

# SPS (Seamlessly Power Supply) Solution

Medium Voltage Power Preservation  
Applications in Mining Areas



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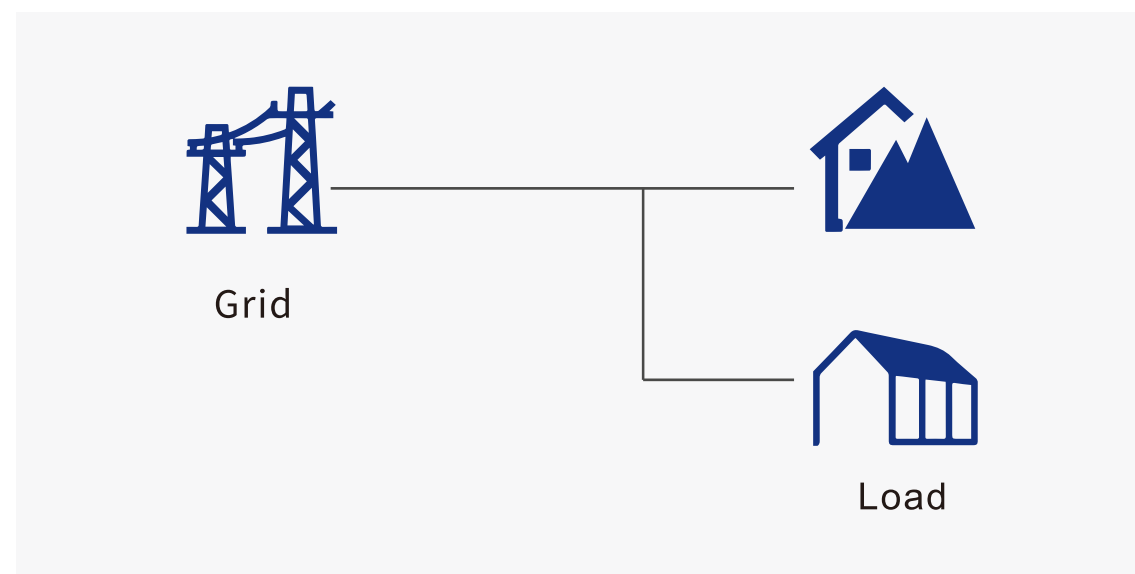


## Grid Situation of Mining Areas

**Application:** Mining areas with unstable electricity

### Grid Situation in Africa

In Africa the grids experience regular power outages. The dry season's (May-November) outages are currently counted as 88 per month or more (~3 per day). The rainy season (December-April) has a higher frequency of power outages, as many as 6-7 per day.





## Impact of Power Outages on Mining Areas

### Pyrometallurgy:

The pyrometallurgy process is commonly used in the extraction of various metals. It uses high temperatures along with reducing agents in order to extract and refine metals from their ores.

Due to their high process requirements, power outages are likely to lead to abnormal temperature control and other quality issues.

### Hydrometallurgy:

Hydrometallurgy uses aqueous solutions in their processes to extract and purify metals from their ores. Main equipment used in these systems include large motors and pumps (blowers, acid pumps, water pumps). Power outages during these process can likewise lead to issues with the production, along with damage to equipment.



**Power outages can significantly impact mining operations and equipment in several ways:**

**Production Interruption:** Mining equipment heavily relies on electricity for various operations like drilling, crushing, hauling, and processing ore. A power outage halts these activities, causing a direct interruption in production.

**Equipment Damage or Failure:** Abrupt power outages can cause damage to sensitive electronic components within the mining machinery. When power is suddenly cut off it may lead to potential equipment failures or malfunctions.

**Recovery Time and Costs:** After a power outage, restarting and reinitializing mining equipment takes time and resources. This downtime affects productivity, and the costs associated with restarting operations can be substantial.

**Safety Concerns:** Mining operations involve heavy machinery and processes that need power to run safely. A sudden power loss might compromise safety systems, potentially endangering the workers and the mining site.

