





Battery Energy Storage Systems (BESS) What is BESS?

BESS sample picture



What are Battery Energy Storage Systems (BESS)?

A Battery Energy Storage System (BESS), is the industry's generic reference name for a collection of equipment that comprise a system to store energy in batteries and use the energy later when it is advantageous.

A typical system is comprised of batteries, a battery management system, an inverter, switchgear, transformer, protection and a control system.

Often renewable energy sources are combined with a BESS to store the renewable energy during peak production time and then the energy is used when it is needed.

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Types of technologies used for energy storage

Energy storage landscape



Lithium-Ion batteries main strengths

- One battery does not work for all applications. Lithium-ion is a very versatile product family with many various chemistries.
- Their benefits such as higher energy density and power efficiency, superior cycle-life, and longer calendar life make this technology one of the most interesting for various industries, in particular for Energy Storage Solutions.
- Main lithium-ion batteries used for BESS are the Lithium iron phosphate (LFP) and the Nickel Manganese Cobalt (NMC).

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Energy storage solutions Value proposition and applications

Value propositions

- Facilitate integration of renewables
- Leverage time of day generation pricing
- Support EV penetration with smart charging management and synchronization
- Increase distributed generation
- Provide back-up functionality to ensure power availability in case of grid outage
- Reduce dependency on diesel generators and CO2 emissions
- Generate revenue through participation in wholesale energy markets
- Optimize electricity consumption to reduce electricity bill
 Defer investment for grid upgrades
- Ensure reliable operation of the grid
- Provide power quality support

Applications

- Energy shifting
- Peak shaving
- Frequency regulation, reserve and response
- Capacity firming
- Spinning reserve

May also be referred to as:

- Synchronized charging for e-mobility
- Renewable's integration
- Voltage control
 Islanding
- Black start
- Synthetic inertia dynamic response
- · Forming a microgrid

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Frequency regulation, reserve and response

The energy storage system is charged or discharged in response to an increase or decrease, respectively, of grid frequency. This approach to frequency regulation (fast frequency response) is a particularly attractive option due to its rapid response time and emission-free operation.

Benefits

- Generate revenue through participation in wholesale energy markets
- Facilitate integration of renewables
- Ensure reliable operation of the grid
- · Provide power quality support



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Energy storage solutions Applications and benefits

Capacity firming

The variable, intermittent power output from a renewable power plant, such as wind or solar, can be maintained at a committed level for a period of time. The energy storage system smooths the output and controls the ramp rate (MW/min or kW/min) to eliminate rapid voltage and power swings on the electrical grid.

Benefits

- · Facilitate integration of renewables
- Increase distributed generation
- Provide power quality support









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eStorage Flex All integrated and productized Energy Storage

eStorage OS



OC Switchgear

- Plug-and-play: Provides all required batteries, power conversion, coupling transformer, safety features, cooling, and protection and controls.
- Factory tested: Factory built solution integrates comprehensive safety features that bring extensive quality control for the highest level of safety and reduce risk by over 90%
- Pre-engineered: Designed with careful equipment selection, catering for a long lifespan in all conditions including asset health and management for longest longevity
- Digitally enabled: Critical power operations digitally controlled for fastest response time with embedded energy management algorythms and microgrid controller available

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eStorage Flex Reference case - Energy Storage to support EV charging

Block diagram of the Energy Storage

- + 10 × eStorage Flex-20 with 500 kW / 500 kWh power for several sites within Europe and the UK
- Peak shaving application for an EV charging infrastructure
- Solution complying with EN50549-1-2 2019



eStorage Flex-20 Integrated Energy Storage ABB CSS HP Chargers

ABB UniPack-G Compact Secondary A Substation featuring the ABB EVSS site to controller and low-voltage distribution





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eStorage Max Reference case 20MW/20MWh – Frequency Regulation BOM Single Line Diagram

	ESM	Block type (Skid + eHouse 40ft)
	Application	Frequency Regulation
	Power	20MW at POI (grid connection point)
	Energy	20MWh, 1C at POI
	Dist. Transformer	3 winding, 13.8/0.69kV, 4.5MVA
	Main Transformer	13.8/230kV, 27MVA
	Grid connection Voltage	230kV
	HVAC	20RT
	Fire Fighting	NOVEC
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