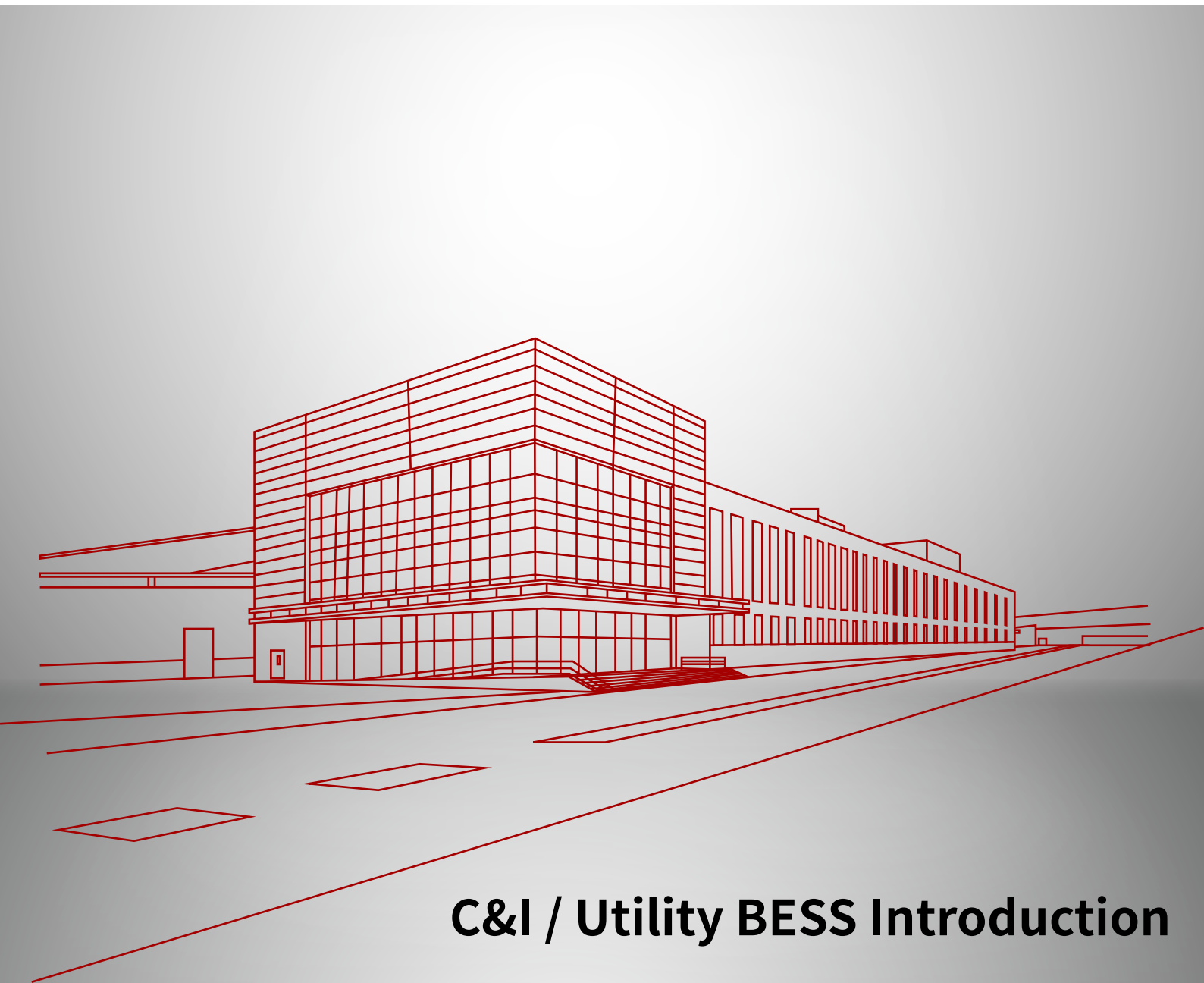




Matrix

Maximum Safety for Your Energy

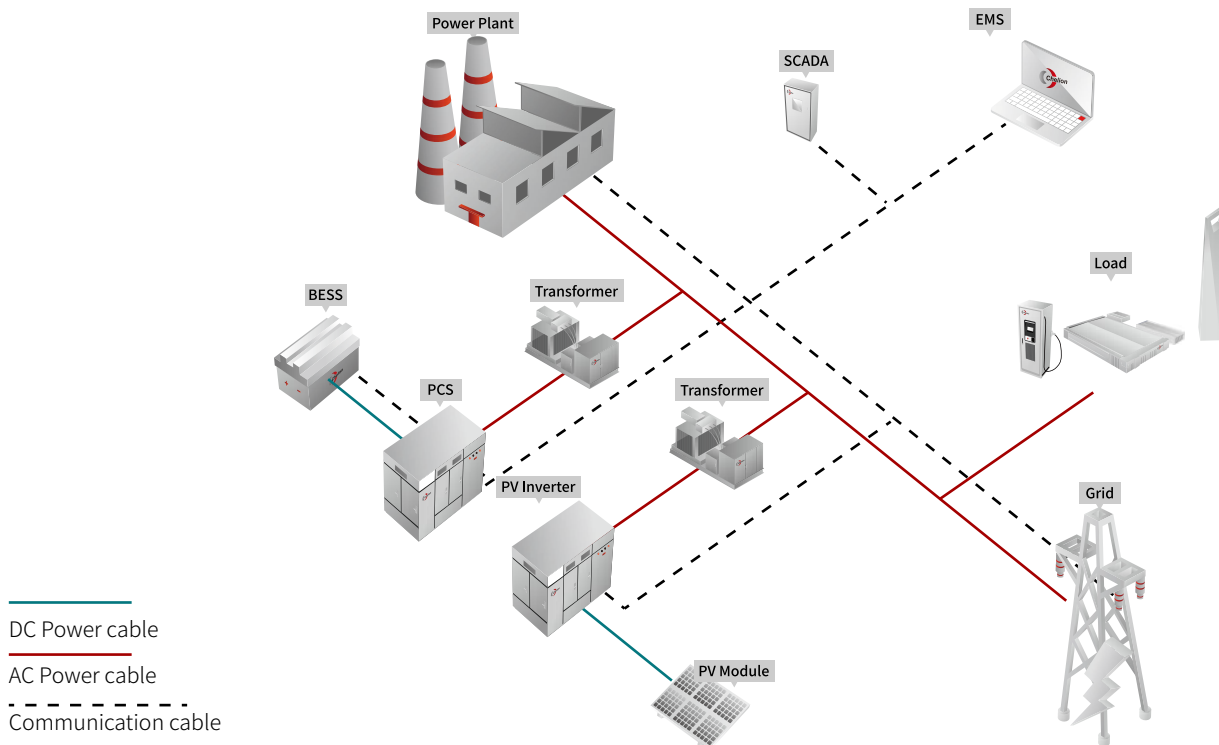


C&I / Utility BESS Introduction

Peak Shifting



Battery Energy Storage Systems (BESS) can store energy during valley time periods and discharge during peak periods. This function has multiple benefits including reducing peak demand from the grid and can compensate local transformer limits. BESS helps save construction and renovation costs of power transmission and distribution, benefiting economic operations.

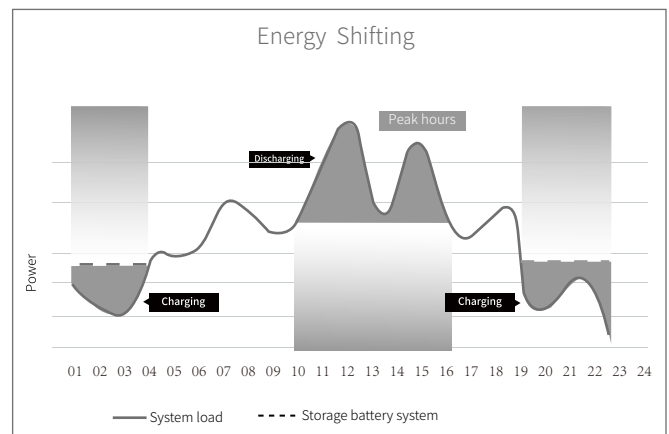


Application Scenarios