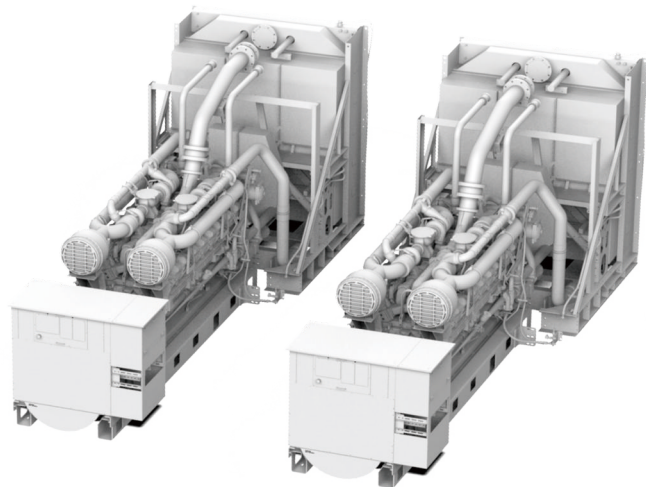




## The Traditional Backup Power- Diesel Generator

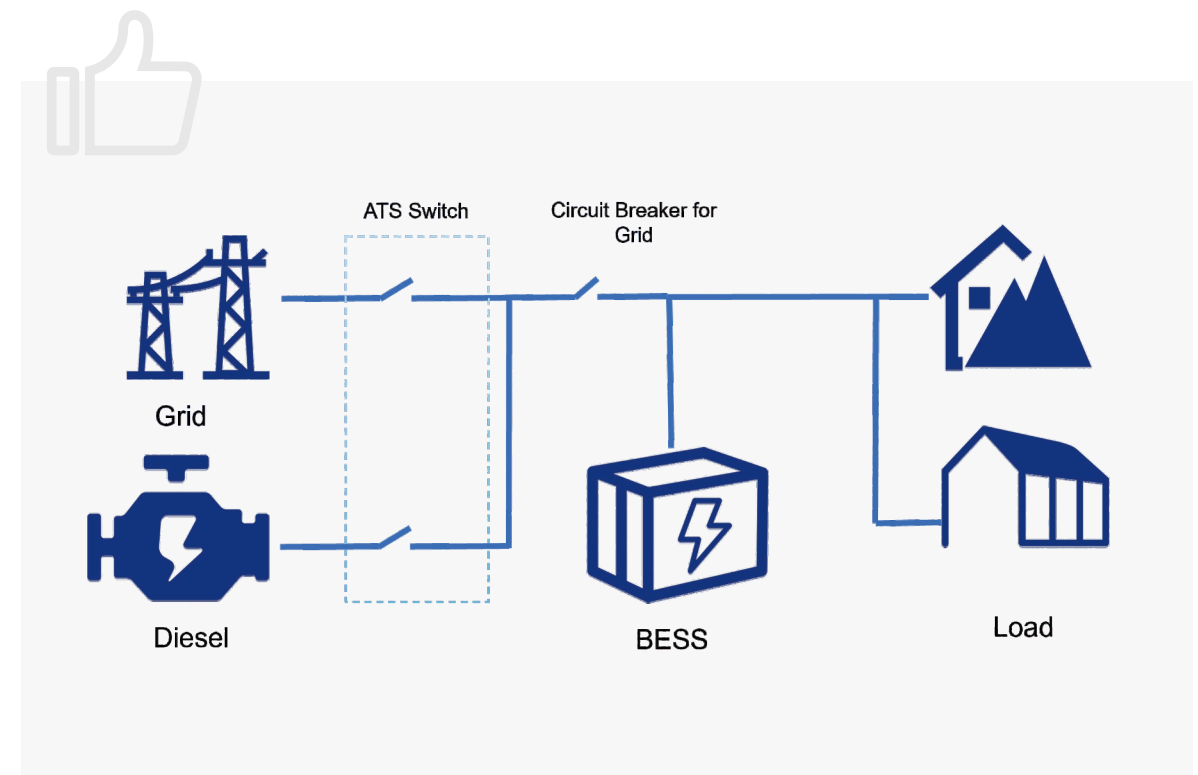
Traditional mining sites back-up power use diesel generators, usually with more than one diesel engine in parallel. Each generator typically provides less than 2MW of power. With this system, the back-up power can not be immediately started with the load running. The generators are typically started one by one, and have a start-up time of 2~20 minutes.

Because of the lag in the supply of power from diesel generators, the mine cannot resume production immediately after a power failure. A solution that switches over immediately when the grid fails and provides power to the loads during the time it takes for the diesel generator come online is the perfect solution to this problem.



## Electrical Topology of BESS(SPS) Solution

Tecloman proposes **SPS (Seamlessly Power Switch)** as a short-term back-up power supply. In the event of a power outage, the energy storage system switchover can be achieved within 10ms (the load will be working normally, not affected by the grid outage) to provide short-term backup power, while the process of diesel generators start-up.



## Lubumbashi, DRC

### Project Case of BESS(SPS) Solution

#### Project Location:

Lubumbashi, DRC

#### Project Applications :

Sulfuric Acid Plant

#### System Size:

2MW/1MWh

#### Factory Situation

The mine has been experiencing essentially daily power outages, sometimes as many as four or five times per day. It takes at least 2 minutes to start the diesel generator unit after a load failure, and it takes more than 40 minutes to resume operations within the plant. This greatly affects the production capacity.





# Project Case Performance of BESS(SPS) Solution

When the grid dropped, the SPS switched over within 10ms and the mine loads were unaffected.

