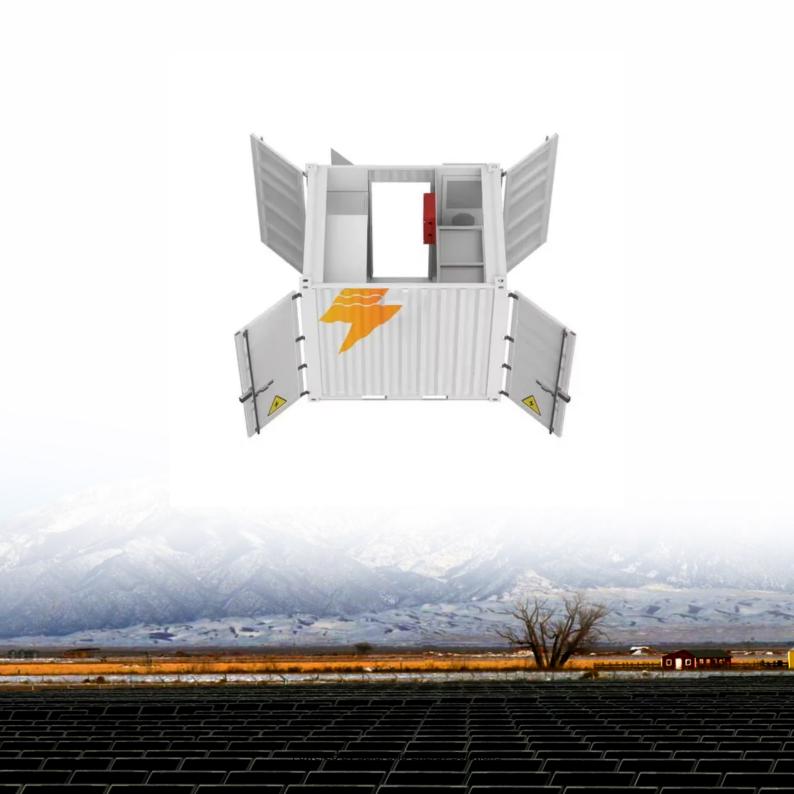


SolarGrid Energy Solutions

Hybrid Energy Storage Power Module





Overview

The system integrates a photovoltaic (PV) module with Maximum Power Point Tracking (MPPT), a single-phase grid inverter, and a battery energy storage system (BESS), all using wide band gap GaN devices for high power density and efficiency. What is a hybrid energy storage system (Hess)?

The complement of the supercapacitors (SC) and the batteries (Li-ion or Leadacid) features in a hybrid energy storage system (HESS) allows the combination of energy-power-based storage, improving the technical features and getting additional benefits.

What are energy-based storage devices?

According to their power range and autonomy time, the energy-based storage devices cover specific PQ and regulation demands, bridging power services, and energy management support. The time response is an aim factor for power-based storage applications since it refers to the capability of the fast charge and full discharge in operation.

What is hybridization between batteries and SC?

The main objective of hybridization between batteries and SC is to complement the characteristics and capabilities of energy-oriented and power-oriented storage, improving the storage energy system's overall performance.

What are the advantages of Hess Battery hybridization?

The features of SCs and battery hybridization make HESS capable of power smoothing fluctuation and reducing the adverse effects on the grid; the suppressed fluctuations contribute to improving transient stability, regulating the frequency, and, finally, the overall efficiency increases.

What are the benefits of hybridization?

Considering the complementary characteristics of storage technologies, the



hybridization between two or more devices allows specific power and energy improvement, reduces storage sizing, and optimizes the efficiency of the overall device, among other large power systems technical benefits that can be achieved .

What are the three storage mechanisms of a battery?

According to the material of the electrodes, three storage mechanisms occur: intercalation, alloying, and conversion. Energy may be stored in an electrode by two mechanisms combination. Compared to all other batteries, it has a low self-discharge and high specific energy.



Hybrid Energy Storage Power Module



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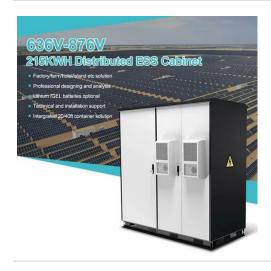
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Battery energy storage system components

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module based around two strings consistent of battery cells as an energy optimized string, and super-capacitors as a power surge optimiz





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