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BESS for grid outages: Instant backup, more resiliency, less downtime

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Here's a troubling trend: Grid outages have become much more common and intense. This year, researchers at Texas A&M University found a 20% annual increase in outage severity since 2019. Other studies from Climate Central show that 83% of major outages in this century were weather-related, and the number of such outages doubled between 2014 and 2023 when compared to the 2000 to 2009 period.

This is why facility managers need an outage management strategy that aligns with organizational needs for uninterrupted power. PowerSecure's Joaquin Aguerre, strategic portfolio director, and Todd Jackson, vice president of utility sales, explain why battery energy storage systems (BESS) make a smart choice for the first line of defense against grid outages.

How do battery energy storage systems fit into an outage response strategy?

The first thing to keep in mind is that most outages are short-lived. Data from the Energy Information Administration has shown that when you take away major events, the average U.S. customer is out of service for two hours or less per year, and that's been a steady number for more than a decade. To be more specific, around 40% of outages last less than an hour. Batteries are a great choice for short-duration ride-through.

A BESS is especially valuable for facilities running sensitive equipment because the battery storage system can pick up the load in milliseconds, and that's fast enough to keep hypersensitive machinery online. Generators can't do sub-cycle load pickup, which means equipment can drop offline in the 10 seconds or longer that it takes for a standby generator to come online. Once the facility equipment goes down, it could take half an hour or more to ramp back up. A BESS eliminates that potential downtime in facility operations. If you have energy storage plus generation, you can cover sub-cycle load pickup with the battery and long-term duration with the generator.

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Beyond fast load pickup, what operational advantages does a BESS provide?

As part of an outage response strategy, a BESS can extend the life of facility generators. The mechanical and thermal stress of on-off operation is tough on engines, and using the BESS for short-term outage support reduces generator cycling, which can extend the life of the generator and its components.

Using a BESS for ride-through on short outages also reduces maintenance needs for the generator. After all, the longer and more often you use the generator, the more maintenance it will require.

The BESS can help the generator run more efficiently, too. Some facilities see dramatic load swings that generators would struggle to meet. Energy storage can absorb load peaks and valleys and give the generator a steady, efficient load point to run on. In addition, the BESS could be used on its own at times when the facility has low load, so the generator doesn't need to run under low-load conditions. Light loads tend to increase the need for generator maintenance because unburned fuel, oil, and carbon can accumulate in the generator's exhaust system. That wastes fuel and adds maintenance expenses.

What environmental benefits do BESS provide?

A BESS teamed with onsite renewable generation offers the ability to use more of those company-owned renewables. The BESS allows facilities to charge batteries when the site uses less power than usual or during optimal renewable generation conditions. This may enable the site to have more hours of non-emitting power.

A BESS can lower Scope 2 emissions, as well. In greenhouse gas accounting standards, Scope 2 emissions include those created by purchased power. When large C&I customers can shift load during peak events, the electric utility company can reduce its reliance on peaking plants that are generally fueled with coal, natural gas, or even diesel. The utility lowers its Scope 1 emissions — the emissions from its direct operations — and the C&I plant lowers its Scope 2 emissions.

How can facilities get the most value out of a BESS investment?

In facilities with critical or sensitive equipment — for example, pharma facilities or manufacturing sites with industrial automation or big furnaces — a BESS can manage power quality issues like frequency instability on the grid or voltage sags and spikes caused by the interruption of renewable generation.

For organizations with on-site solar, a BESS can also enable solar shifting. This is when the facility charges the battery from solar panels when grid power is less expensive, and then discharges the battery when grid prices rise, thereby lowering operational costs.

Along the same lines, site managers can use batteries for load shifting by charging at night when utility power is less expensive, and discharging during the day when grid power costs rise, which can lower costs and demand charges.

Facilities can also use the battery to save money via load curtailment programs. For example, coincident peak rates kick in when a distribution company's peak hits at the same time as the transmission grid operator's peak. In some parts of the country, these rates are five times the normal price of power, so enrolling in a coincident peak rate program — one where the site shifts to BESS-supplied power during curtailment hours — delivers significant savings.

The bottom line is this: To get the most from a BESS, use the stored energy for more than power backup. A BESS brings savings and efficiency opportunities that traditional backup systems can't deliver.

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