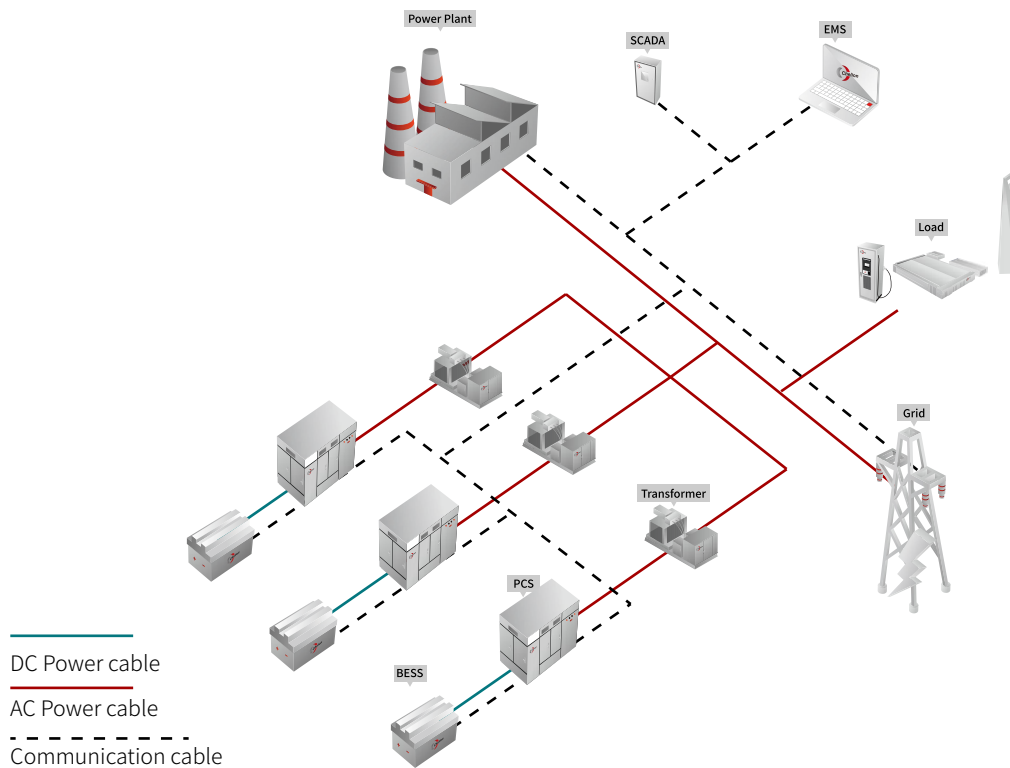
Utility power grids, commercial buildings,
industrial parks and other large consumers of electricity

Values to Customers

Significant savings of cost and peak demand charge.(C&I Customer)
Reduce operational cost of generating power during peak periods (Utilities)
Less frequent investment in infrastructure due to flatter loads with smaller peaks (Owner)



BESS has a fast regulation rate with high accuracy and a quick response time. BESS will be imperative to ensure that frequency regulating services be provided when required, meeting the charge/discharge requirements imposed on assets.

