Hybrid Energy Storage System

Future-Oriented Energy Solution

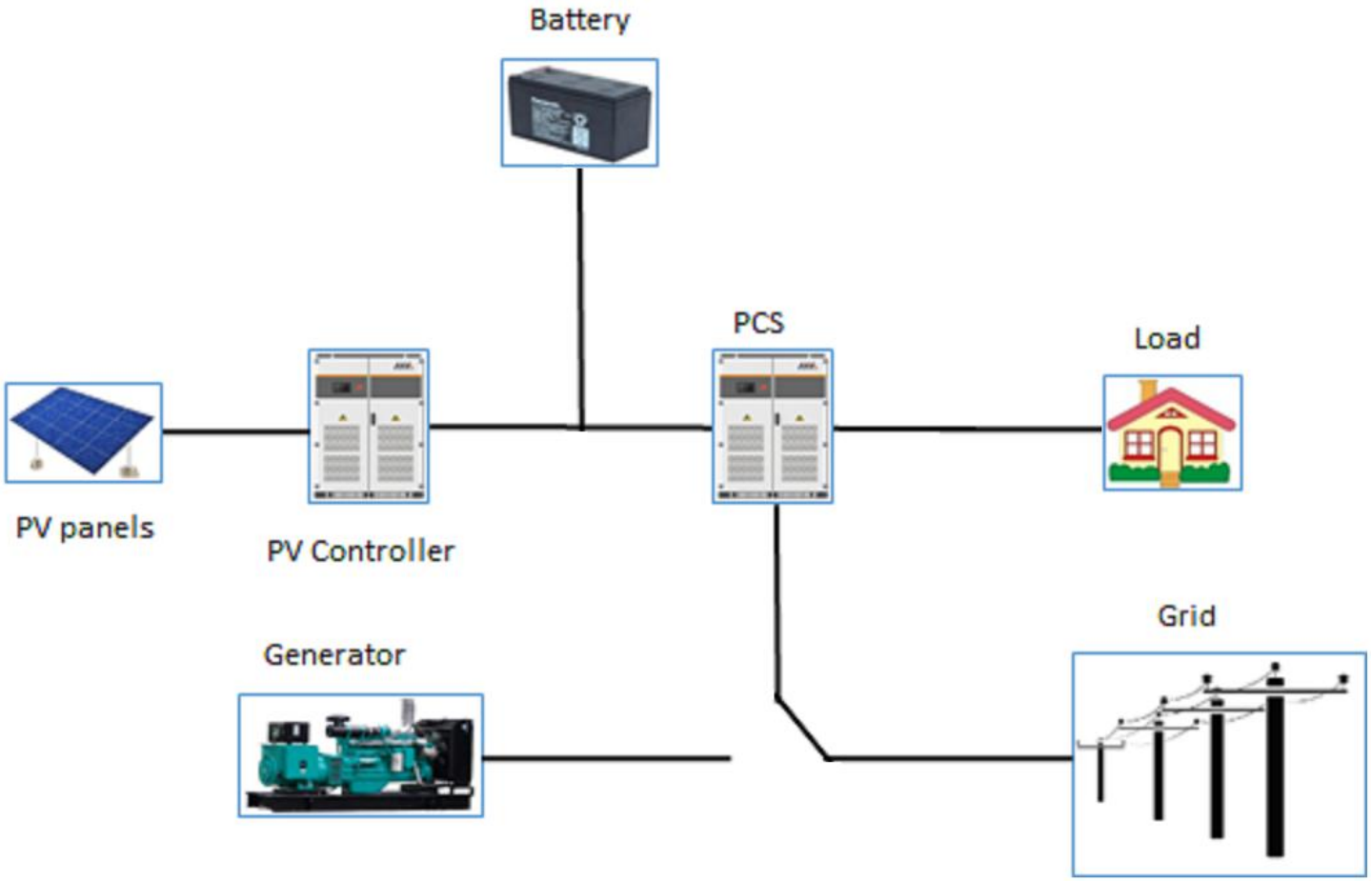
Contents

ESS Components

PV System	Diesel Genertor	Battery System
315W/PCS *288 PCS* *Total Power: 90.72kW*	*32kW* *40KVA*	*50kW* *368.64kWh*

Load Requirements: 20~50kW, 30kW on avarage for 8h, 60kW for 10mins

Layout of ESS Components



ESS Operation Modes

ON-Grid Mode

① PCS traces grid voltage and phase;
② Strong solar, PV supports and charges battery;
③ Weak solar and battery (above 50%), PV and battery support together;
④ Offline solar and battery (15~50%), battery supports 40% and the rest by grid;
⑤ Offline solar and battery (below 15%), battery stops and grid supports;
⑥ Grid failure, generator starts to replace grid.

