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# BluE ESS Product Introduction

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**PART 01**

# **Residential Energy Storage Solution**

Powering Green Future



# All-in-One Residential Storage System

Single Phase



Safety



10000 Cycles



24/7 Monitoring



UPS



VPP



Easy Installation

**Hybrid Inverter: BluE-S 3680D/ BluE-S 5000D**

**Battery Pack: BluE-PACK5.1, expandable to 20.4KWH**



# All-in-One Residential Storage System

Three Phase-10K



Safety



10000 Cycles



24/7 Monitoring



DO/DI  
SUPPORT



UPS



200% DC/AC  
ratio



Easy  
Installation



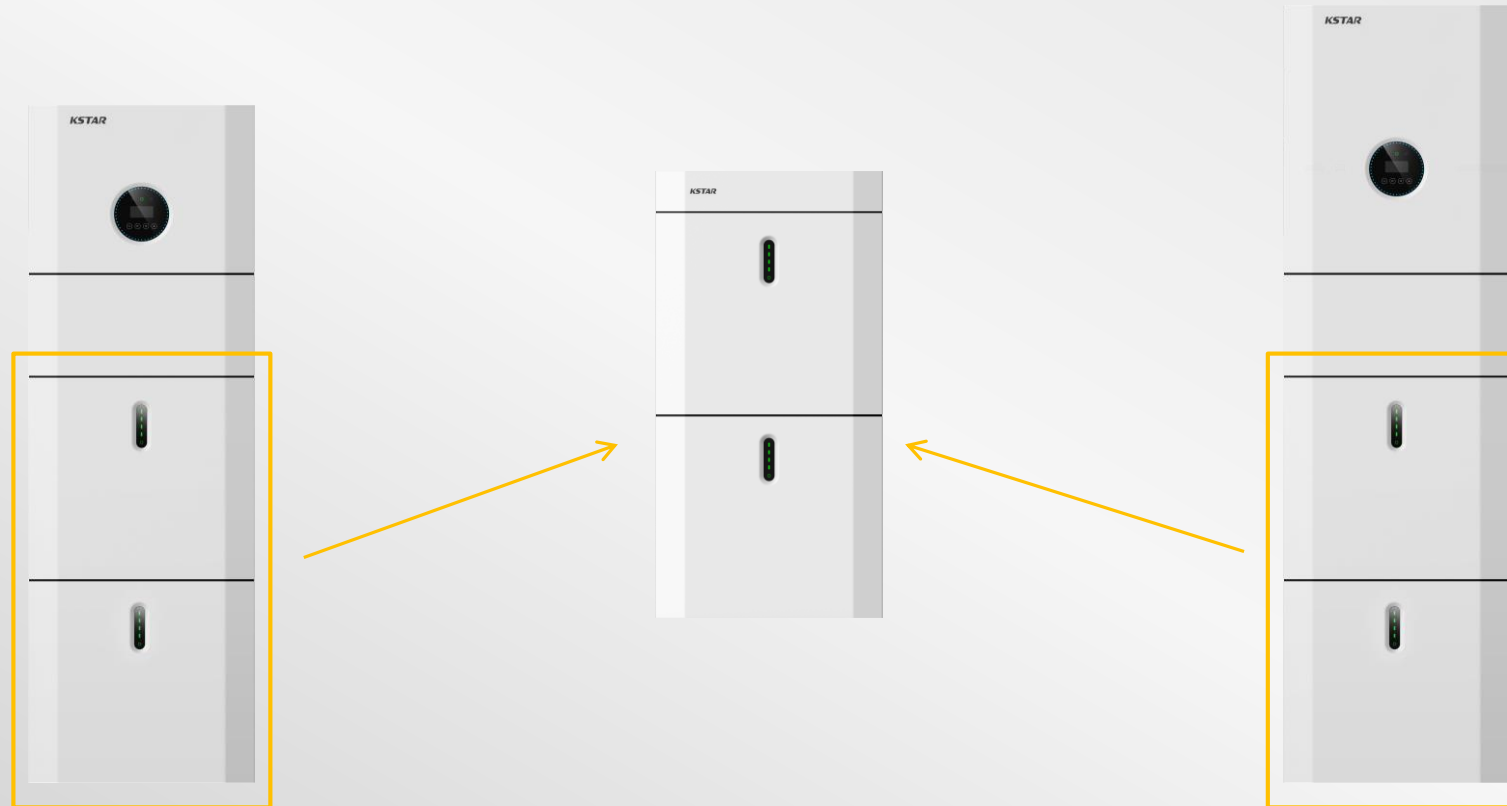
Unbalanced  
output

**Hybrid Inverter: E10KT**

Battery Pack: BluE-PACK5.1, expandable to 40.8KWH

# Battery compatibility

Single phase and three phase inverters share the same battery pack

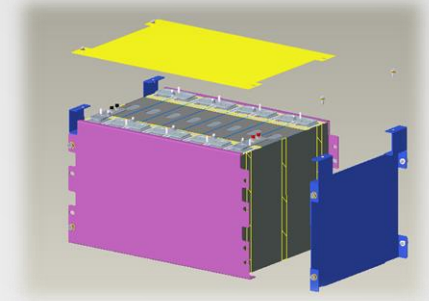


## Battery Cell

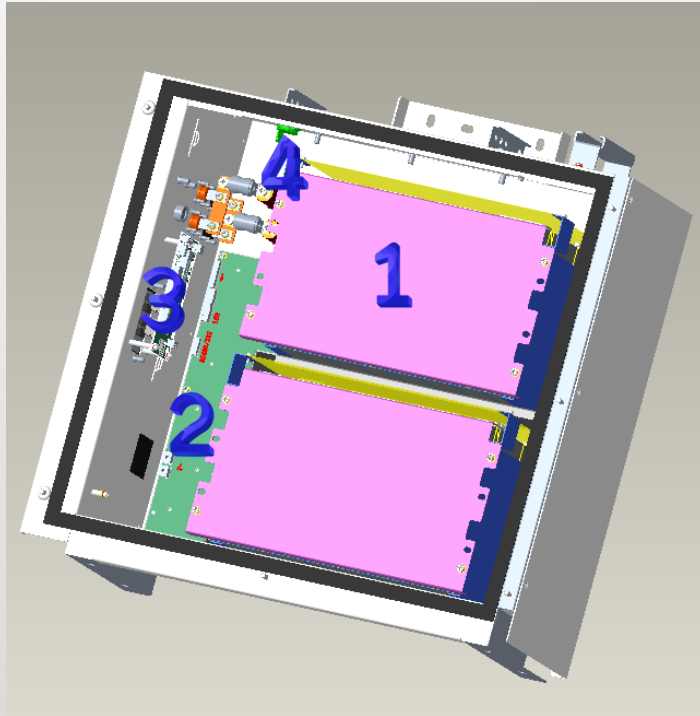


ITEM	SPECIFICATION
Capacity	100Ah @ 25°C, 0.5C
Nominal voltage	3.2V
Dimension(W×H×D)	200.3×172.2×33.2mm
Weight	2.27±0.30Kg
Impedance(1kHz,BOL,40%SOC)	0.15±0.06mΩ
Reversible capacity loss (25°C,100%SOC/month)	≤ 3.5%
Operation temperature	-30°C ~ 60°C
Storage temperature	-30°C ~ 60°C
Certification	IEC 62619,UL1973, UL9540A,UN38.3