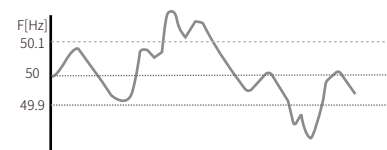


BESS installed in thermal power plants can improve the Automatic Generation Control (AGC) regulation performance of thermal power units to meet the frequency regulation requirements of power grids. BESS can also improve the deep adjustment capability of thermal power units to ensure safe and stable operation.

Application Scenarios

Utility power grids, thermal power plants with insufficient frequency and peak regulation capacity

Sequence diagram



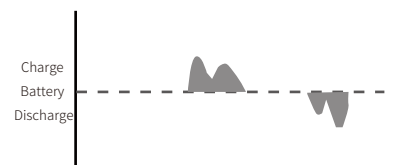
Charge battery from grid when the power abundant, Discharge battery to compensate power of grid and keep regular frequency.

Vaues to Customers

Obtain more benefits in the AGC market

Ensure system frequency stability via constant and reliable balance.

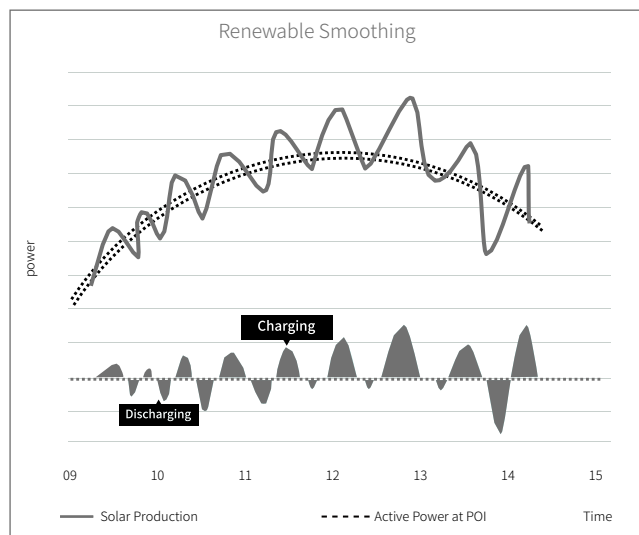
Reduce the investment of power generation, save costs and improve the life and performance of assets.



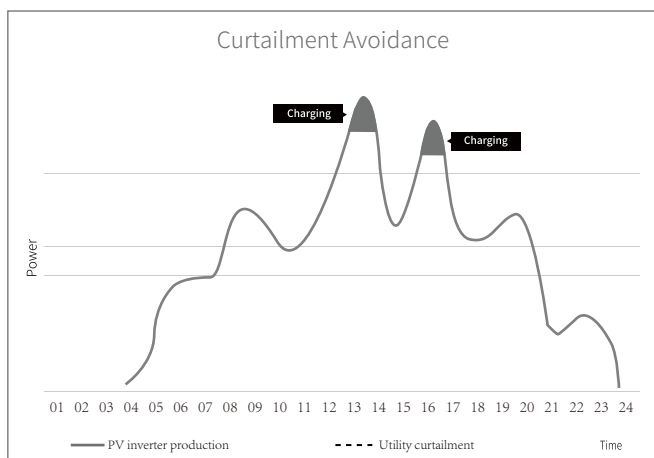
Renewable Integration



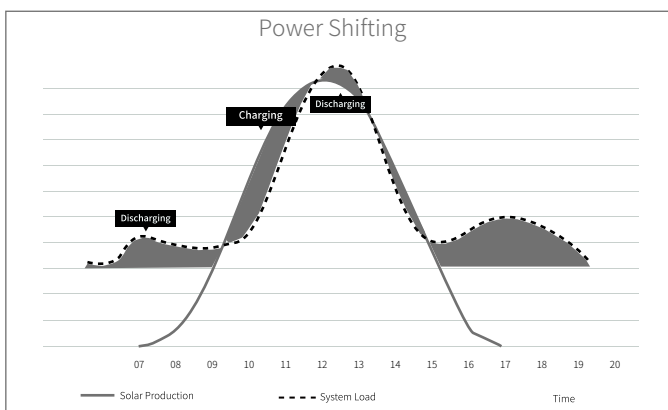
As wind and solar energy adoption continues to grow, power grids can be impacted by the intermittency of renewable sources. Incorporating a BESS is the most cost-effective method to safely and successfully integrate renewable energy. A BESS assists in smoothening the power supply and allows electricity to flow regardless of time and weather condition



Production of renewable energy may be curtailed by a grid operator for various reasons, such as increasing the stability of the network. At the same time, BESS allows excess renewable energy to be stored and delivered when needed.



BESS can shift the power generation from the PV system as energy demand fluctuates. It can store surplus PV energy during low-demand periods and discharge when needed. Energy shifting allows investors to maximize revenues from a PV plant, and enables higher DC/AC ratios for PV plants as well as time-variant grid injection



Integrating renewables brings more reliability and resiliency to the grid, as the systems can be used to manage short-term variability for voltage correction and frequency response services

PV plant and other renewable energy projects

Values to Customers

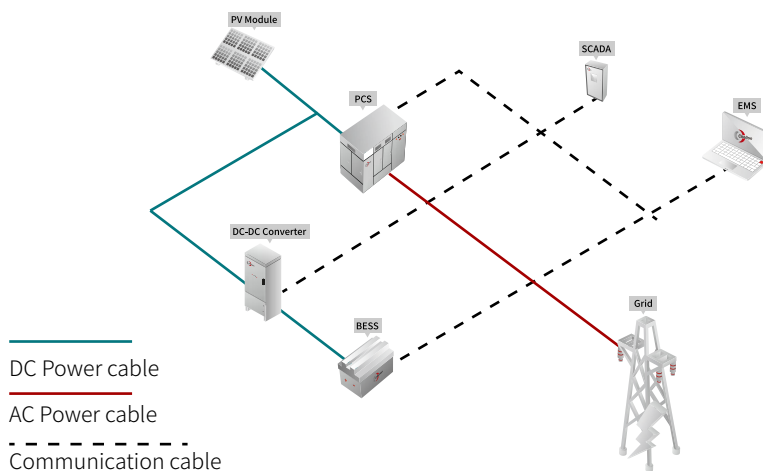
Realize renewable energy transfer and reduce inefficiencies

