ContainerPower Energy Solutions

PV plus energy storage operation mode

Overview

Can a utility-scale PV plus storage system provide reliable capacity?

Declining photovoltaic (PV) and energy storage costs could enable “PV plus storage” systems to provide dispatchable energy and reliable capacity. This study explores the technical and economic performance of utility-scale PV plus storage systems. Co-Located?

AC = alternating current, DC = direct current.

How does a DC-coupled storage system affect PV output?

DC-coupled system (right figure)—with shared 50-MW inverter—must shift storage output to lower-price periods to accommodate PV output. DC-coupled system value decreases by about 1% relative to independent PV + storage system. Impacts of DC tightly coupled storage systems are more significant.

What happens if a PV system doesn't have a battery?

Without smart storage strategies, your system may not deliver optimal ROI, causing reduced profitability for you. ■ Risk of Power Outages: In grid-connected PV systems without batteries, inverters must shut down during outages for safety reasons, leaving homes and businesses powerless.

How does independent PV + storage increase value?

Increases value by about 1% relative to independent PV + storage. In other periods (July 1 shown here), storage plant cannot be fully utilized because of the operation of the PV system. Combined output of independent PV + storage plant (left figure) is as high as 70 MW, which is possible because of the separate inverters.

What happens if a PV system has no ITC?

With no ITC for PV or storage, the benefit/cost ratio declines in all cases but remains above 1 for the PV plus storage systems (highest is DC-coupled with

flexible charging, although at 24% PV the tightly coupled system has little penalty because much of the storage charging is from PV).

What is a DC-DC converter & solar PV system?

DC-DC converter and solar are connected on common DC bus on the PCS. Energy Management System or EMS is responsible to provide seamless integration of DC coupled energy storage and solar. Typical DC-DC converter sizes range from 250kW to 525kW. Solar PV system are constructed negatively grounded in the USA.

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