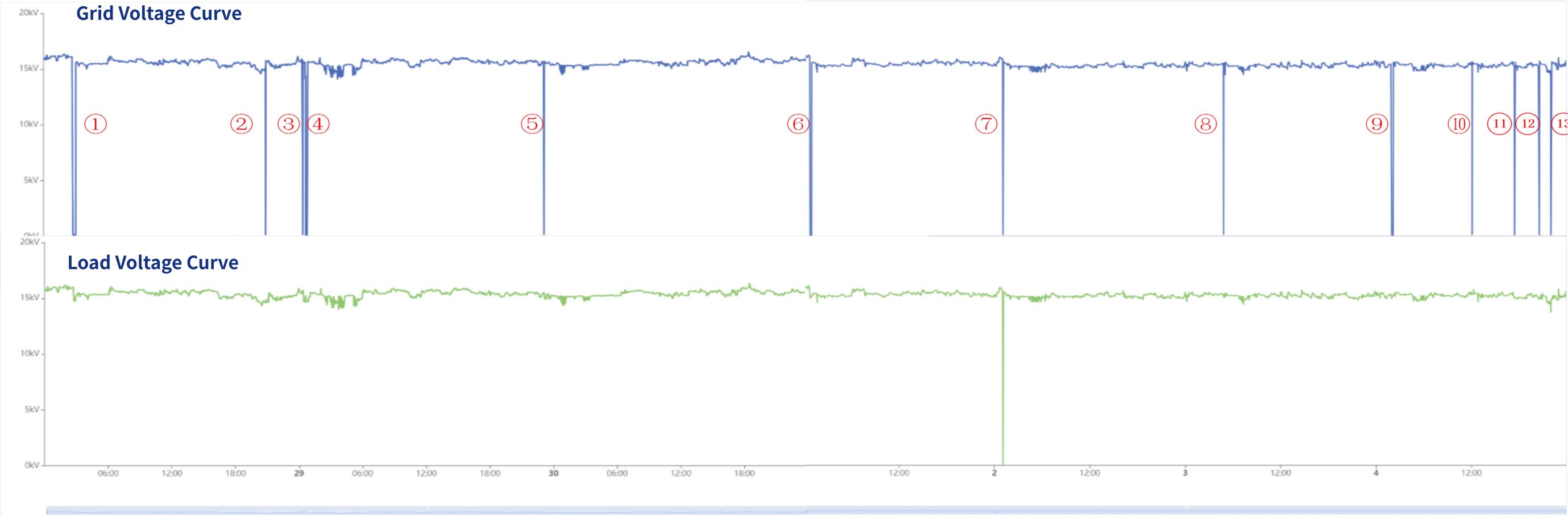
Starting Date: 2023/6/28

Ending Date: 2023/7/4

Trial Run Time: 6 days

Number of Power Outages: 13 times

SPS Switching Times: 13 times





## Project Case Investment Benefits of BESS(SPS) Solution



In the event of a power outage, the loads at this mine are shut down with start-up times greater than 40 min. Based on the number of outages counted, an average of 2 outages per day, the impact of power outages on production capacity is 80 min per day.



Therefore, by using the BESS solution, the capacity can be increased by  $80\text{min/day} = 5.88\%$ .



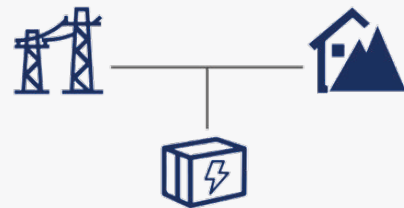
Estimated at \$100 million production value, then payback of BESS investment < 1 year





# BESS(SPS) Solution for Mining

## Solution 1



- Grid provides mains power to loads
- BESS provides emergency power supply

### Advantage:

- Standby online in real time
- Switching time between on and off-grid:  $\leq 10\text{ms}$
- Duration of power backup: 0.3~2h

### Disadvantages:

- Less backup power available

### Use Occasions:

- Outages are short and predictable
- Newly constructed mines

## Solution 2

- Grid provides mains power to loads
- BESS provides emergency power supply
- Diesel provides long term backup power