Reduce grid stress from the surge of renewable energy, expanding the renewable energy capacity credit

Reduce grid investment for renewable energy connections

Increase the prediction accuracy of power stations, maintaining safety and stability of the grid

Application Scheme



DC Coupled:

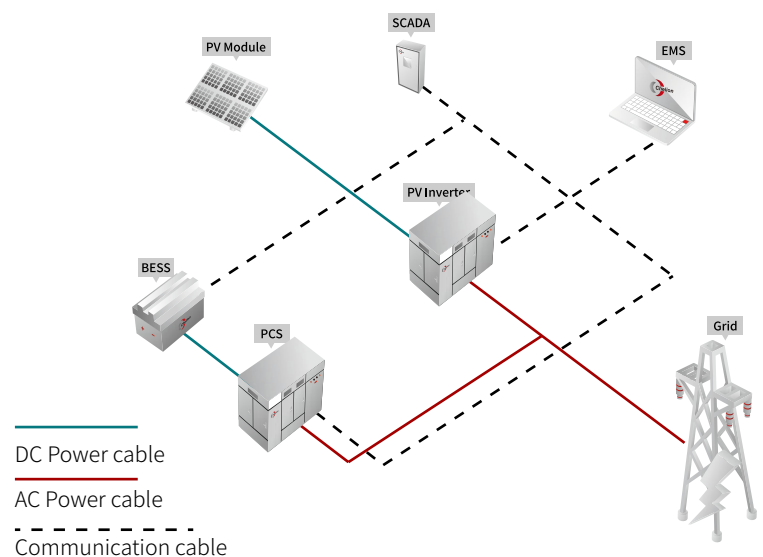
Batteries and PV modules share one inverter: PV inverter with a direct connection to PV modules and connection via DC-DC converter to batteries.

→ lower CAPEX due to less equipment

AC-Coupled:

Batteries and PV modules have their own inverters and can either share one point of connection (POC) or have separate POCs (a standalone ESS).

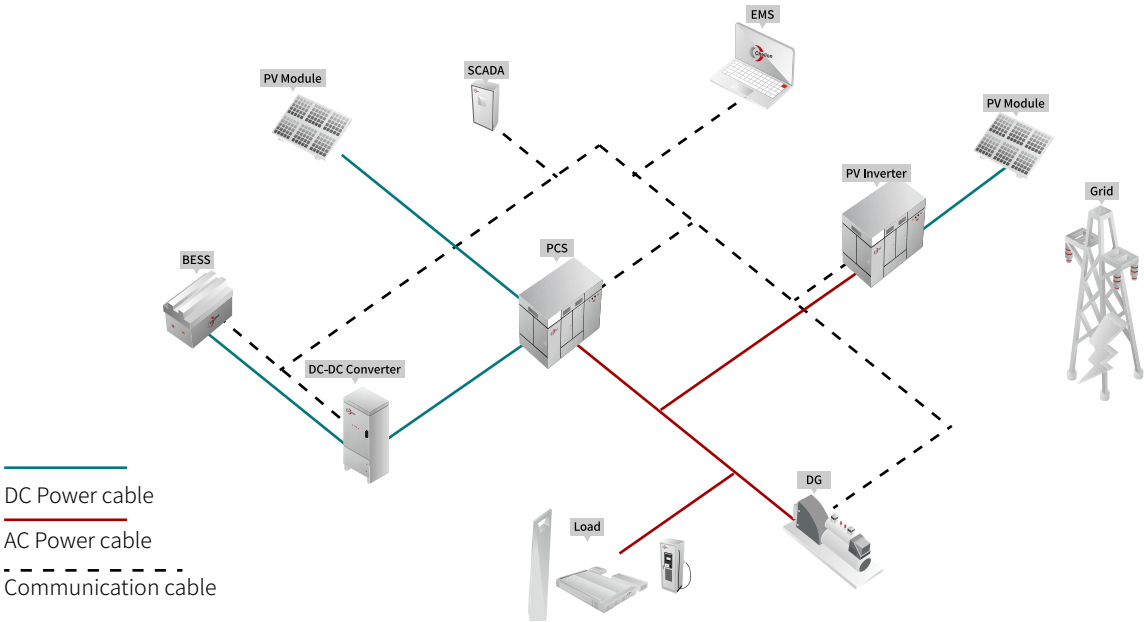
→ more operational flexibility



Microgrid



In a microgrid, using renewable energy and a BESS is the most suitable solution. When a BESS is used in a microgrid, it will greatly increase the safety and stability of the entire system, especially with off-grid operations. In addition, more renewable energies can be integrated to reduce fossil fuel consumption, optimize the power supply structure and balance the grid.

