



Solar-Plus-Storage Fundamentals: Products and Services to Consider

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About Interconnection Systems, Inc.

- Vertically Integrated Solar/Storage EPC
- Energy Storage Experience

Utility	Capacity	Manufacturer	Date
United Power (cooperative)	4.5 MW / 18 MWh	Tesla	2018
New Hampshire Electric Cooperative	2 MW / 4 MWh	Sungrow / Samsung	2020
Midwestern IOU	5 MW / 10 MWh	WEG / BYD	2021



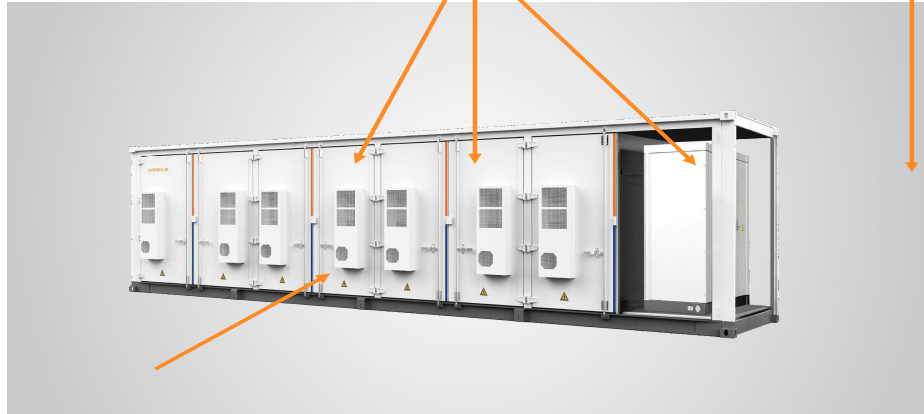
What is a Battery Energy Storage System (BESS)?

1. Batteries
2. Inverters and the rest of the “Energy Storage System”
3. Optional Advanced Operating System

BESS System Components

Batteries

Inverter (PCS)



HVAC and
Fire Suppression

Image Courtesy Sungrow

BESS Main Components



1 PCS



2 Battery rack



3 LV panel



4 Local controller



5 HVAC



6 FSS

Images Courtesy: Sungrow

Standard Systems



Sungrow 1 MW / 4 MWh



Tesla Megapack 0.7 MW / 3 MWh
Tesla Powerpack 50 kW / 232 kWh

Fluence "Edgestack"
Power and Energy Unknown





Operating Systems

Advanced Operating Systems may add value

1. Will the system perform?

- the same function
- at the same time
- every day

2. How much would you save (staff time and possible missed peaks) to automate peak prediction and battery operations?

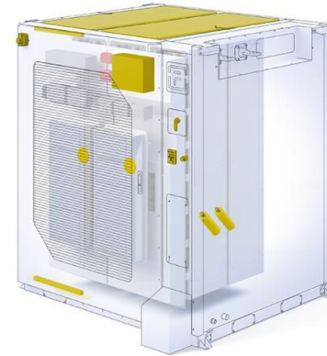
3. Are you missing opportunities to tap multiple services?

Safety



- Fire Detection
 - Smoke, Heat

FLUENCE
A Siemens and AEG Company



- Fire Suppression
- Water shower and/or mist
- Heptafluoropropane (HFC-227ea/FM200)
- “Deflagration”
- Passive Shutdown
- Key Standards:
 - NFPA 68 (includes deflagration vent specs)
 - UL9540A (in-depth protocol to document how system reacts to fire)

Image source: <https://fluenceenergy.com/committed-to-safety/>



Examples

* Also a Developer

Battery Manufacturers

- Panasonic
- Samsung
- LG
- BYD

BESS Manufacturers

- Tesla
- Sungrow
- Fluence
- WEG *

Advanced O.S. Providers

- Enel X * *DER.OS*
- Engie * *GridSynergy*
- Stem * *Athena*
- Energy Toolbase *Acumen*
- Fractal *EMS*

Developers

- Today's Power Inc.
- Strata Solar
- NextEra Distributed
- Ormat / Viridity
- Origis