

Battery Power Conditioning Systems A part of the Green Energy Solution.

Battery Energy Storage Systems complement renewable energy technologies such as wind and solar, as well as other utility and industrial applications.

As battery development continues to improve and renewable energy sources become more important in power distribution, it is not surprising that Battery Energy Storage Systems (BESS) are playing a larger role in making “green” energy possible.

In a wind farm application, the wind speed can vary considerably over a short period of time which affects the amount of power that the wind turbine generators can deliver to the power grid. Many utilities prefer that a smooth or constant power is delivered from the wind parks to their network. A BESS provides a convenient way to fill in the valleys and absorb the peaks of power that normally comes from the wind turbines so that the utility sees a steady power flow.

Power smoothing is only one of the applications that BESS can offer. Some other operating modes are:

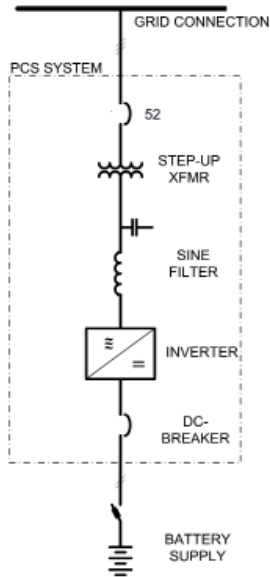
- Load Shifting – Batteries store energy when demand is low and deliver energy when the demand is high.
- Peak Power Shaving – Without a BESS, the utility generation and delivery equipment must be sized to meet peak demand which is very costly. A battery system can be used to deliver power during peak demand periods thus reducing the need for expensive alternative power generation capability.



- Islanding – In some cases, the batteries can supply network power to an isolated section of the grid for a period of time until regular power can be restored and re-connected to the grid.
- Frequency Regulation or Ancillary Services – Since batteries can absorb and deliver real power, it is possible for a BESS to be used to help regulate the frequency of the network such as on a micro grid network.

In order for a battery to be useful in these operating modes, ABB's Power Conditioning System (PCS) must first convert the DC energy in the battery into AC power. ABB's PCS uses a special inverter to convert the DC battery power into a 3-phase AC voltage. The AC voltage is smoothed by filter components and then stepped up to the utility grid voltage by a transformer.

ABB's PCS is capable of taking power from the utility grid and converting it to DC power to the battery when charging and also taking power from the battery (discharging) and putting it back to the network. Since the converter is electronic, the charging and discharging can be done very quickly, if needed.



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Because of the wide range of battery applications and battery types, ABB will custom design the PCS to fit the specific project requirements. Depending upon the battery type (sodium-sulphur, lithium-titanate, nickel-iron, zinc bromide flow, etc.) the range of DC voltage from fully charged state to fully discharged state can vary widely.

The inverter equipment used in the PCS is based on ABB's proven technology and well supported standard ACS800 low voltage motor drive product family.

Adaptation to customer needs:

- Because BESS systems can be found in extreme conditions from the hot desert to frigid climates, ABB offers the complete PCS system in one enclosure from primary AC circuit breaker to the DC battery connections including the local controls, if desired. Not only is this design initially cost effective but reduces installation and startup costs.
- The system equipment can be supplied separately for indoor locations or packaged in one or more outdoor enclosures.
- The PCS can also be used as a Statcom device for the network grid. A Statcom is an electronic system that is capable of delivering and absorbing reactive power (VAR's) to the network. Thus using the PCS to improve power factor or regulate voltage on the network when it is not doing its main function of charging and discharging the batteries.
- ABB's power conditioning system can operate on 50 or 60 Hz networks with ratings from a few hundred kilowatts up to match any battery size.

For Battery Energy Storage Systems of all types and energy storage sizes, ABB can readily develop an optimized Power Conditioning System solution to meet almost any customer requirements.

Power and productivity
for a better world™