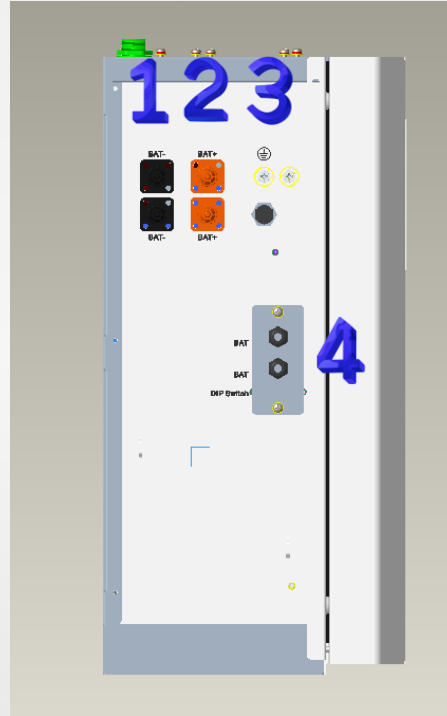
## Battery Module



ITEM	SPECIFICATION
Cell	LFP-100Ah
Nominal Energy	2.56kWh@25°C, 1P8S
Rated Voltage	25.6V
Voltage Range	Min:20V Max:28.2V
Weight	21kg
Dimension	303*187.5*203mm
Operation Temperature	Min:0°C Max:50°C
Cooling Method	Air Cooling
Humidity	0%~95%, No condensing



- 1. Battery module
  - 2. BMS
  - 3. Communication interface board
  - 4. Positive and Negative fuses
- \*Heater can be optional which in the module



- 1. Battery Negative terminal
- 2. Battery Positive terminal
- 3. Earth terminal
- 4. Communication and DIP

ITEM	SPECIFICATION
Cell	LFP-100Ah
Nominal Energy	5.12kWh@25°C, 1P16S
Rated Voltage	51.2V
Voltage Range	Min:40V Max:58.4V
Weight	48kg
Dimension	490mm(H)*540mm(W)*240mm(D)
Operation Temperature	Min:0°C Max:50°C
Cooling Method	Air Cooling
Humidity	0%~95%, No condensing
Certification	Cell:IEC 62619,UL1973,UL9540 A,UN38.3 Pack:IEC 62619,UN38.3

# Energy Management System

## Cloud Platform

Connects all the ESS systems and enable monitoring, smart control, power transaction and ancillary service.



Lifespan free access to monitoring via Web and APP



Remotely control and build VPP



Support upgrading the new function and latest version remotely.



IoT compatible



## Battery Management System

### High SOC accuracy

LFP SOC estimation error < 3%, accuracy up to 97%.

### Comprehensive protection

3-level software protection.

Redundant hardware level protection

### Functional safety

Comprehensive and optimized protection including multiple monitoring items, hardware alarm system , multiple protection



## Energy Management System

### Multifunctional and powerful

Local absorption, reducing PV power abandonment

Peak and frequency regulation

PV power self-consumption

Load shifting

Backup power supply, UPS/EPS

Peak shaving

Micro/Off-grid control

Demand charge management

### Highly compatible

Enabling external control through SCADA, MOUDBUS, ETHERNET etc.

### Safety

Safety control designs.



# Certificate

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ITEM	Certificate
Safety	IEC62109-1(ed.1),EN62109-1:2010,IEC62109-2(ed.1), EN 62109-2:2011
Environment	IEC 60068-2-1:2007, IEC 60068-2-2:2007 IEC 60068-2-14:2009, IEC 60068-2-30:2005
EMC	IEC/EN61000
Efficiency	IEC 61683:1999
Europe Grid Connection	EN 50549-1
South Africa	NRS 097-2-1: 2019
UK	G98 G99
Belgium	C10/11
Germany	VDE-AR-N 4105:2018, VDE 0124:2020
France	VDE0126 VFR
Australia	AS4777.2
Ireland	NI

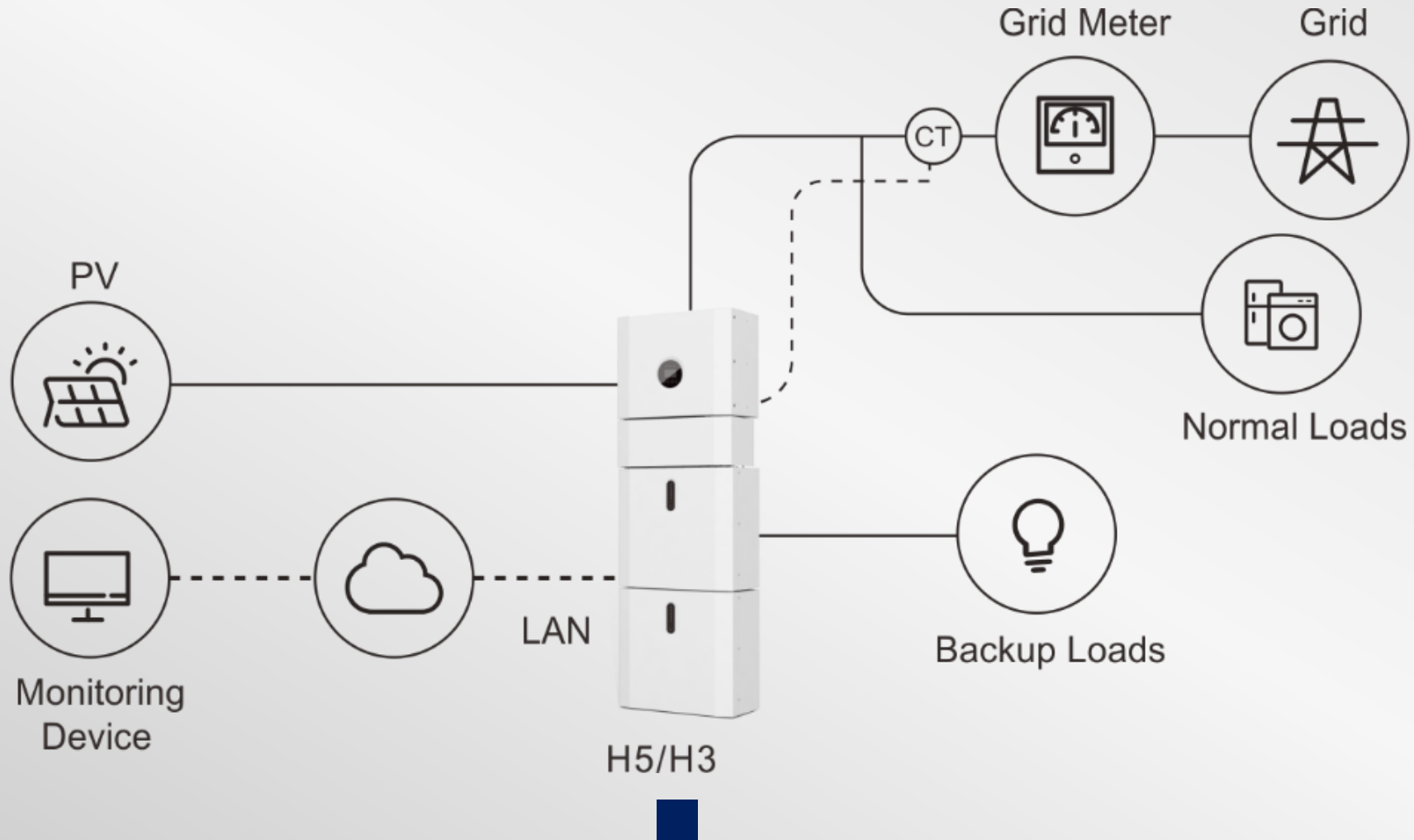


**PART 02**  
**Applications**  
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A vertical blue line with a diamond-shaped marker in the center, positioned to the right of the main text.