OFF-Grid Mode

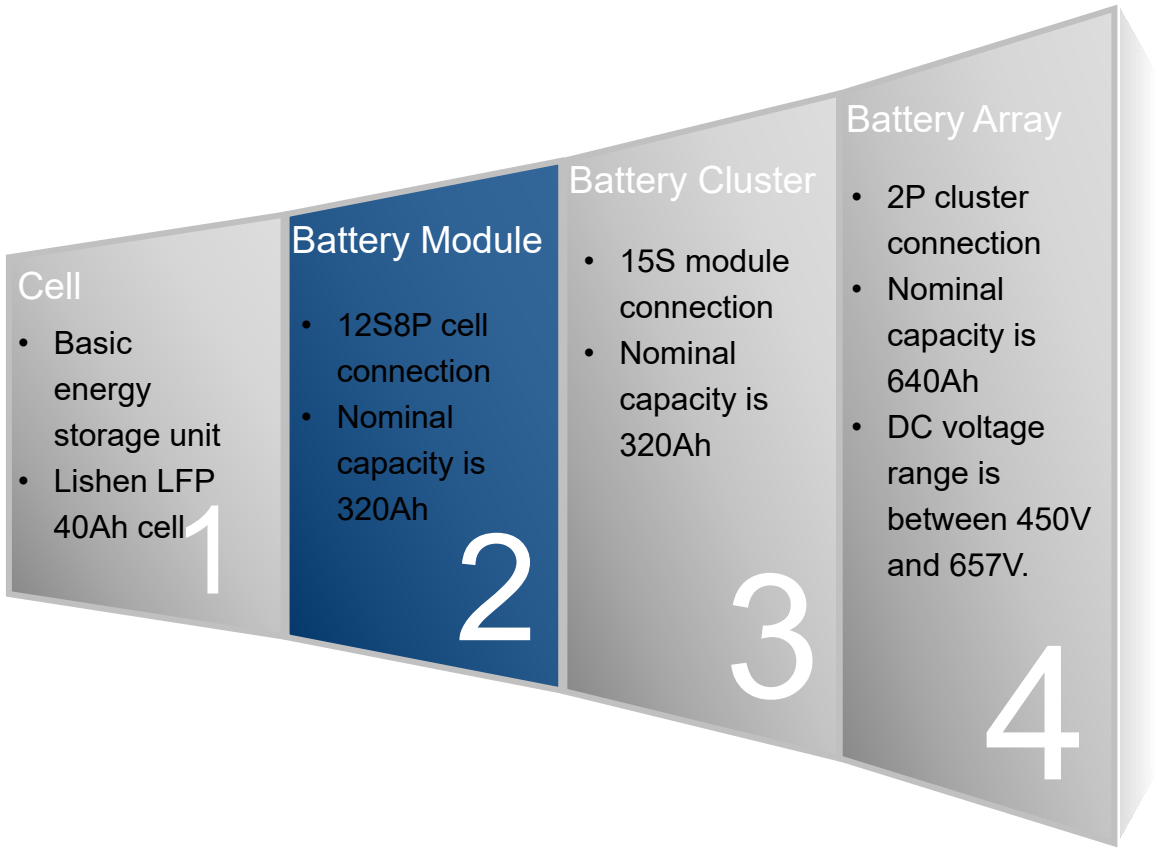
① Strong solar, PV supports and charges battery;
② Weak solar and battery (above 50%), PV and battery support together;
③ Offline solar and battery (15~50%), battery supports 40% and the rest by generator;
④ Offline solar and battery (below 15%), battery stops and generator supports;
⑤ Solar increases and battery (above 50%), generator stops, PV and battery support together.

Powerful Battery System

1. ***Energy Storage Unit***
2. ***Battery Management System***
3. ***Battery Protection Unit***
4. ***LSESS BMS***

Energy Storage Unit

- 1 Battery Array
- 2 Battery Clusters
- 30 Battery Modules
- 2,880 Cells



Battery Management System

BLMU

- Managing cell parameters (voltage, current, temperature, balance function, warning and protection signals);
- Upload parameters to BCMU;
- Keep communication with BCMU via CAN bus.

BCMU

- Managing module parameters (voltage, current, temperature, charging/discharging time, warning and protection status);
- Keep communication with BLMU via CAN bus, with BAMS via Ethernet;
- Co-operate with HVCU for short-circuit protection.