### Advantage:

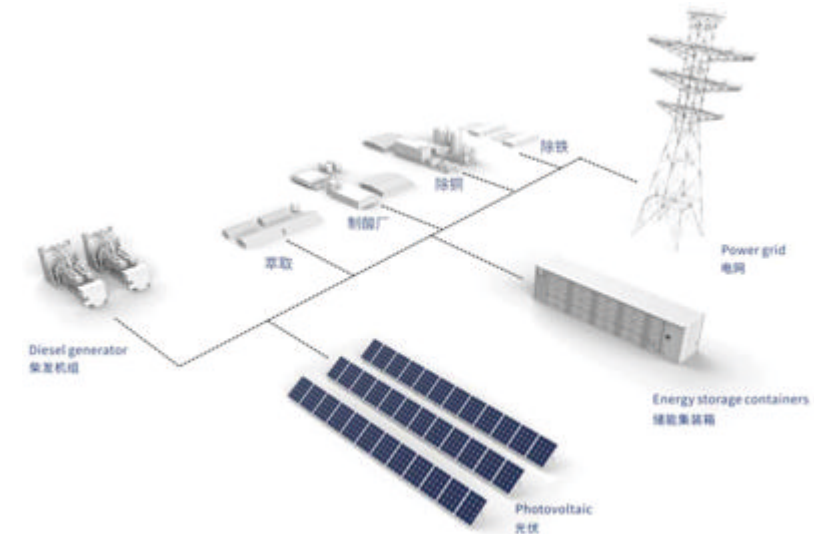
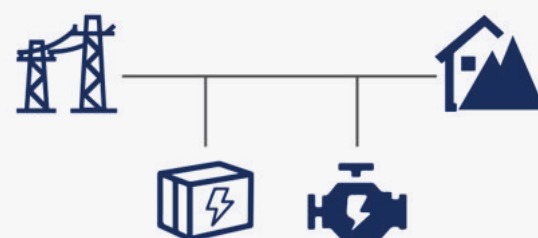
- Standby online in real time
- Switching time between on and off-grid:  $\leq 10\text{ms}$
- Duration of power backup: >2 hours

### Disadvantages:

- High cost of power backup

### Use Occasions:

- Facing long power outages
- New mines + renovation of old mines



## Solution 3

- Renewable energy provide the main power supply
- Grid supplementary power supply
- BESS for emergency power supply
- Diesel provides long term backup power

### Advantage:

- Standby online in real time
- Switching time between on and off-grid:  $\leq 10\text{ms}$
- Duration of power backup: > 2 hours
- Low cost of electricity

### Disadvantages:

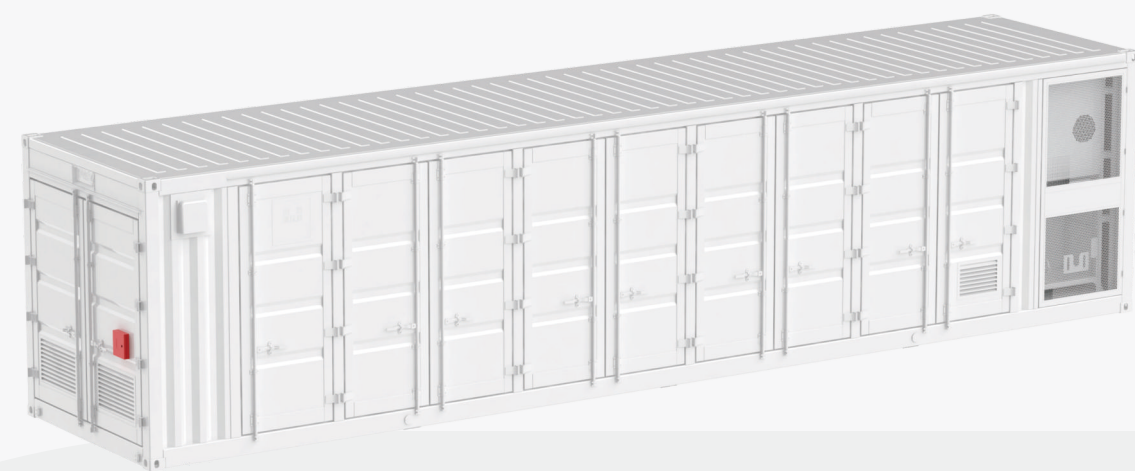
- High construction costs


### Use Occasions:


- High electricity price area
- New mines + renovation of old mines
- Abundance of light resources


# BESS container/Medium Voltage Electrical container


TESS-1000-500/1000-2000/2000-1000/2000-400




 Energy storage system online in real time with hot standby

 Unit-based design, convenient for long-term power protection and capacity expansion