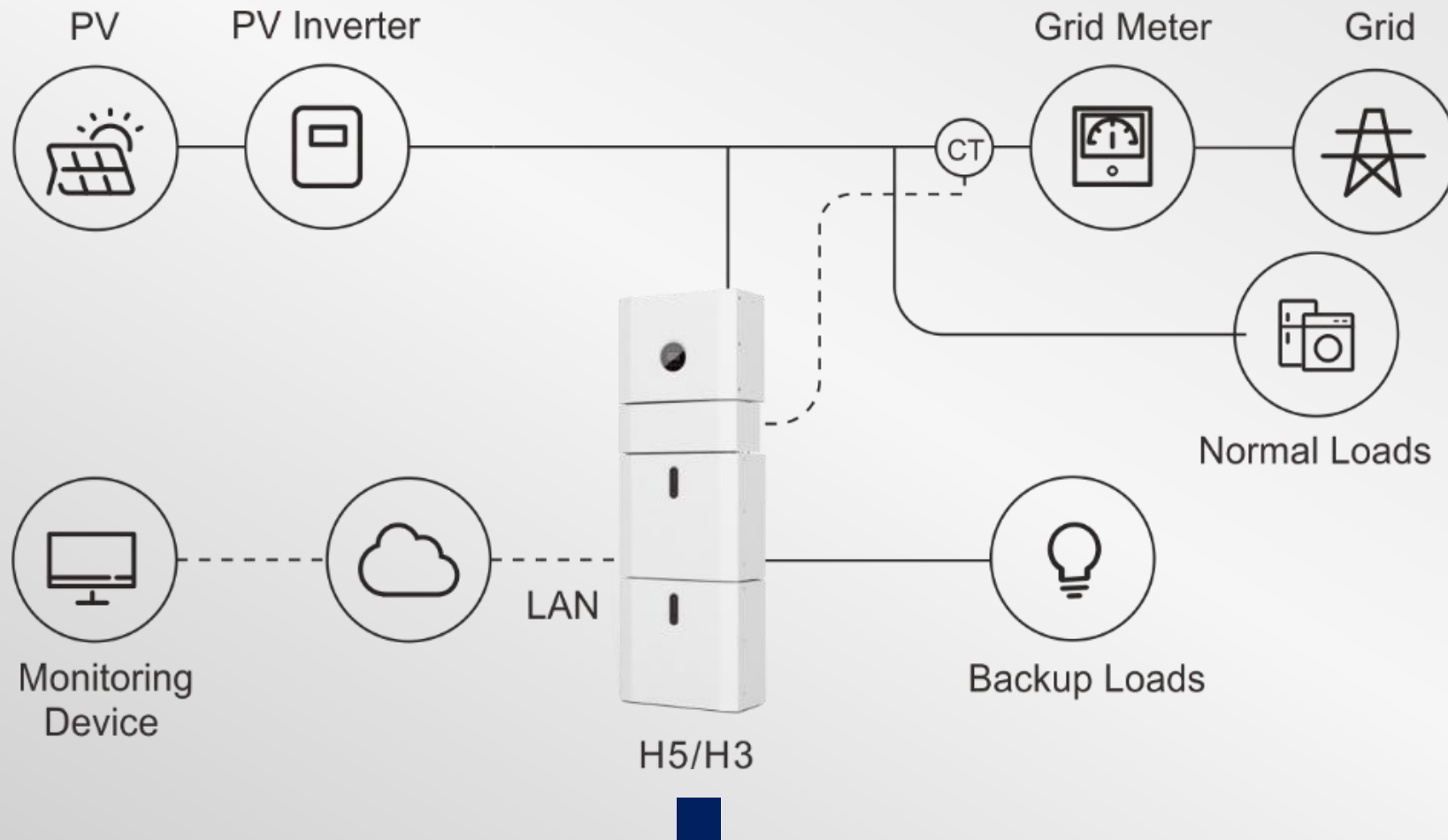
# DC-coupled Solution

Typical application for new installations-----Energy is concentrated on the DC side



