What’s in this document

Explore this document to find out what ABB offers to optimize, protect, and enhance Battery storage systems.

How?

Click on the interactive infographics to see more information.

Where?

Go through the interactive landscape to explore ABB Application solutions and find the one that best suits your needs.

Explore

Click on the desired Application Bundle to explore our offering.
Index

01 Introduction & Key trends
- Market trends
- Key trends
- How does energy storage benefit the grid and industry?
- How ESS becomes BESS
- Why we need Energy Storage

02 Main switching & protection challenges in BESS
- New technology on the rise
- Main switching and protection challenges in BESS

03 Application overview
- Why to choose ABB solutions
- Applications overview
- Utility Scale (Front-of-the-meter)
- Commercial and Industrial (Behind-the-meter)
- Residential (Behind-the-meter)

04 Product offering
Introduction & key trends

In a world becoming more digital and electric every day, we need Energy Storage Systems to help the world produce and consume energy more efficiently and sustainably.
Market trends
What are the expectations for the BESS market?

As electricity consumption increases, we must find different and more sustainable ways to produce, use, and consume our primary source of power.
Key trends
Current challenges of the electrical grid

Electrical grids that were once state-of-the-art now struggle to deliver the reliability and efficiency required today.
How does energy storage benefit the grid and industry?

Energy Storage Systems (ESS) can solve one of the well-known problems in electricity production: the electricity needs to be used as it is generated, which is not always the same time it is needed.
How ESS becomes BESS

There are many types of energy storage systems depending on the type of technology used. Some technologies provide short-term energy storage, while others provide energy storage for a longer duration.
Why we need Energy Storage

Battery energy storage systems provide short-term energy storage.

Lithium-ion batteries, which are used in mobile phones and electric cars, are currently the dominant storage technology for large-scale plants to help electricity grids ensure a reliable supply of renewable energy.
Main switching & protection challenges in BESS

Handling higher fault current events, managing direct currents and protecting the battery storage against ground faults are just few of the latest challenges that Battery is faced with today.
New technology on the rise
BESS moving to higher DC and AC voltages

Today, most utility-scale solar inverters and converters use 1500 VDC input from the solar panels. Matching the energy storage DC voltage with that of the PV eliminates the need to convert battery voltage, resulting in greater space efficiency and lower equipment costs.

1500V DC and 800V AC
Main switching and protection challenges in BESS

**Problem**

Higher fault current withstand capability

In battery system applications, each battery rack can provide short circuit current contribution that is ten times higher than its rated current according to the battery technology.

Hence, having up to tens of battery racks in parallel, the total short circuit current contribution could be very large.

**Need**

The switching devices must be able to withstand such large short circuit current values.

The time must be sufficient to allow the fuse to trip.

EXPLORE THE ABB SOLUTIONS
Main switching and protection challenges in BESS

Problem

Critical currents management and bidirectionality

In Battery System applications, the load current must be switched often, not at the battery rated value, but at a low value, when the battery itself is almost fully charged or discharged.

Need

As a consequence, switching devices must be able to interrupt the load current in both directions without having to change the poles connection.

Switching devices must be able to interrupt these types of currents, called critical currents, because their interruption is more difficult than the rated current in DC applications.
Main switching and protection challenges in BESS

In a Battery System there can be up to three ground connection points: the MV/LV transformer neutral, either the DC negative or the DC midpoint (if present) at the converter level, and either the DC negative or the DC midpoint (if present) at the battery rack level.

**Problem**

Even though the DC battery racks and DC negative/midpoint at converter level are unground, while the transformer neutral is grounded, the DC system is not isolated, since in case of a DC ground fault, there will be a ground fault current passing through the grounded transformer neutral and the converter (unless the converter is isolated type) made by a double contribution: from the AC Utility and from the battery racks through the healthy polarity (interrupted by the converter itself).

**Need**

Otherwise, if not only the DC battery racks and DC negative/midpoint at converter level are unground, but also the transformer neutral (or an isolated converter is installed), an insulating monitoring device is needed to detect the first ground fault.

This means that overcurrent protective devices for protection against ground fault contribution coming from the AC Utility in a sort of TN system are needed.
Direct Current knowledge about distribution, switching and protection.

Interruption of Direct Current is historically more difficult than interruption of Alternative Current, because Direct Current doesn’t pass through zero. So, the switches’ and breaker of the pole connection are different, with more poles in series.

In addition, the presence of converters requires the understanding of their behavior during both short circuits and ground faults.

Based on such considerations, the DC distribution inside plants like battery storage systems and the related protection are topics not so very understood thus far, also because of the lack of suitable and dedicated standardization.

Main switching and protection challenges in BESS
Application overview

Explore ABB tailored solutions to secure, protect and optimize any type of battery storage systems.
Why to choose ABB solutions
BESS Typologies
Utility Scale (Front-of-the-meter)

Explore our Application Bundles, a solution with preconfigured bundles of products to easily set up your Bess utility scale installation.
BESS Typologies
Commercial and Industrial (Behind-the-meter)

Explore our Application Bundles, a solution with preconfigured bundles of products to easily set up your Bess Commercial & Industrial installation.

EXPLORE OUR APPLICATION SOLUTIONS FOR COMMERCIAL AND INDUSTRIAL

- Switching & Protection with the ABB PCS100 ESS (IEC & UL)
- Switching & Protection for DC combiner
  - IEC
  - UL
- Switching & Protection for Battery Rack
  - IEC
  - UL
BESS Typologies
Residential (Behind-the-meter)

EXPLORE OUR APPLICATION SOLUTION FOR RESIDENTIAL

Switching and protection solutions COMING SOON
Explore our most cutting-edge products to secure, protect and optimize battery storage systems.
Product offering

To explore the complete product offering visit our web page
Leave feedback

How would you rate this document?

⭐⭐⭐⭐⭐