 Millisecond-class fast switching, high reliability and high power supply quality

 Prefabricated energy storage system, bulk shipment and convenient installation

 Medium-voltage centralized power protection, with high efficiency and low cost

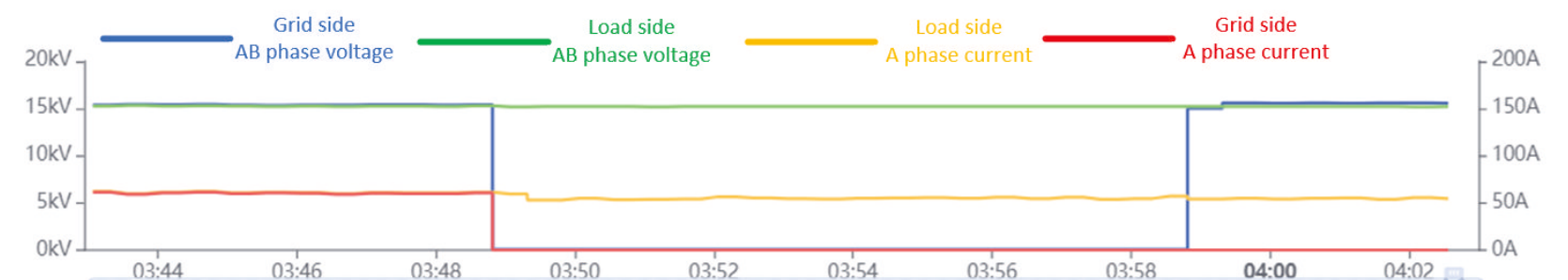
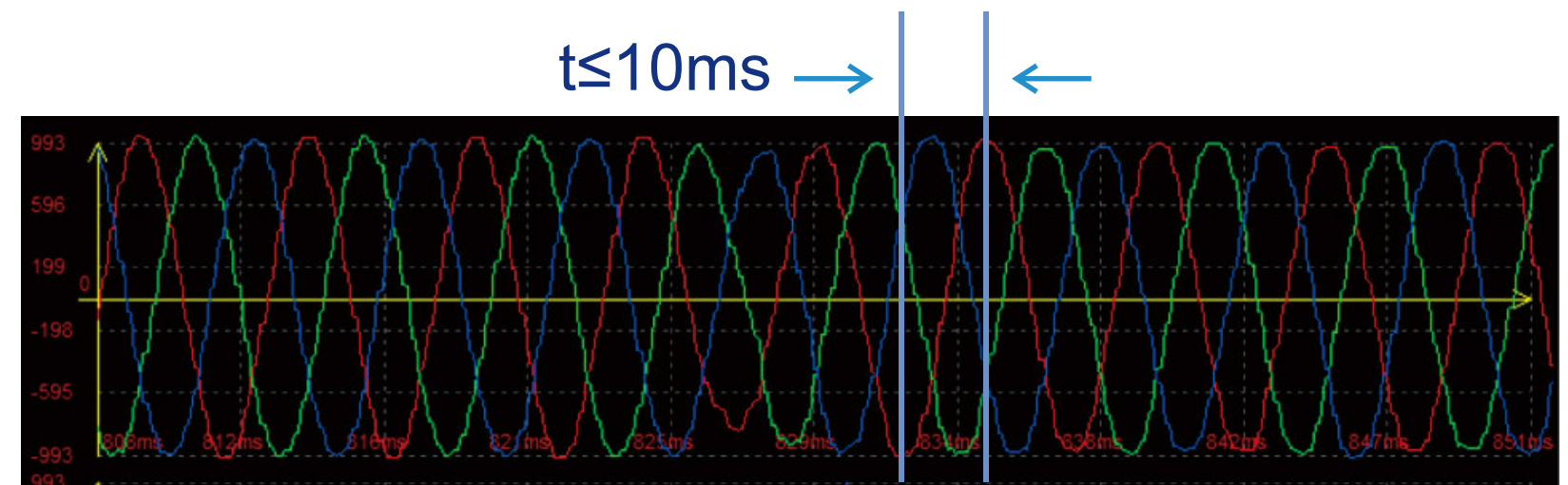
Type	TESS-1000-500	TESS-1000-2000	TESS-2000-1000	TESS-2000-4000
Common parameters				
Rated power	1000kW	1000kW	2000kW	2000kW
Rated power	500kWh	2000kWh	1000kWh	4000kWh
Rated power charging time	≈0.5h	≈2h	≈0.5h	≈2h
Rated power discharging time	>20min	>90min	>20min	>90min
AC voltage level	6~35kV			
Switching time	≤10ms			
Grid-connection output				
Maximum output power	1100kVA	1100kVA	2200kVA	2200kVA
Allowable voltage range	±10% (configurable)			
Allowable frequency range	50Hz/60Hz±5Hz (configurable)			
Power factor	0.99 (ahead)-0.99 (delay)			
THDi	<3% (rated output power)			
Off-grid output				
Carrying capacity of unbalanced load	100%			
Voltage variation range	<5%U <sub>N</sub>			
Voltage DC component	<0.5% (linearly balanced load)			
THDu	<5% (linearly load)			
Battery parameters				
Battery type	Lithium iron phosphate			
Charge-discharge ratio	2C	0.5C	2C	0.5C
Charging temperature range	0~55℃			
Discharging temperature range	-20~55℃			
Fire protection design	Heptafluoropropane/perfluorostadioketone extinguishing medium			
Basic parameters				
Protection level	IP54			
Relative humidity	0-95% (condensation free)			
Cooling type	Intelligent cooling/liquid cooling			
Highest altitude	5000m (>4000mderated)			
Display	Touch screen/Cloud platform			
Communication port	Ethernet, RS485, CAN2.0, cable (IO)			