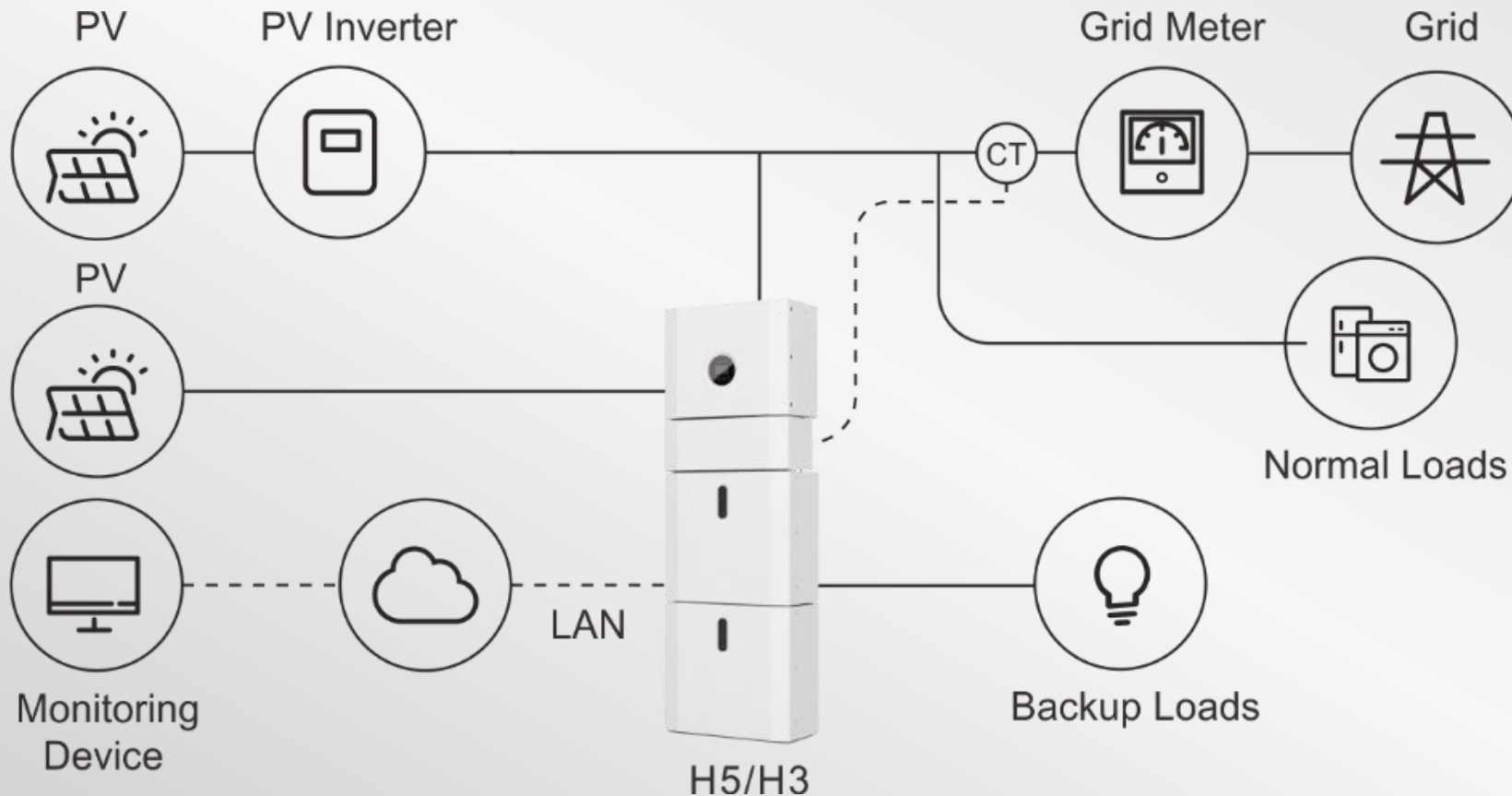
# AC-coupled Solution

Retrofit application----Energy is concentrated on the AC side



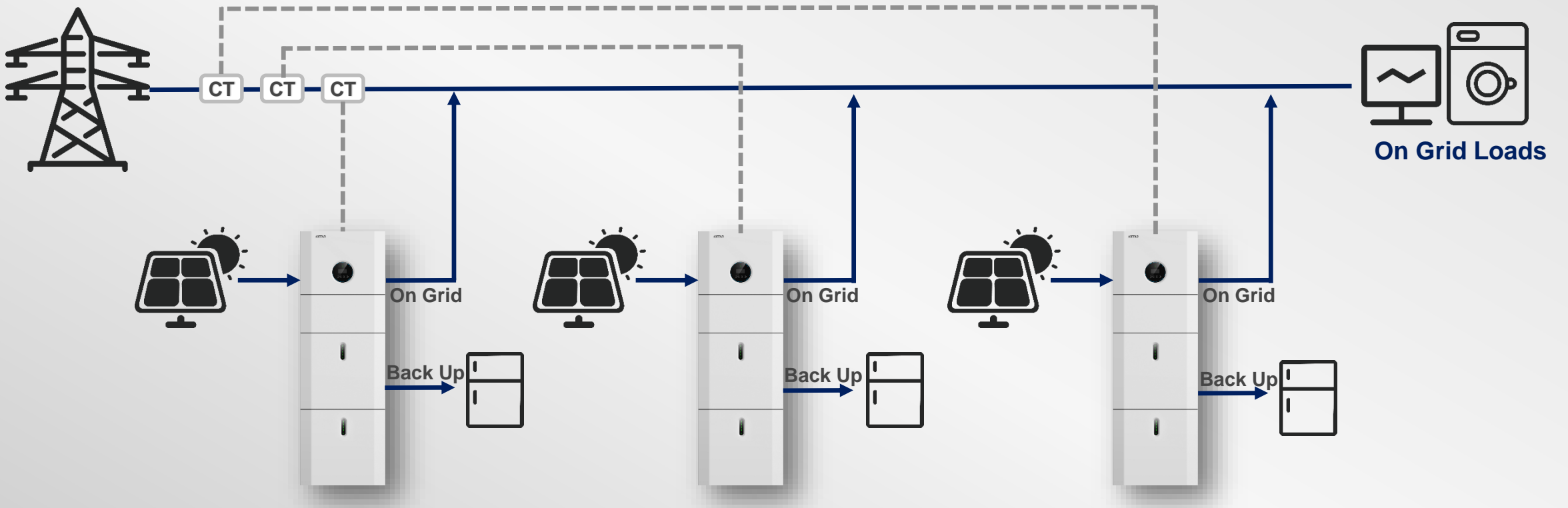
# Hybrid-coupled Solution

For retrofit and PV expansion



# Installing System In Parallel

For **single phase** system

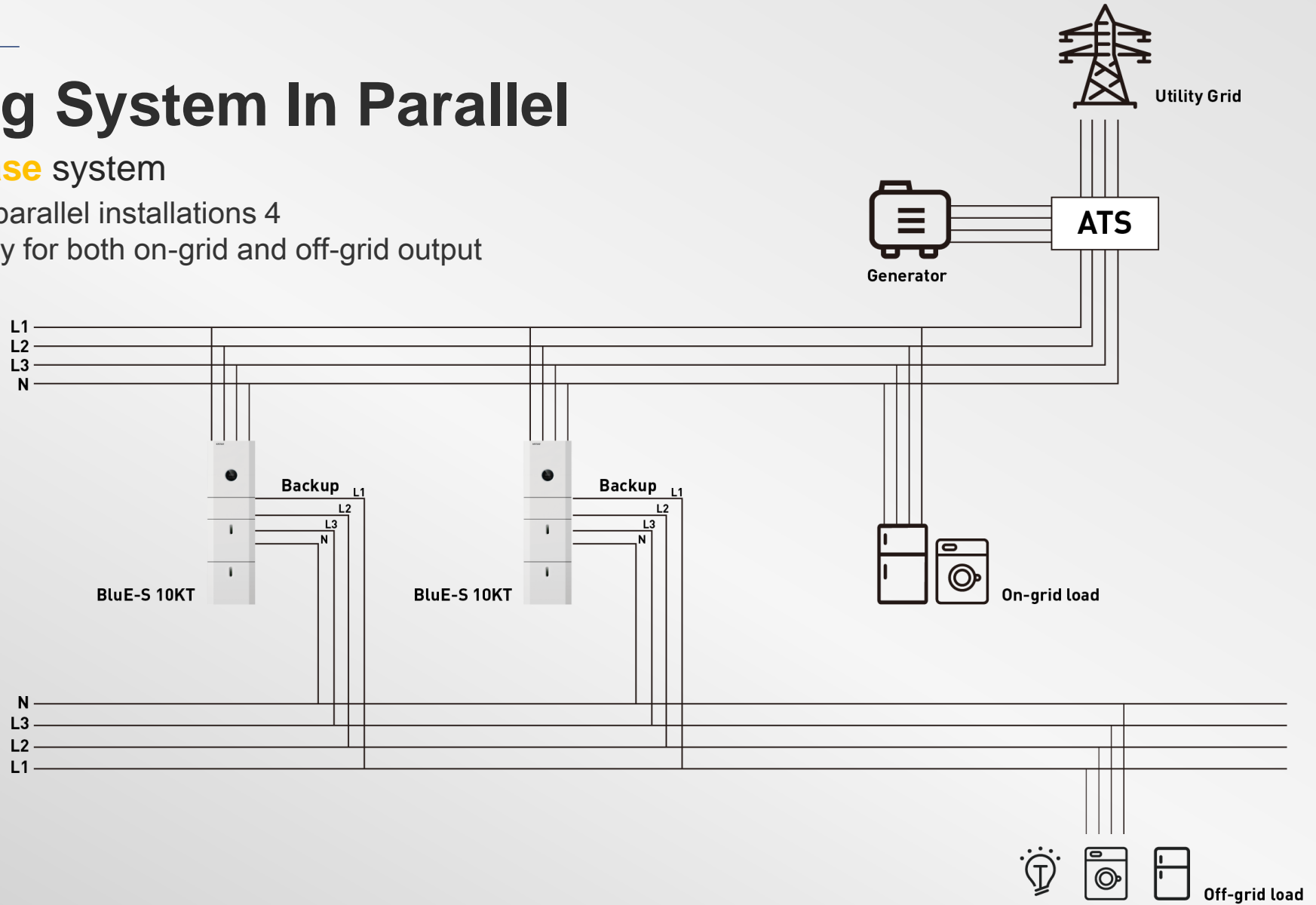


# Installing System In Parallel

For **three phase** system

Max. number of parallel installations 4

Full parallel ability for both on-grid and off-grid output



**PART 03**

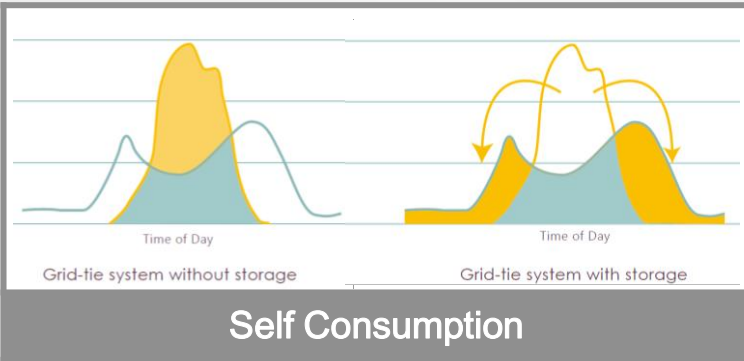
**Working modes**

Powering Green Future





# Work Mode—Self Consumption



**Strategy:** PV generation meets the demand of the loads in priority.

**Purpose:** Cut electricity bill by minimizing the energy consumption from the grid.

PV > Load

PV supports load, PV charge the Battery

PV < Load, low BAT

PV+Grid supports Load

PV < Load, sufficient BAT

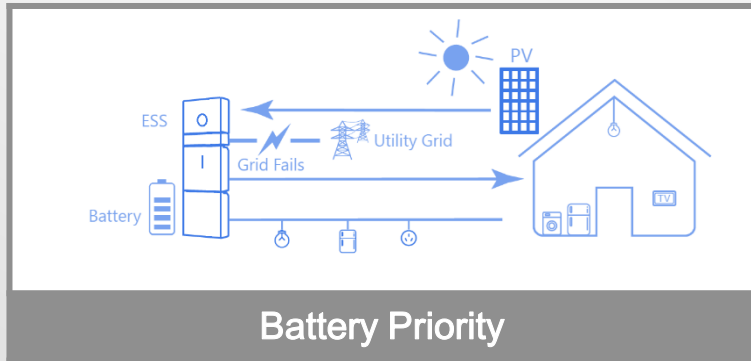
PV+battery supports Load

No PV, low BAT

Grid supports Load



# Work Mode—Battery Priority



**Strategy:** PV generation and Grid meet the demand of battery charging; Battery discharges only after grid failure in order to reduce life cycles of battery.