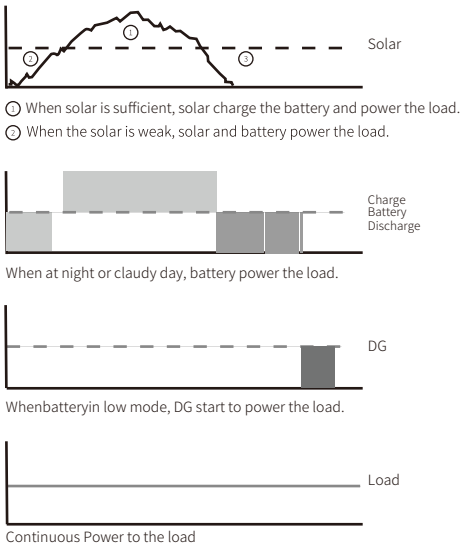


Application Scenarios

Business centers, communities, factories with multiple energy inputs and island operations

Values to Customers

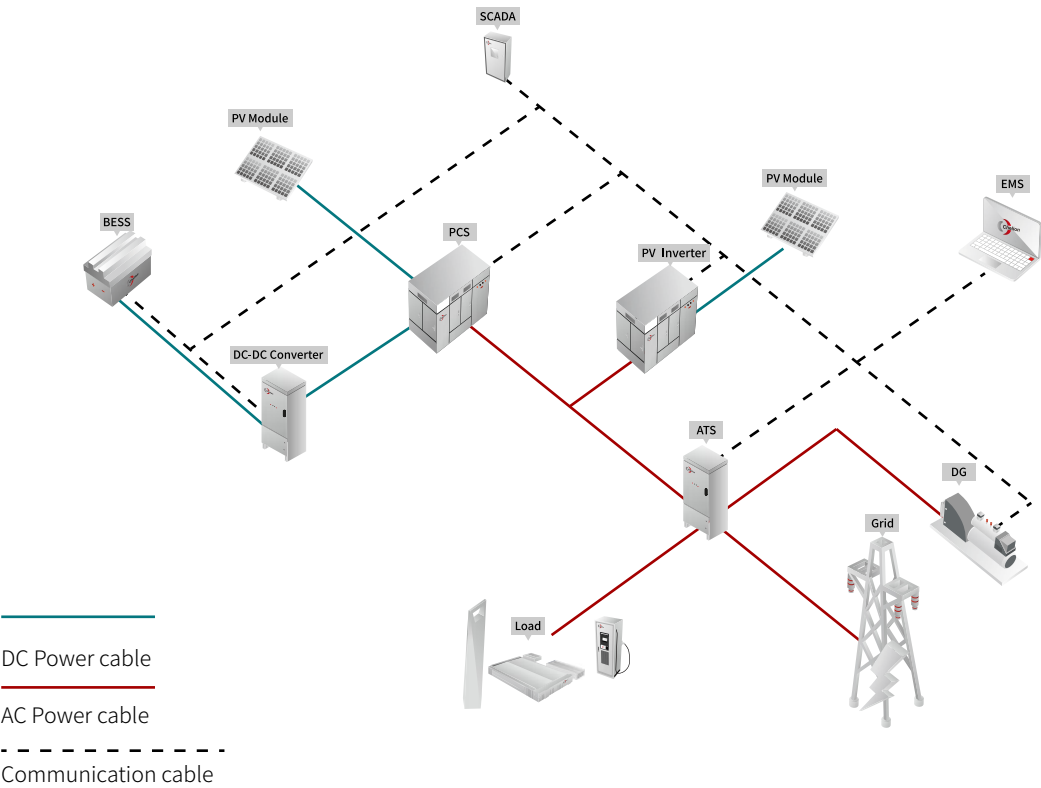
- Reduce electricity bills and costs of diesel generation via self-consumption of renewables
- Allow diesel generators to be switched off when energy is being generated from renewables
- Improve power supply reliability and overcome the grid outages more easily no matter planned or unplanned
- Green and sustainable source of energy



Backup or Off-Grid



BESS serve as an ideal backup for supplying power quickly and seamlessly, switching to off-grid mode in a very short time and perceiving an uninterrupted power supply. The black start function of a BESS system can provide support to the grid in case of an outage and improve power supply reliability



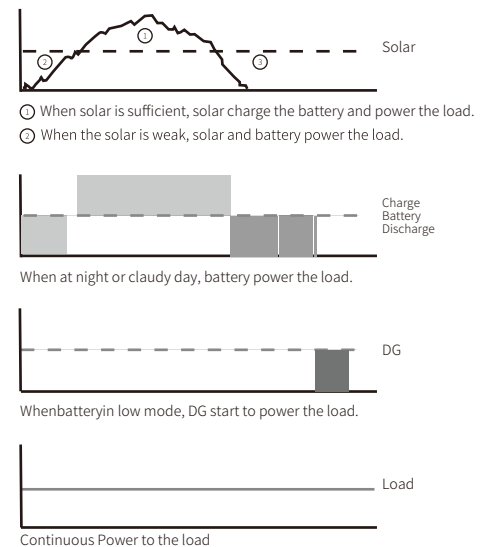
Application Scenarios

Utility power grids, critical loads, commercial buildings and industrial parks

Values to Customers

Backup energy, ensuring appliances and devices to work uninterruptedly and reduces economic losses associated with grid outages or disconnections. (Customers)

Black start capability, improving reliability of the grid (Utilities)





High Level Integration

Lithium iron phosphate battery (LFP) integrates with BMS, PDU, FFS, cooling unit, etc.

Integrated battery rack provides a convenient system for indoor and outdoor applications

Advanced integration ensures optimal system performance and lower costs



Efficient and Flexible

Modular design supports convenient installation, parallel connections and easy system expansions

Intelligent battery management system and cell-level temperature control ensures a high-level safety, efficiency, and a longer-lasting battery life cycle

Activates a vast number of business models. For instance, self-consumption, manage consumption peaks, backup or provide energy in other special use cases.