## Working Performance of BESS(SPS) Solution

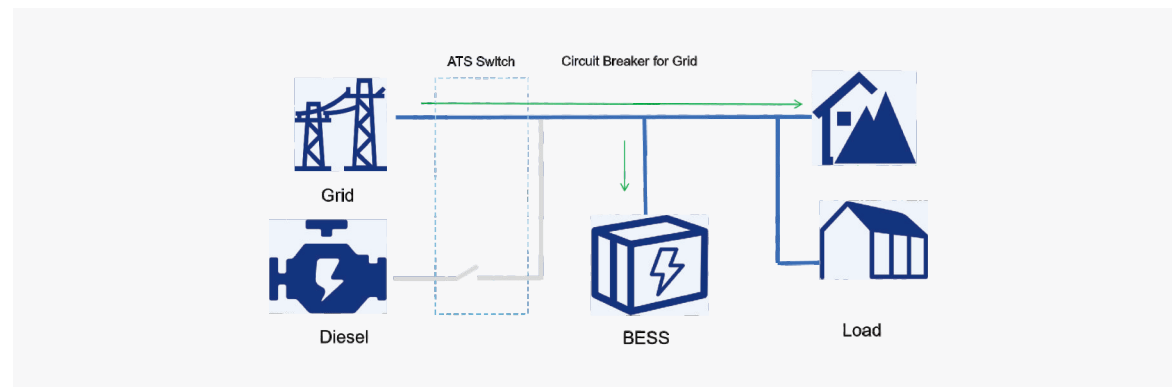
- Fast detection speed
- Fast grid-connected switching
- Fast on and off grid switching

**Switching time less than 10ms, no impact on load operation**



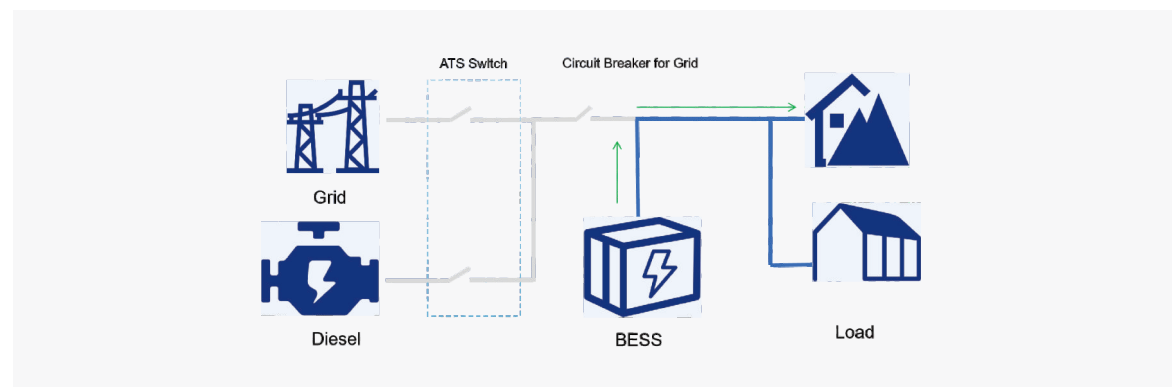
## Working Principle of BESS(SPS) Solution

### Normal operation of the power grid:



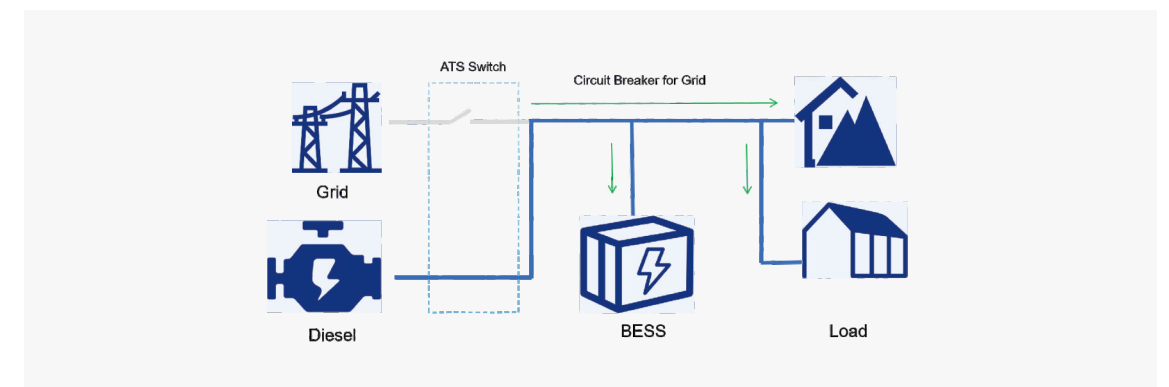
During normal grid operation, the ATS grid-side switch is closed and the diesel side is disconnected, at which time the loads operate normally and the energy storage is in charging or standby mode.