**Purpose:** Ensure the UPS function of the system.

PV>Load

PV supports load, PV charge the Battery

No grid, PV<Load, sufficient BAT

PV+Battery supports Load

Full BAT

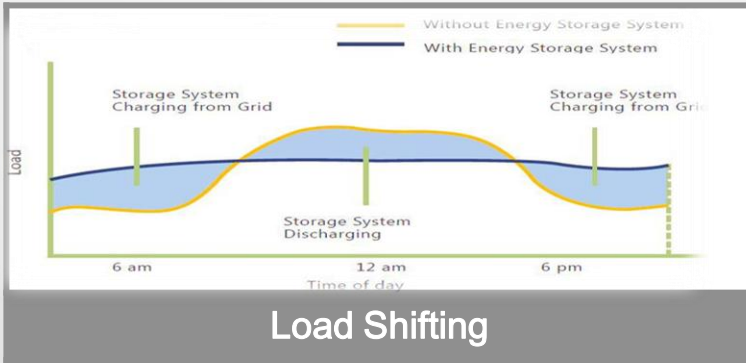
PV supports the load, remaining go to Grid

Full BAT, PV<load

Grid+PV support load



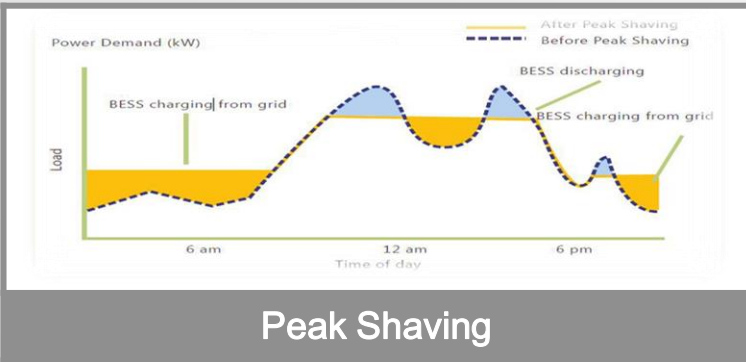
# Work Mode—Load Shifting and Peak Shaving



Reduce your electricity bill by storing electricity during off-peak time and shift energy to be used at peak time.

**Strategy:** Battery control of charging/discharging can be preset depending on the period of valley-peak, Battery is charged at the maximum power.

**Purpose:** Planning load curve and dispatch order from grid aggregator.



Avoid the increase of import capacity to supply the peaks of a variable load. Energy storage provides a fast response and emission-free solution.

Price is cheap	Charge battery
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Price is high	Discharge battery
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**PART 04**  
**Blue ESS Highlights**  
Powering Green Future

# CATL Battery Performance



## CATL Battery

Safety | Reliability | Long Life



## Easy Installation

Modular Design | All-in-one System



## Monitoring System

Solarman Platform | VPP Ready

Date Sources: SNE Research



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LFP vs NCM

Long life span



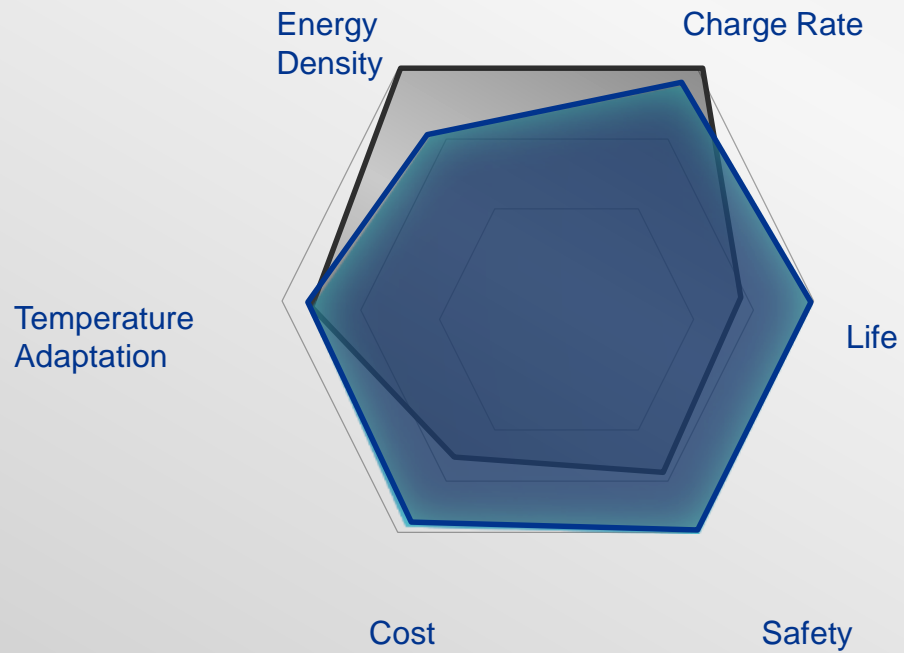
Triple level design

Global top 1-reliable

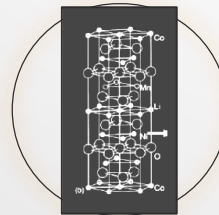
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# CATL Battery Safety---LFP

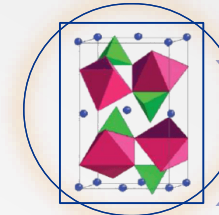


**NCM** Layered Crystal structure



Higher Energy Density

**LFP** Olivine structure

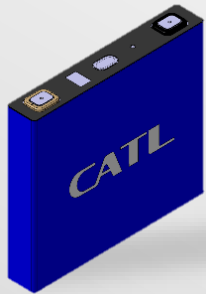


Longer Cycle Life

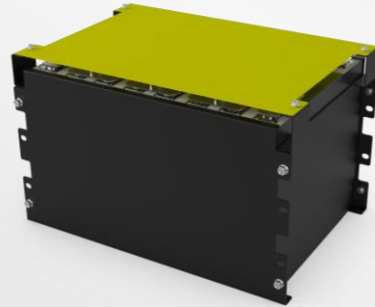
Safer & More Reliable



# CATL Battery Safety---Triple Level Design



**100Ah Cell**



**Module Level**

- Comply with GB/T18384 electric shock protection requirements
- Comply with UL94-V0 flame retardant requirements and latest national standard
- Comply with the requirements of GB/T31467.3-2015 combustion of 130sec



**PACK Level**

- Thermal management, control battery temperature rise ( $\leq 10^{\circ}\text{C}$ )
- High performance BMS, comprehensive protection including over/under voltage, over current, short circuit, high and low temperature
- Positive and negative double fuse design meets the Australian AS4777 safety standard



**System Level**

- Battery connection abnormal protection
- Triple protection with thermomagnetic switch, MOSFET high speed switch, fuse
- System leakage protection, insulation monitoring, overload and short circuit protection



IEC 62619



JIS C 8715-2



UL 1973

**N38.3**

UN 38.3



THE STANDARDS INSTITUTION OF ISRAEL

SII Cush & Nail Standards Institution of Israel



# CATL Battery Reliability-Manufacturing

## CATL Intelligent Manufacturing System



### Intelligence

Introduce & develop advanced production system to optimize manufacturing  
EPR + MES + Big Data + Automation



