systems offers more than just a standard battery. It is fully packed with technologies allowing its system to capture charge and execute discharge. The following are the typical technologies it includes:

Inverters

Inverters are devices that transform direct current (DC) to alternating current (AC). AC is the type of electricity used in homes and businesses.

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Control Components

The control components of a BESS manage the charging and discharging of the batteries and regulate the flow of electricity to and from the grid.

Integrated Sensors

Integrated sensors monitor the BESS's performance and conditions, providing valuable data to help optimize its operation.

Multiply Battery Modules

Multiple battery modules are composed of multiple batteries that work together to store and release energy.

Battery Energy Storage Systems Application

BESS is used in a variety of applications, including:

Peak Shaving

Peak shaving reduces the peak electricity demand by using stored energy to meet part of the demand. This can help reduce the overall cost of electricity and the need for new power plants or upgrades to the existing grid.

Microgrids

A microgrid is a small, independent power system that can operate either connected to or disconnected from the main grid.

BESS can provide backup power for a microgrid in an outage and can also help stabilize the grid by providing energy during peak demand periods.

Uninterruptible Power Supply

It is an electrical apparatus that supplies continuous power to critical loads during power outages.

BESS is often used in conjunction with a UPS, as it can help ensure that critical equipment continues to function without interruption during a power outage.

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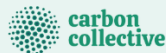
Types of BESS

There are various types of BESS available, depending on your needs and preferences.

Some common types include lithium-ion batteries, lead-acid batteries, flow batteries, and flywheels. Each type has its advantages and disadvantages in performance, lifespan, cost, and other factors.

Types of BESS

- > Lithium-Ion Batteries
- > Lead-Acid Batteries
- > Flow Batteries
- > Flywheels



Lithium-Ion Batteries

These batteries are one of the most popular types of BESS. They offer a high energy density and are relatively lightweight, making them easy to transport and install.

Lead-Acid Batteries

Lead-acid batteries are another common type of BESS. They are typically cheaper than lithium-ion batteries but have a shorter lifespan and are not as efficient.

Flow Batteries

Flow batteries are a newer type of BESS that offer a longer lifespan than traditional lead-acid or lithium-ion batteries.

They work by storing energy in an electrolyte solution, which can be redirected to different parts of the battery as needed.

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Flywheels

Flywheels are another energy storage system that uses kinetic energy to store and release electricity.

Flywheels are typically used for short-term storage applications, such as load leveling or backup power generation.

Advantages of BESS

There are several advantages to using BESS, including:

- Provide a cost-effective way to store excess energy generated by renewable sources like wind and solar farms.
- Can store excess electricity generated by renewable energy sources such as solar or wind farms, allowing it to be used at a later time when these sources are not available.
- BESS can provide backup power during outages or extreme weather events, reducing the need for costly distribution upgrades or emergency generators.
- Assist in load leveling and grid support, helping to balance fluctuations in electricity demand throughout the day and reduce congestion on the grid.
- BESS can improve power quality by smoothing out voltage fluctuations that may otherwise disrupt equipment operations.
- Many types of BESS are easy to install, making them a popular choice for businesses and homeowners looking for reliable energy storage systems.

Disadvantages of BESS

While there are many benefits to using BESS, some potential drawbacks should be considered. These include:

- Higher upfront costs compared to other energy storage solutions.
- Issues with performance and lifespan are associated with certain types of BESS, such as lithium-ion batteries or flywheels.
- Increased need for maintenance and monitoring, especially if a qualified technician does not install the BESS.
- The reliability of BESS is typically lower than that of traditional power generation sources like fossil fuels or nuclear power plants.

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Key Takeaways

Battery energy storage systems, or BESS, are a type of energy storage solution that can provide backup power for microgrids and assist in load leveling and grid support.

There are many types of BESS available depending on your needs and preferences, including lithium-ion batteries, lead-acid batteries, flow batteries, and flywheels.

While BESS does have some advantages, such as its ability to store excess energy generated by renewable sources like wind or solar farms, they also have some drawbacks, including higher upfront costs and potential issues with performance or lifespan.

To choose the right BESS for your needs, it is important to consider cost, efficiency, and reliability when making your decision.

FAQs

1. What is a BESS?

A BESS is a type of energy storage system that can be used to store excess energy from renewable sources.

2. How does BESS work?

BESS typically consists of one or more batteries that use kinetic energy to store and release electricity as needed.

3. What are the different types of BESS available?

There are many different types of BESS available, including lithium-ion batteries, lead-acid batteries, flow batteries, and flywheels.

4. What are some advantages of using a BESS?

Some key advantages of using a BESS include reducing costs by storing excess energy generated by renewable sources, improving power quality by smoothing out voltage fluctuations and providing backup power during outages or extreme weather events.

5. What are the disadvantages of using a BESS?

These include higher upfront costs, issues with performance or lifespan, and an increased need for maintenance and monitoring.

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