### Grid anomaly , BESS provides power to load:



When the power grid is abnormal, the ATS disconnects the grid switch, the grid circuit breaker is disconnected, and the energy storage system provides emergency power for the load, reserving time for the diesel to start up startup

### Grid anomaly , generator provides power to load:



When the diesel generator is running normally, the Diesel generator side of the ATS switch is closed, the grid circuit breaker is closed, and the energy storage system is charged, at which time the diesel generator provides the load with a long period of guaranteed power. When the grid returns to normal, the ATS will disconnect the diesel side switch and close the ATS grid test switch



## Advantage of BESS(SPS) Solution for mines

### Optimal solution

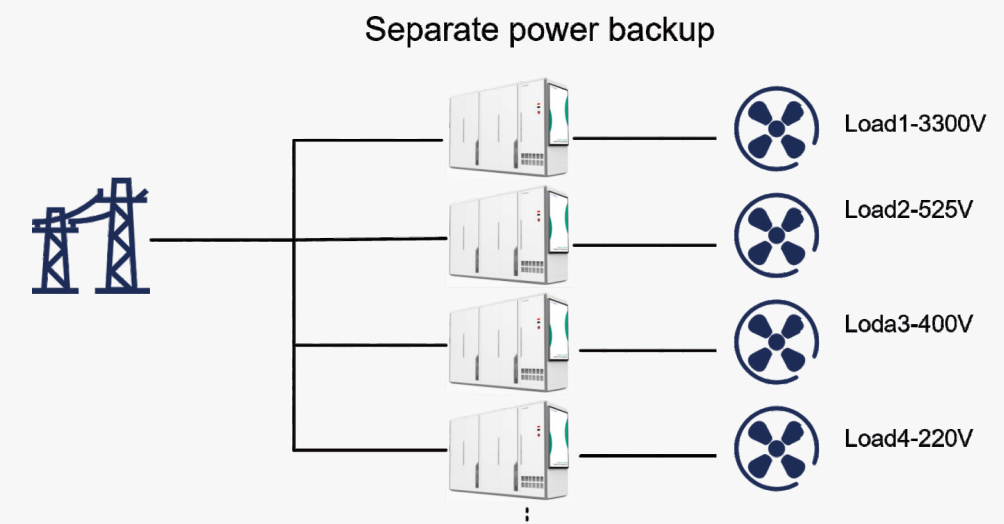
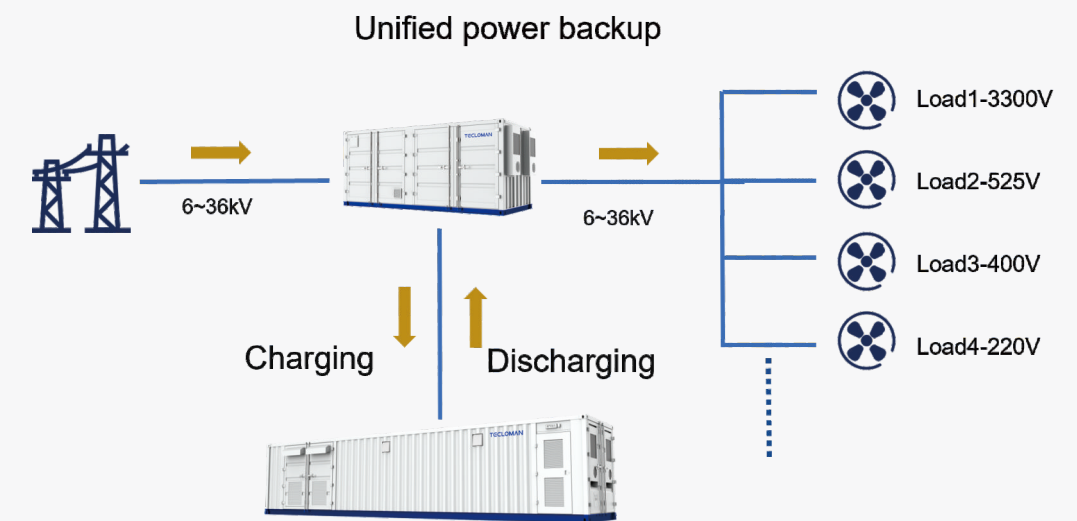


When the diesel generator is running normally, the diesel generator side of the ATS switch is closed, the grid circuit breaker is closed, and the energy storage system is charged, at which time the diesel generator provides the load with a long period of guaranteed power. When the grid returns to normal, the ATS will disconnect the diesel side switch and close the ATS grid test switch

### Cost-optimized



Unified power backup solves the problem of high cost for customers who provide independent power backup for loads separately