### Automation

100% automated & flexible production

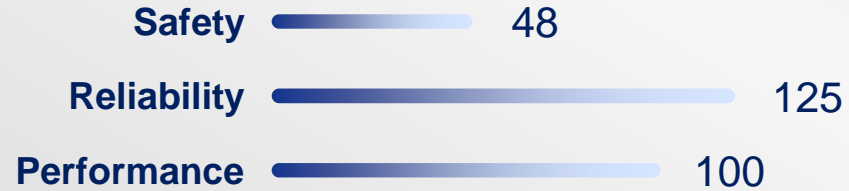


### Information

IoT & big data  
20 years' traceability

# CATL Battery Safety -Reliability

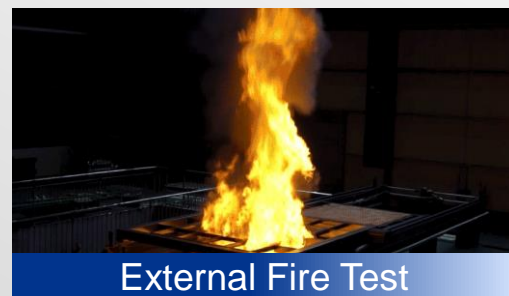
## Comprehensive Test & Validation



**273 Tests in Total**



## Monthly Test Capability

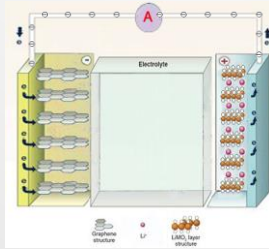


Date Sources: SNE Research

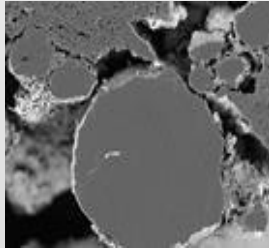
# CATL Battery Long Life

## Self-healing Technology

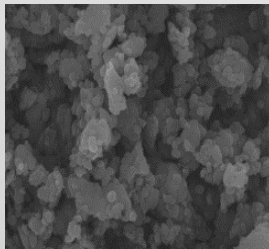
Optimize Anode/  
Cathode/  
Electrolyte



Graphite with  
Self-healing  
Structure  
(Volume  
ED≥350Wh/L)

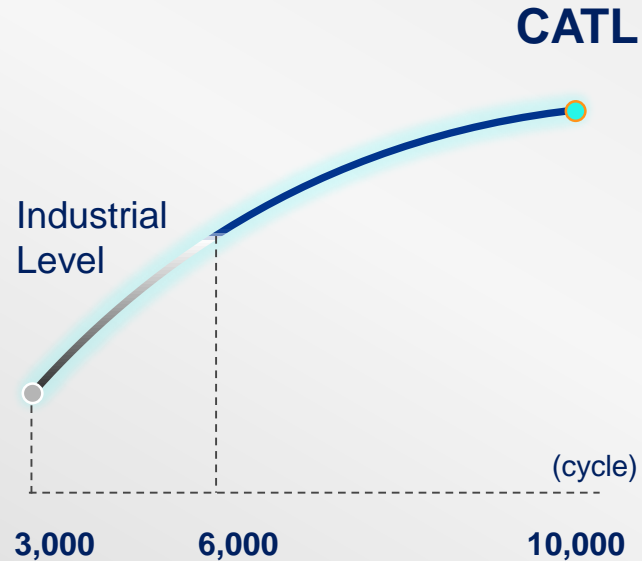


Martial Coating



## CATL Long Life Product

Long Life



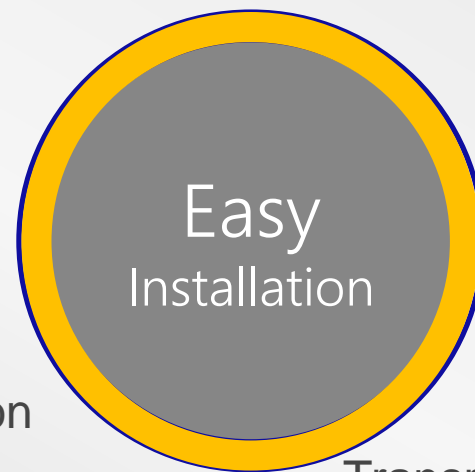
\*@25°C, 0.5C/0.5C, 100%DOD, 80%Ret

## Case Study

Jinjiang Megawatt-scale BESS Station  
30MW/108MWh



- Provide peak load shifting and frequency regulation services for substations.
- The first BESS project whose life is more than 12,000 cycles.



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Flexible application

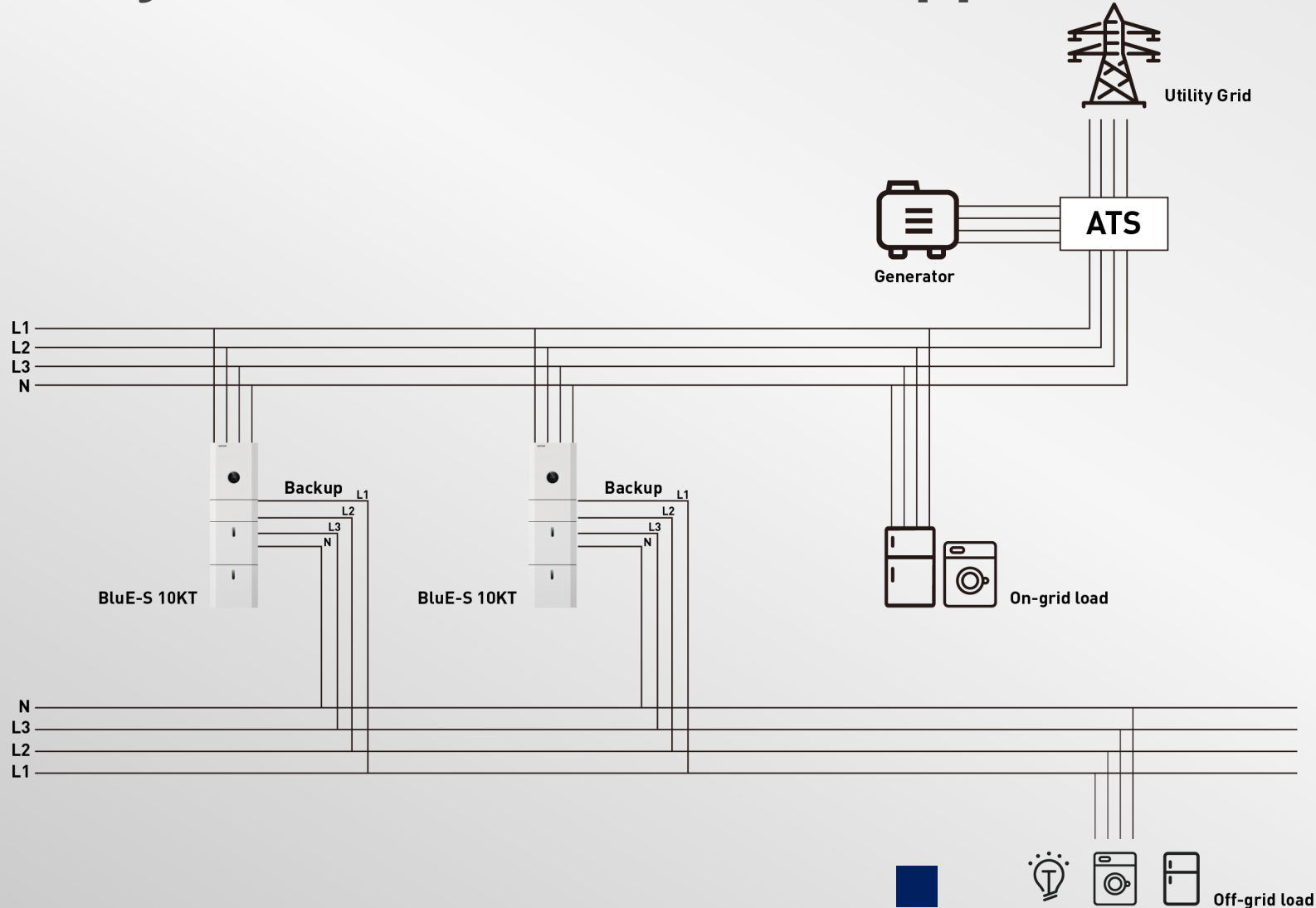
Labor saving

Transport friendly

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# Easy Installation---flexible application



➤ Enable to integrate with a genset for a PV+ESS+Grid+Genset micro grid system.

➤ Max 4 parallel installations for both on-grid and off-grid output

\* The off-grid parallelling function is available at Q2 2023

# Easy Installation---Labor Saving



## **Saving 50% installation time**

Installation in half an hour, wiring in one hour.  
Quick plug connection design ,free from on-site wiring.



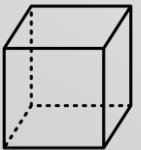
## **Handled by single person**

One module is less than 50kg, which can be handled by single person.