BAMS

- Managing cluster parameters;
- Keep communication with BCMU via Ethernet, with PCS and SCADA via Ethernet and RS485;
- Control PCS operation mode according to battery SoC;
- Accurate battery SoC and SoH calculation;
- Smart UI design for remote/local control

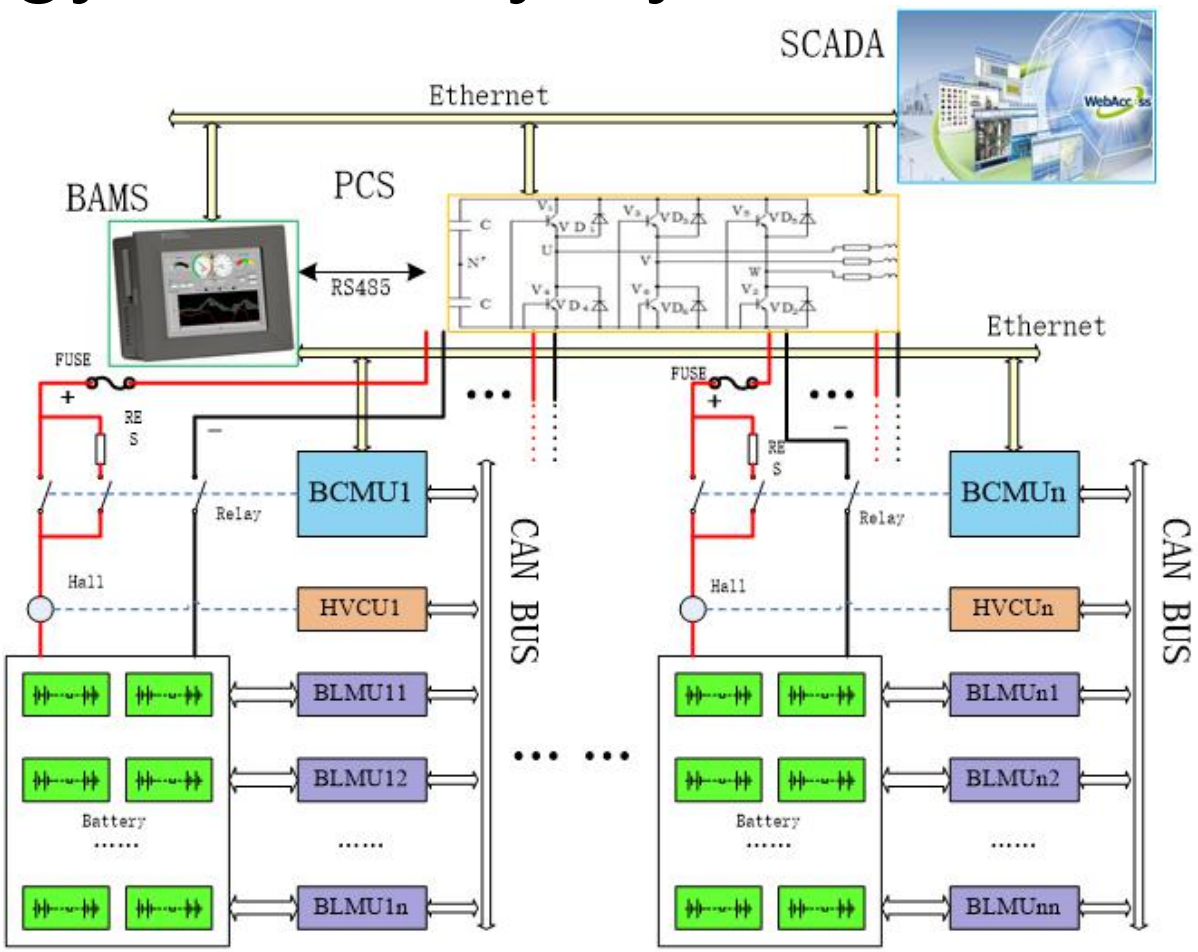
1 BAMS $\supseteq$ 2 BCMUs $\supseteq$ 30 BLMUs

Battery Protection Unit

HV devices include relay, contactor, fuse, DC switch, pre-charging resistor and current sensor;

HVCU is embeded in BCMU, used to control HV devices in the main loop.

Topology of Battery System



LSESS BMS

Advantages Standing out, so Employed

- *High accuracy on each level units' parameter sampling;*
- *Precise calculation on SoC and SoH, the most imporatnt parameters of battery system, directly influencing the battery lifecycle;*
- *Low power consumption;*
- *Powerful communication between each level of management system;*
- *Low thermal emmission and comprehensive thermal management;*
- *Online self detection and diagnosis;*
- *Robust structure design.*

ESS Advantages and Applicaitons

Power Saving | **Eco-friendly** | **Less Noise** | **Tailored Solution**

ESS

- Emergency Power Supply

- Routine Power Supply
- Energy Use Independent of Time

- Power Regulation in a more Cost-effective Approach

ESS has reflected the ongoing technology development in the area of energy storage. As constant development launches, ESS will definitely substitute the last generation of traditional mono power supply.

Thank you very much!