Safe and Reliable

Multi-state monitoring and actions ensure battery safety

DC electric circuit safety management includes fast breaking and anti-arc protection

A three-level management system design delivers high reliability

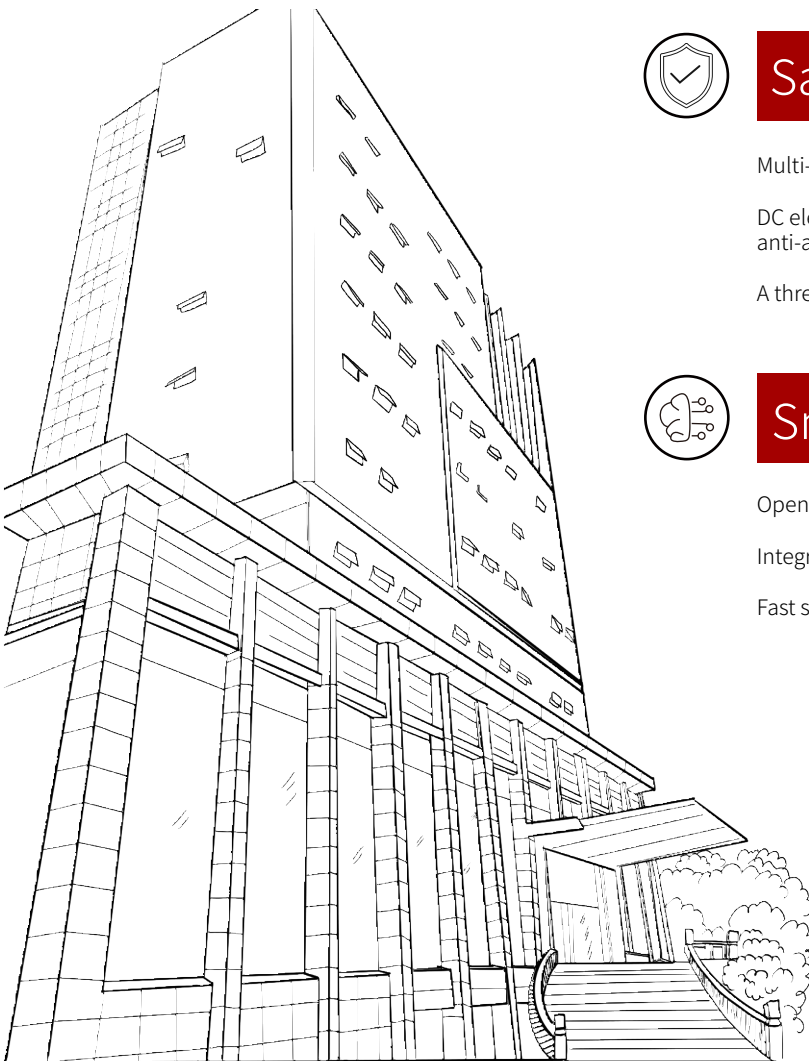


Smart and Friendly

Open battery interface ensures integration into any energy system

Integrated local controller enables single point communication interface

Fast state monitoring and faults recording enable pre-alarm and fault location



PWS1-500KTL Power Conversion System



Features

Flexible Configuration

- 62.5kW to 500kW by 1 to 8 power modules.
- 3P3W AC output for 400/480/208/690 Vac interconnection

High Efficiency & Stability

- Maximum efficiency > 98.2%
- Multi-string technology for better battery safety and performance.

Extensive Use

- Multiple battery strings working independently allows energy expansion.
- Optional STS to achieve seamless switching between on/off grid

Compliance & Compatibility

- Compatible with various types of battery system.
- Global grid certified & listed

- Modular design and wide power range in single cabinet
- Bi-directional Power Conversion System
- Grid-support functions
- Multiple DC battery strings, different battery mixing application
- Flexible derating available

Model	PWS1-500KTL-Mx							
	PWS1-500KTL-EX-M8	PWS1-500KTL-EX-M7	PWS1-500KTL-EX-M6	PWS1-500KTL-EX-M5	PWS1-500KTL-EX-M4	PWS1-500KTL-EX-M3	PWS1-500KTL-EX-M2	PWS1-500KTL-EX-M1

Battery voltage range	600~900V							
DC max current	873A	763A	654A	545A	436A	327A	218A	109A
AC voltage	400Vac (3P3W)							
AC current	720A	630A	540A	450A	360A	270A	180A	90A
AC max current	792A	693A	594A	495A	396A	297A	198A	99A
Nominal power	500kVA	437.5kVA	375kVA	312.5kVA	250kVA	187.5kVA	125kVA	62.5kVA
AC max power	550kVA	481.2kVA	412.5kVA	343.8kVA	275kVA	205.2kVA	137.5kVA	68.7kVA
AC frequency	50/60Hz(±2.5Hz)							
THDi	≤3%							
AC PF	Listed: 0.8~1 leading or lagging (Controllable)							
	Actual: 0.1~1 leading or lagging (Controllable)							

Battery voltage range	600~900V							
DC Max Current	873A	763A	654A	545A	436A	327A	218A	109A
AC voltage	400Vac (3P3W)							
AC voltage range	360~440V							
AC current	720A	630A	540A	450A	360A	270A	180A	90A
AC max current	792A	693A	594A	495A	396A	297A	198A	99A
Nominal power	500kVA	437.5kVA	375kVA	312.5kVA	250kVA	187.5kVA	125kVA	62.5kVA
AC max power	550kVA	481.2kVA	412.5kVA	343.8kVA	275kVA	205.2kVA	137.5kVA	68.7kVA
Output THDU	≤2%（Linear load）							

AC frequency	50/60Hz							
AC PF	Listed: 0.8~1 leading or lagging (Load-depend)							
	Actual: 0.1~1 leading or lagging (Load-depend)							
Overload Capability	105%~115% 10min;							
	115%~125% 1min;							
	125%~150% 200ms							