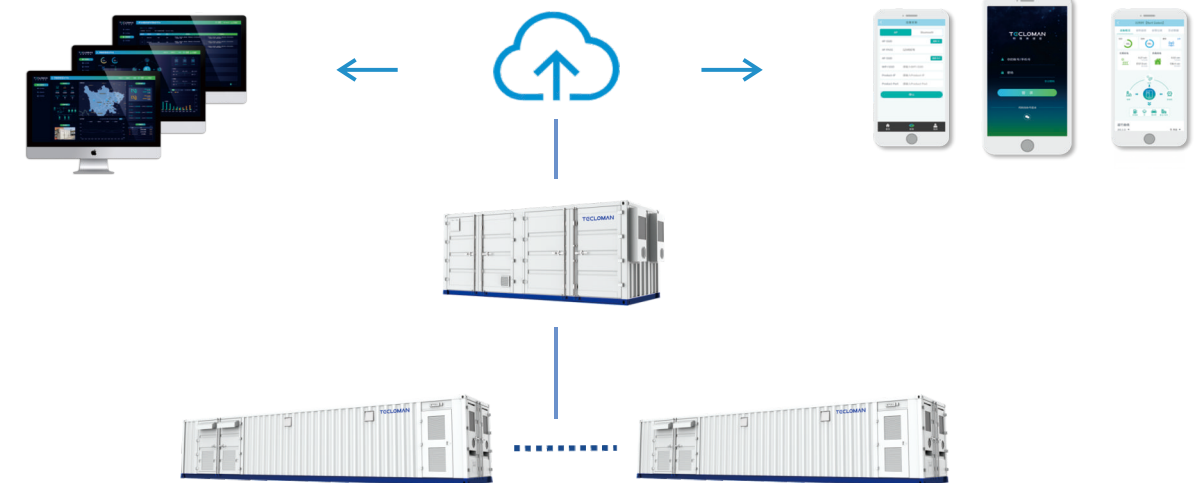


## Advantage of BESS Solution(SPS)



- Integration in the factory
- Container Transportation
- Convenient installation

Classification Society Certification:  
**Un3536 Certification**  
**UN38.3 Certification**



**Real-time data, remote monitoring,  
real-time push of event information**

# Company Profile

## Company Overview

Tecloman specialize in tailored BESS solutions for a wide range of applications focusing primarily on large-scale projects in the commercial, industrial, and utility sectors. Our portfolio includes utility scale energy storage, commercial and industrial applications, residential solar storage, data centers, mining and oil systems, electric vehicles, mobile energy storage, distribution networks, and DC microgrids.

 **60000m<sup>+</sup>**  
Production Base

 **160+**  
R&D Engineers

 **158+**  
R&D Patents

 **1200+**  
Global Team Members



Regions/Countries	Regulatory	EMC	Grid-connect	Transport
China	GB/T 36276	GB/T 34131	GB/T 36547	UN38.3  SDS  Certification for Safe Transport of Goods  Syndrome of dangerous package  CCS
	GB/T 34131	GB/T 34120	GB/T 36548	
	GB/T 34120			
North America	UL 9540	FCC Part15	IEEE 1547	
	UL 9540A		IEEE C62.41.2	
	NFPA 855		IEEE C62.45–Surge	
	UL1973		IEEE C90.2–EMI	
	UL 1741S		C22.2 NO.257	
			C22.3 NO.9	
Europe	IEC 62933	2014/30/EU EMC	EN 50438	
	WDE-AR-E 2510–50	IEC/EN 61000–6–1~4	CEI 021	
	2011/65/EU ROHS		OVEE-8001–4–712	
	2014/35/EU LVD		RD 1663	
	HIEC 62619		RD 1699	
	IEC 63056		...	
	IEC 62620			
	IEC 62109–1–2			
	IEC 62477–1~2			
UK	BS/EN/IEC 62933	BS/EN 55011	G99	
	BS/EN 62619	IEC/EN 61000–6–1–4	G98	
Germany	IEC 62933	IEC/EN 61000–6–1–4	VDE-AR-N-4105	
	VDE-AR-E 2510–50		VDE-AR-N-4110	
	IEC 62619		VDE-AR-N-4120	
	2PfG 2698			
Australia	AS/NZS 5139	IEC/EN 61000–6–1–4	AS/NZS 4777–2	
	AS IEC 62619			
Japan	JIS C 4412	JIS C 4412.2	JET GR0002–1	
	JIS C 8715–2	IEC/EN 61000–6–1–4	JET GR0003–1/4/5/6	
	SBA S1101		JEAC 9701	
Korea	SPS-CKBIA-10104–03–7312	SPS SGSF-025–4–1972	KSC 8564	
	SPS SGSF-025–4–1972		KSC 8565	
	KC 62619			
Africa	Reference to European IEC standards			



# The Support for After-Sale Service by Tecloman

## Professional Consulting In Full Life Circle

With an office in Munich, Germany, and overseas after-sales teams all around the world, Tecloman is able to provide on-site installation support and remote support worldwide. Meanwhile, our project service teams consist of lots of professionals related to R&D, design, business, engineering and quality, and can provide one-on-one Q&A service.

## Rapid Response

For global after-sales Service , Tecloman commit to respond within 1 hour, emergency response and damage treatment within 3 hours, arrive on site within 24 hours.

