



## Battery Energy Storage Systems (BESS)

### What is a Battery Energy Storage System (BESS)?

A BESS is a power system which uses batteries to store electrical energy. These systems play a crucial role in grid stabilization, grid resiliency, load management, and grid transfers. A BESS is commonly combined with other distributed energy resources (DER), such as wind turbines, photo-voltaic arrays and AC generator sets for creating efficient, low emission, renewable energy. A BESS offers the end user a reduction in energy consumption by discharging stored energy during high-demand periods and storing surplus energy during low-demand. The use of sophisticated controls allows the user to optimize DER utilization, energy consumption, and energy costs, while improving grid reliability. KVAR control, load leveling, peak shaving, grid resiliency and export power are all possible with the use of a properly sized BESS.



### What role does a BESS play in energy management and microgrids?

Customers often need help defining their goals for incorporating a microgrid and BESS. At AC & DC, we use AI systems to determine the right mix of DER assets needed for meeting each customer's unique electrical and operation goals based on the following general categories:

- **Prime Power** – This user type seeks to sever their dependency on a legacy power provider.
- **Islanding** - Some consumers need isolation from other consumers on the same grid and want complete control of power consumption and production. Islanding offers the most protection from rolling black-outs, brown-outs, and utility disturbances.
- **Emergency Power** - When your grid is relatively stable, and you simply need a buffer for voltage flicker or the occasional power outage, Make-Before-Break or uninterrupted stand-by power may be the best goal.
- **Load Curtailment** - This type of user is interested in reducing energy costs by controlling and minimizing peak demand charges and/or KVAR penalties.
- **Grid Catching** - This user type absolutely requires a properly sized BESS which meets the ultimate load capacity. Grid catching provides the user with support that backs up the grid upon failure while providing voltage recovery within 5 microseconds.
- **Export Power** - Selling power back to the grid is an attractive way to create a revenue stream from traditionally stand-by or stranded assets. Surplus power can be sold back into the open market with the use of bi-directional converters and BESS technology.
- **Power Cost Reduction** - Flexibility of which DER assets to deploy and specifically when to deploy these assets offers the user the ability to control the price of power by taking advantage of the lowest real-time utility power rate structures and fuel/source optimization. BESS systems add a layer of control and flexibility unmatched by other DERs.
- **Power Quality Control** - Did you know that with a properly designed BESS you can actually increase or decrease how much KVAR you push back onto the grid. A BESS can help you lower your utility costs by controlling KVAR. A BESS can also provide voltage support and provide power factor correction.



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## What are my choices for battery chemistry?

All battery chemistries are welcome, including nickel cadmium, sodium nickel, lithium titanate (LTO), lithium ion, vented lead acid, and valve regulated lead acid (VRLA).

## What are the benefits of grid resiliency?

Grid resiliency, as it pertains to the electrical infrastructure, offers five essential benefits: risk reduction, flexibility, economic management, delivery reliability, and quick recovery.

## What are BESS benefits?

- **Energy Cost Savings (Load Shifting):** BESS can store electricity during off-peak hours when rates are lower and release it during peak times, thereby reducing energy costs.
- **Grid Resilience:** In the event of a power outage, BESS can provide backup power, ensuring continuous operations.
- **Renewable Optimization:** A BESS offers uninterrupted transferability between multiple DERs to bring those systems on-line when the economies are favorable (i.e., to connect the generators to the bus when fuel prices are most attractive or to connect the BESS when other renewable sources are not producing).
- **Environmental Benefits:** Reduces greenhouse gas emissions by integrating clean energy sources into the grid.
- **Grid Catching:** Seamless backup power with less than voltage recovery.
- **Income Stream:** Surplus power can be exported back to the grid providing lucrative revenue streams.

## What is Value Stacking?

Value stacking incorporates the best features of any DER while minimizing the faults in order to maximize system integrity. Value stacking combines all the benefits of energy management with resiliency to create the best ROI for an investment in BESS. Artificial Intelligence (AI) and the use of sophisticated controllers allows BESS and/or microgrids to be operated to optimize performance of each individual source. No longer do alternative generation sources need to sit on the side-lines only to being used as emergency power when the utility fails.

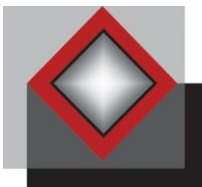
## What is your company's level of expertise?

With decades of experience in power conversion and battery technologies, we ensure a dependable BESS installation for your microgrid. We manage permitting, metering/protection, site development, electrical build-out, energization, and commissioning of BESS and EV charging systems, providing comprehensive guidance throughout the entire installation process. Trust us for a worry-free installation. We offer:

- **Custom Solutions:** Tailored BESS solutions to meet your specific energy requirements.
- **Battery Expertise:** Battery chemistries vary in technical characteristics, each offering unique advantages and disadvantages, depending upon the application and scale.
- **Incentives:** We explore available incentives, grants, and tax benefits to make BESS implementation cost-effective.
- **Expert Installation:** Our team of experienced technicians ensures seamless installation.
- **Maintenance Services:** Regular maintenance to keep your system operating at peak performance.

## Ready to explore BESS designs for your facility?

Let us help you select and size the right stored energy solution. We have the tools to help you maximize the return on your investment while delivering the most dependable solutions for your energy demands. Whether your goal is load curtailment, peak shaving, grid catching, resiliency or simply back-up power, our team is dedicated to building the right system to meet the safety and permitting requirements to comply with **NFPA 855**, **UL 1973**, **IEEE 2030.5** and **IEEE 2030.2**.



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