Physical								
Cooling	Forced air cooling							
Noise	70dB							
Enclosure	IP20							
Max elevation	3000m/10000feet (> 2000m/6500feet derating)							
Operating ambient temperature	-20°C to 50°C (De-rating over 45°C)							
Humidity	0~95% (No condensing)							
Size (W×H×D)	1100×2160×800mm							
Weight	600Kg	550Kg	500Kg	450Kg	400Kg	350Kg	300Kg	250Kg
Installation	Floor standing							

Other								
Peak efficiency	98.20%							
Protection	OTP, AC OVP/UVF, OFP/UFP, EPO, AC Phase Reverse, Fan/Relay Failure, OLP, GFDI, Anti-islanding							
Configurable protection limits	Upper/Lower AC Voltage/Frequency limit, Battery EOD voltage.							
AC connection	3-Phase 3-Wire							
Display	Touch Screen							
Communication	RS485,CAN,Ethernet							
Isolation	Non-isolation							
Compatible	Battery: Lithium ion, Lead Acid, flywheel							

Certifications and compliance

PWS1-500KTL-Mx and PWS1-500KTL-xM

CE

UNE 217002:2020

UNE 206007-1:2013 IN

EN 50549-1:2019

PWS1-500KTL-EX-M1 and PWS1-500KTL-EX-1M

UE 2016/631

PWS1-500KTL

CE

Outdoor Cabinet



Specification

Physical	
Cooling	Forced air cooling
Enclosure	NEMA3R / IP54 /C5(optional)
Operating ambient temperature	-20°C to 50°C
Humidity	0~95% (No condensing)
Size (W×H×D)	1500×2450×1150 mm /4.92×8.04×3.77ft
Weight	450~500kg
Feature	
Connection	Bottom wiring or Side wiring
Compatible with	Sinexcel PWS1-500KTL
Installation	Floor standing, liftable by forklift

Matrix CAIO Series



All In One design with a highly integrated ESS and a protective structural design for outdoor applications



Modular design that includes optional DC/DC converter, supporting DC coupling solution with ESS and PV

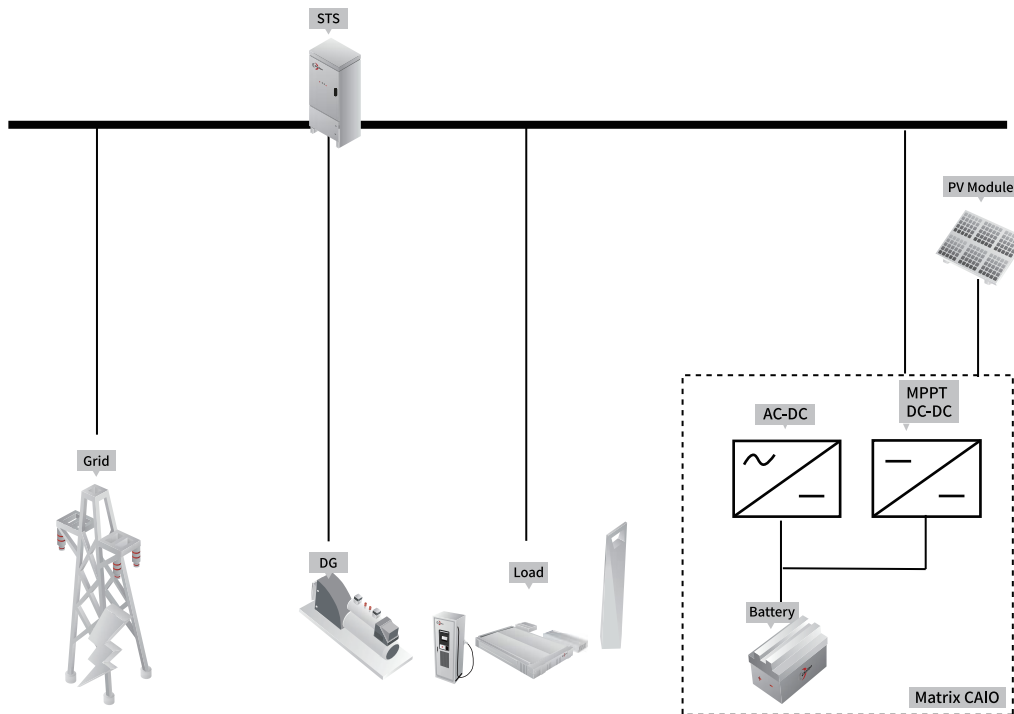


Three-level BMS structure guarantees highly efficient cooperation and safety performance



Easy on-site installation saves costs

Typical Application Diagram



Outdoor Cabinet ESS for micro-grid island, hotel, farm and other suitable applications

PCS Power optional power range: 30 - 60 kW

Battery optional capacity range: 62.51 - 96.61 kWh (28.42 - 56.83 kWh derated)

Matrix CAIO Series



Battery Data

Rated Energy (kWh)	96.61
Rated Voltage (V)	652.8
Operating Voltage (V)	550.8~734.4
Max. Operation Current (A)	148
Max. Battery Module Qty / Rack.	17
Battery Cell Type	Li-ion(LFP)
Round-trip Efficiency(@0.5C)	0.95

General Data

Dimension (W*H*D mm)	1450*2000*1100
Weight(kg)	590
Enclosure Protection Rating	IP65 (battery room)+IP54 (PCS room)
Anti-Corrosion	C3 (Optional upgrade to C5)
Operation Temperature Range (°C)	-20 to +60
Humidity	0~95% or 5%~95%
Altitude(m)	<3000
Cooling Concept (PCS Cabinet)	Forced Air Cooling
Cooling Concept (Battery Cabinet)	HVAC
Auxillary System Peak Power Requirement (kW)	3.5
Communication	Ethernet / Modbus TCP
Certification	PCS: CE / Battery: CE / IEC62619 / UN38.3 / UN3536
On/Off Grid Switch	Optional STS module, switching time <20ms