## **Installed by single person**

stacked and installed by single person.



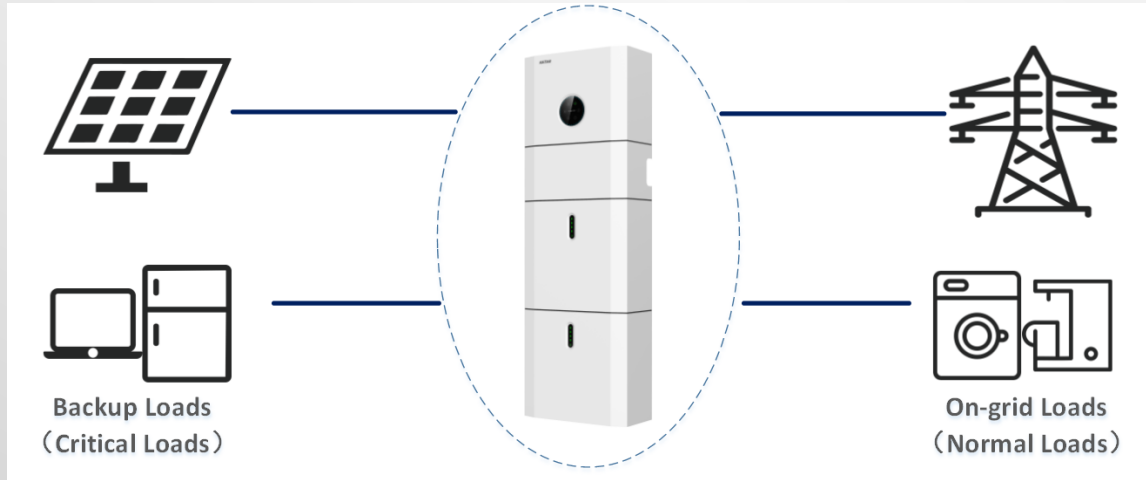
## **Minimum cover**

0.6M\*0.25M (0.15 square meters)



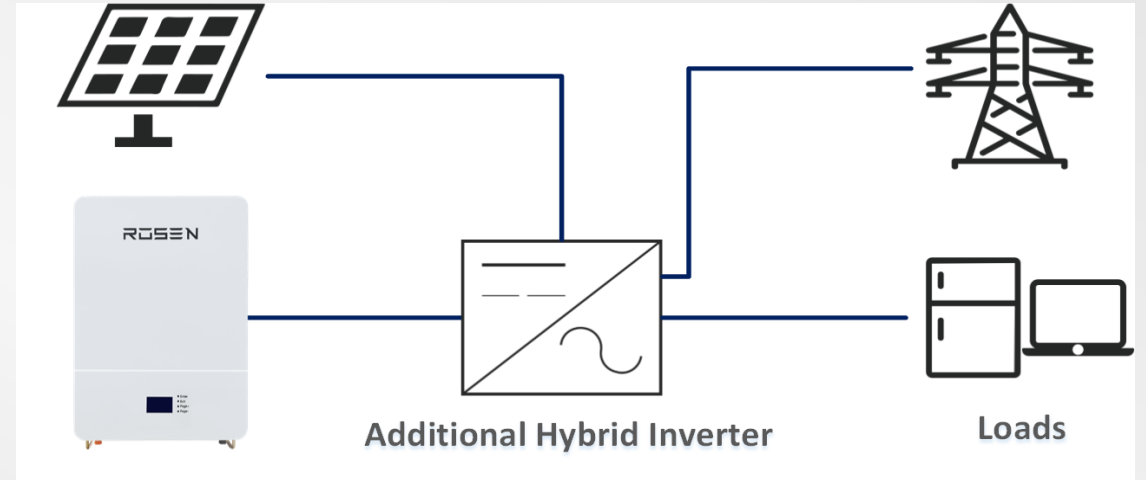
# All-in-one Design

Consist Residential Energy Storage System is Composed of Hybrid Inverter Module and Battery Pack Module



**Kstar BluE ESS**

# Split Type



**Other Supplier**

## All-in-one Design



- 🔧 Integrated distribution
- 🔧 Integrated design and quick plug connection
- 🔧 Plug and play, free of adjusting the inverter and battery together.

## Split Type



- 🔧 Making unsightly cables on the spot
- 🔧 Power distribution and installation
- 🔧 Adjust the inverter and battery together





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Online monitoring



VPP

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# Interconnect – Online Monitoring

WiFi Plug or 4G Plug optional, Real-time online monitoring from anywhere at anytime by APP or PC Web.



The solution is designed to monitor load energy consumption in real time for 24 hours.

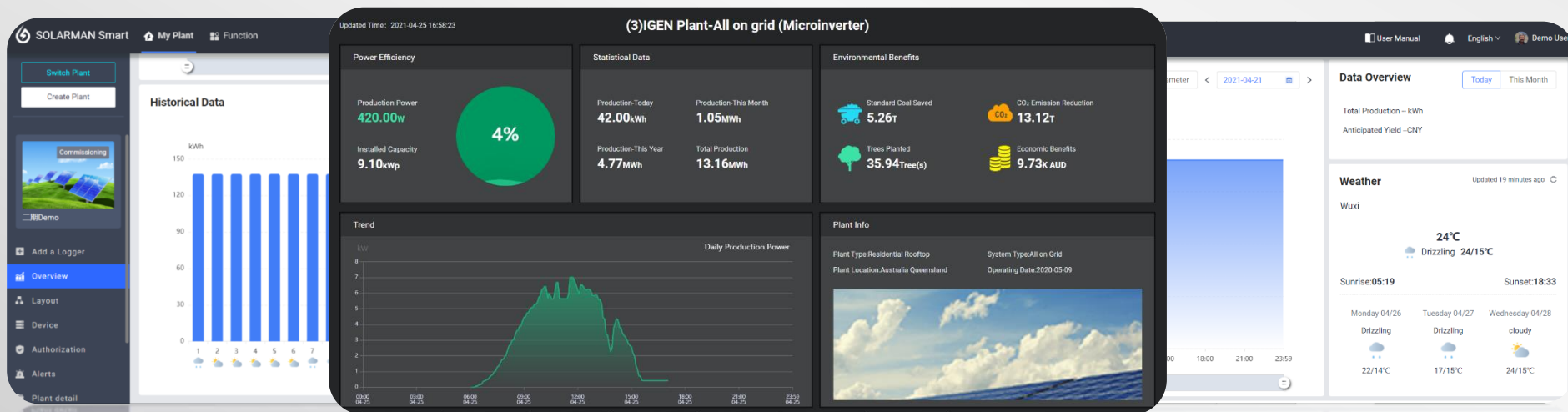
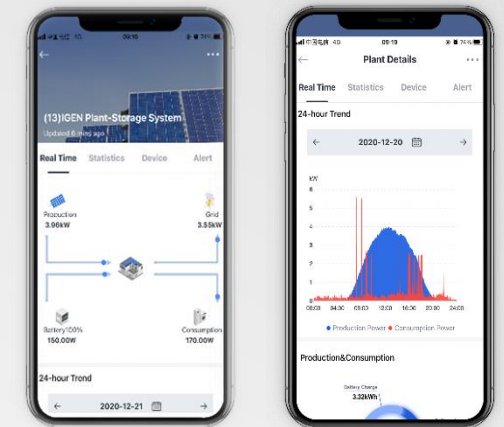
Based on the best design principles, the monitoring system is tailored to the needs of the home and requires only an internet connection. The data collected is stored in the cloud by Wi-Fi or 4G.

The end users benefit by achieving a better understanding of their electricity consumption and the source from which it is generated.