AC Output Data / On-Grid Mode (Optional)

Rated AC Power(kW)	30 (Expandable to 2*30)
Rated AC Output Voltage (V)	400
Max. Apparent Power (kVA)	33 (Expandable to 2*33) kVA
Rated AC Output Frequency (Hz)	50
Power Factor	Listed: 0.8~1 leading or lagging, actual: 0.1~1 leading or lagging
Max. THD of Current	≤3%
Isolation Method	Transformerless
Rated Grid Voltage	3W4P+PE, 400 (±15%) Vac
Peak Efficiency	0.973

AC Output Data / Off-Grid Mode (Optional)

Rated AC Output Power (kW)	30 (Expandable to 2*30)
Power Factor	Listed: 0.8~1 leading or lagging, actual: 0.1~1 leading or lagging
Overload Capacity	110%~120%, 10 min; 120%~150%, 200 ms

Matrix CA Series



Each battery cabinet contains 4 battery strings.
 Each battery cabinet is equipped with 2 sets of HVAC, 1 set of aerosol FPS
 0.25CP configures 3 kW air conditioner, 0.5CP configures 5kw air conditioner



Convenient installation and expansion, reducing on-site installation costs and commissioning time



Support back-to-back installation and side outlet, no need to preset cable trench / cable rack, reduce installation space



Comes with on-board transportation, reducing transportation and installation costs

Rated Energy (kWh)	532.4
Usable Energy (kWh)	521.8
Rated Voltage (V)	665.6
Operating Voltage (V)	582.4 ~ 748.8
Round-trip Efficiency(@0.5C)	≥94%
Dimension (W*D*H mm)	2200*1400*2443
Weight (kg)	5800
Max. Charge/Discharge Current (A)	200
Operating Temperature Range (°C)	-30 to +55
Humidity	5%~95% No condensing
Altitude(m)	≤3000
Communication	Ethernet / RS485 / CAN
Enclosure Protection Rating	IP54 / NEMA 3R
Rack Parallel Connection	Max. 16units (8 cabinets) in parallel (@0.25CP)
Certification	IEC62619 / UL1973 / RCM / CE EMC / FCC EN 61000-6-1 & EN61000-6-3
Battery Cell Type	Li-ion (LFP)
Cooling	HVAC

Parallel Application



Matrix UP Series



Modular design with different densities. Suitable for all scenarios.



A three-level battery management system design delivers high reliability



Open battery interface ensures integration into any energy system



Rack mounted or a container-based configuration



Advanced integration ensures optimal system performance and lower costs



Flexible voltage range, up to 1500VDC

Power Converter System

PCS model

PWS1-500KTL series

PCS power

62.5 * n kW (n=1,2,...,8) * n, units (n=1,2)

AC voltage

380V @ PCS, 480 or 400V @ AC interface

Battery Voltage Range

600 - 900 V

	20H-M2	40H-M2
Rated Energy(kWh)	1432 / 1454	2983 / 3273
Rated Voltage (V)	806 / 1228	806 / 1228
Voltage Range (V)	680~907 / 1036~1382	680~907 / 1036~1382
System Charge/Discharge Rate	0.5C	0.5C
Dimension (W*D*H mm)	2462*6058*2896	2462*12192*2896
Weight (Ton)	18	35
Operating Temperature Range(°C)	10~40	10~40
Humidity	5%~95% (No condensing)	5%~95% (No condensing)
Ambient Temperature (°C)	-20~50	-20~50
Altitude (m)	<4000m	<4000m
Enclosure Protection Rating	IP54	IP54
Battery Certification	IEC62619 / UN38.3 / CE / UL1642 / UL1973 / JIS C 8715-2 / UKCA / WEEE / REACH / RoHS	IEC62619 / UN38.3 / CE / UL1642 / UL1973 / JIS C 8715-2 / UKCA / WEEE / REACH / RoHS
Communication	Ethernet / CAN / RS485	Ethernet / CAN / RS485
Cooling	HVAC	HVAC







LFP Lithium Ion Energy Storage System
Battery Module

PowerCube-M2A-180
HM2A180

Please contact us for the optional DC/DC converter and STS module. For certifications of the PWS1-500KTL series, please refer to Page 12.

Matrix UE Series



-  Liquid cooling technology with three-level anti-leakage design.
-  Highly integrated and supports back-to-back installation. Saves up to 34% floor space
-  Accurately thermal control over cells, increasing service life by up to 23%
-  Pre-installed design with no battery module handing on-site. Transportation and installation costs are reduced
-  Liquid cooling technology reduces auxiliary consumption by up to 50%
-  Complete FSS, ensuring system safety

Rated Energy(kWh)	3727
Rated Voltage (V)	1331.2
Voltage Range (V)	1164.8~1497.6
Charging/Discharging Power (0.25P)	0.93MW
Dimension (W*D*H mm)	2462*6058*2896
Weight (Ton)	~35
Operating Temperature Range (°C)	-25 to +55
Humidity	<95% No condensing
Storage Temperature(°C)	-40 to +60
Altitude(m)	<4000
Noise	<80dB winthin 1.2m
Enclosure Protection Rating	ISO 12944, C3~C5
Certification	IEC 62477/EN IEC 61000-6-2/EN IEC 61000-6-4/IEC 62619/IEC 62933-5-2/IEC 63056/ UL 1973/ UL 9540A/ CE/ UN3536
Communication	Ethernet / CAN / RS485
Cooling	Liquid: 50% Ethylene glycol aqueous solution
Auxiliary power supply (0.25P)	Voltage Range: 3 Phase AC 380V...480V, 50/60Hz, Maximum Power: 36.3kW@25°C