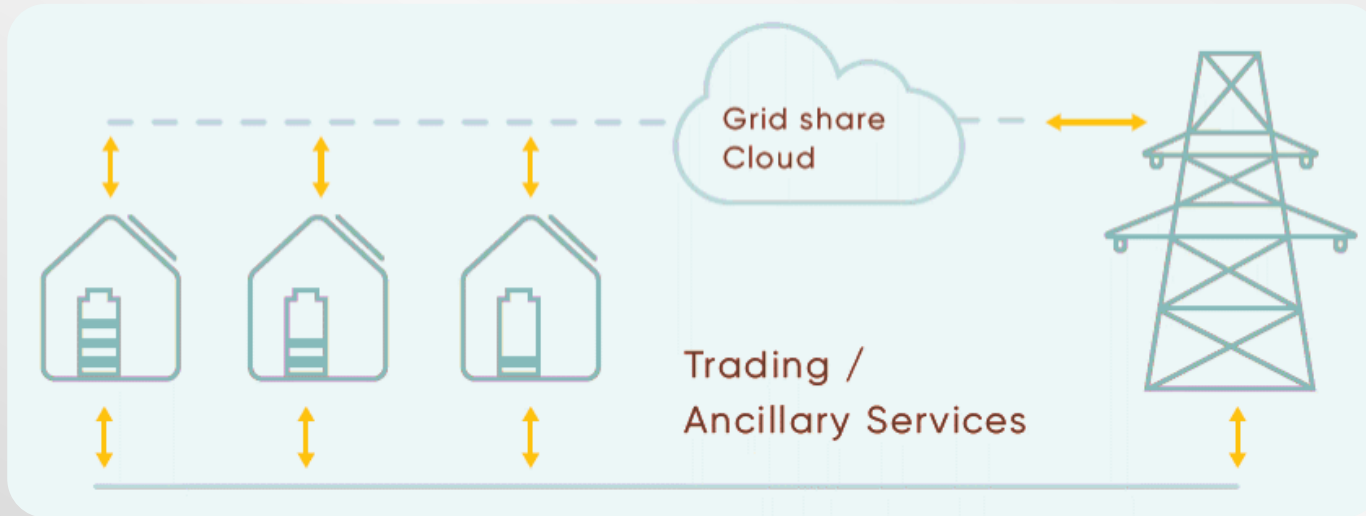
# Interconnect – Smart Home Energy Management System

Solarman Smart Home System of BluE ESS is an open protocol monitoring platform. It is designed to help operators to monitor a diverse range of PV plants operating at different places simultaneously.

It carries extensive data processing, including the production of customized charts. Its system of notifications and maintenance functions help the operators of PV assets to manage the generation of energy efficiently and comfortably, contributing to higher system yields.



# Interconnect – VPP –TOU(Time of use)



TOU Scheduler + Invalid

Date Of TOU Schedule 00:00 – 00:00

Charge Power 0 kW  
0 ~ 100

Discharge Power 0 kW  
0 ~ 100

Charge Time 1 : – :

Discharge Time 1 : – :

Charge Time 2 : – :

Discharge Time 2 : – :

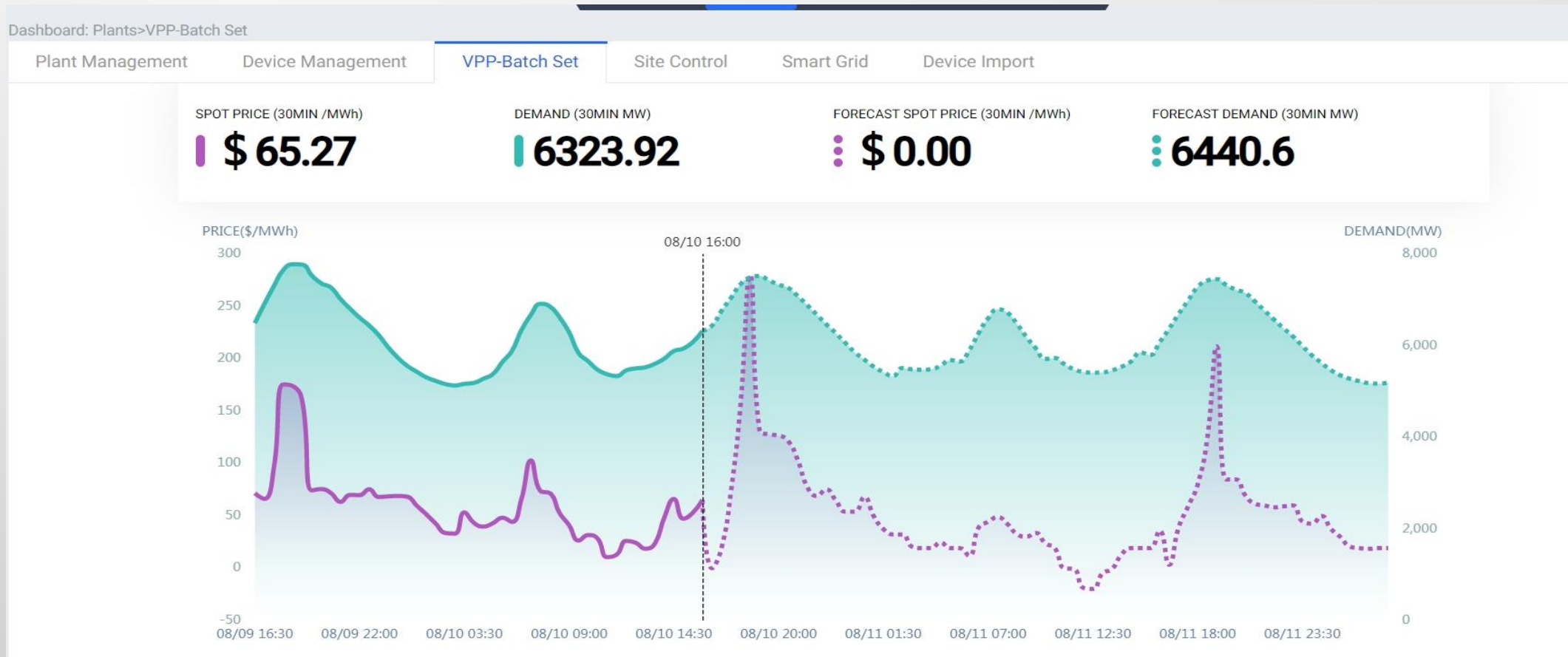
**VPP Revenue** :Benefit from the electrical price difference

**Ancillary services** :The combination of several flexible production and consumption units, controlled by a central intelligent system, is the core of VPP which can stabilize the grid by balancing frequency and voltage.

**Electricity arbitrage** : Optimize trading strategies to maximize returns. VPP can utilize the aggregated power to react to changes of the electricity price on the exchanges, quickly adapting to the existing supply of power in the grid, and thus execute trades.



# Interconnect – VPP –Electrical Demand and Price Forecast



example: capture the information on Australian Energy Market Operator)



# Interconnect – VPP – Smart Grid, providing voltage and frequency regulation service

VPP-Batch Set   Site Control   **Smart Grid**   Device Import

Grid Code : 澳洲 Read

Synchronization Ramp Rate Voltage Ride Through Frequency Ride Through <b>Active Power Control</b> Reactive Power Control	V2: <input type="text" value="0"/> % <small>0 ~ 6600</small>	V2: <input type="text" value="0"/> % <small>0 ~ 6600</small>
	P2: <input type="text" value="0"/> W <small>105 ~ 130</small>	P2: <input type="text" value="0"/> W <small>70 ~ 95</small>
	Response Time: <input type="text" value="0"/> ms <small>0 ~ 6600</small>	Response Time: <input type="text" value="0"/> ms <small>0 ~ 6600</small>
	<input type="checkbox"/> Over Frequency	<input type="checkbox"/> Under Frequency
	Start Frequency: <input type="text" value="0.00"/> Hz <small>50.00 ~ 65.00</small>	Start Frequency: <input type="text" value="0.00"/> Hz <small>40.00 ~ 60.00</small>
	Gradient: <input type="text" value="0.0"/> %/Hz <small>0.1 ~ 100.0</small>	Gradient: <input type="text" value="0.0"/> %/Hz <small>0.1 ~ 100.0</small>
Response Time: <input type="text" value="0"/> ms <small>0 ~ 20000</small>	Response Time: <input type="text" value="0"/> ms <small>0 ~ 20000</small>	
<span>Save</span>		



**KSTAR** Powering  
Green Future