CATL

Storing Infinite Energy

Energy Storage System Solutions and Products

Contemporary Amperex Technology Co., Limited

About CATL

2011
Establishment

1.37 billion USD
R&D investment to revenue ratio of 2023 H1

26.3 billion USD
Annual revenue of 2023 H1

CATL is a global leader of new energy innovative technologies, committed to providing premier solutions and services for new energy applications worldwide.

Main Business

Provide EV battery systems and services for green transportation

Cell → Module → Pack

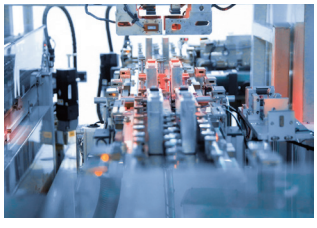
Provide solutions and services for clean energy storage

Rack → Container → Power Station

Lighthouse Factory
World Economic Forum
Ningde Plant (2021),
Yibin Plant (2022)

100 Most Influential Companies
TIME
Companies of 2022

Lifetime Achievement Award
NAATBatt
Dr. Zeng



China Grand Awards for Industry
China Federation of Industrial Economics
(2022)

Development in Three Directions

Utilizing renewable energy generation + energy storage to replace stationary fossil energy

Utilizing EV batteries to replace mobile fossil energy

Utilizing electrification + intelligentization to real ize integrated innovation of market applications

Innovation in Four Dimensions

Innovation in Material and Electrochemistry System

Extreme Manufacturing Innovation

Structure System Innovation

Business Model Innovation

Zero-carbon Factory

SGS
World's First Zero-carbon Factory in New Energy Industry (2022)

Future 50

Fortune
(2019 - 2021)

50 Smartest Companies

MIT Technology Review in China (2019/2021)

Global 500 2023

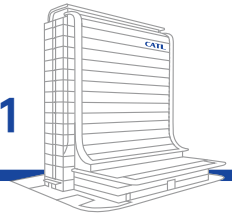
Brand Finance
No. 135 Brand Value $14.7 Billion

Company Milestones

1999

The founding team established ATL, which is the world's leading company in the field of lithium-ion batteries for consumer electronics (CE).

2011



Establishment of CATL, a new endeavor started by the founding team.

Participated in the construction of Zhang-bei energy storage project - the largest wind and solar energy storage and transmission project in the world at the time.

2012

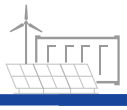
Started strategic partnership with BMW.

2019

Established joint ventures with Geely Auto Group and FAW Group respectively.

Led the establishment of the National Engineering Research Center for Electrochemical Energy Storage Technology.

2020



Established two energy storage joint ventures with the State Grid Integrated Energy Service Group under the State Grid.

Successfully delivered phase Ⅰ of Jinjiang 100 MWh Energy Storage Power Station Project - the largest indoor stationary energy storage system in China.

Established 21C Lab.

2021

Ningde Plant was selected as a member of the Global Lighthouse Network.

Put Yibin and Lingang production bases into operation.

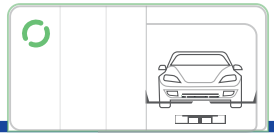
Released its first-generation sodium-ion battery with the world's leading energy density of its kind.

Participated in Europe's largest grid-side battery energy storage power station - Minety Battery Energy Storage System in the UK.

The 220MWh liquid-cooling energy storage project in Texas is connected to the grid, marking the world' s first large-scale application of its kind.

Deployed the Innovation Center and the Future Energy Research Institute in Shanghai.

2022



Ranked No.1 globally in EV battery consumption volume for six consecutive years.

Ranked No.1 globally in BESS battery shipment for two consicutive years.

Launched CTP 3.0 battery "Qilin"

Yibin plant was certified as the world's first zero-carbon battery factory and was selected as a member of the Global Lighthouse Network by the World Economic Forum.

Rolled out its battery swap solution EVOGO featuring modular battery swapping.

2013

Established Xining production base.

Developed EV batteries for the world's largest commercial vehicle manufacturer, Yutong.

2014

Established CATG in Germany, the company's wholly-owned subsidiary.

2015

Acquired Brunp Recycling to start the development in battery recycling and regenerating.

2016

Established the CATL Academician and Specialist Workstation.

2017

Established wholly-owned subsidiaries in France, USA, Canada and Japan.

Established joint ventures with SAIC Motor.

2018

Listed on the Shenzhen Stock Exchange.

Established joint ventures with Dongfeng Motor and GAC Group respectively.

Put Liyang production base into operation.

2023

Established joint ventures with Changan Automobile and FAW Jiefang respectively.

German plant and Zhaoqing plant started production.

Kicked off Indonesia EV Battery Integration Project.

Started to build the second European battery plant in Hungary.

Announced the plan to achieve carbon neutrality in its core operations by 2025 and across the battery value chain by 2035

Launched the condensed battery, enabling electrification of passenger aircrafts with an energy density of up to 500 Wh/kg

Released QIJI Energy, the self-developed all-in-one heavy-duty truck chassis battery swap solution

Zhaoqing plant was certified as zero-carbon battery factory

*Data source: SNE Research

Global Locations

Headquarters

Ningde, Fujian

5 R&D Centers

China | Ningde, Fujian / Liyang, Jiangsu / Shanghai

Xiamen, Fujian

Germany | Munich

Erfurt Production Base
Erfurt

Xining Production Base
Xining

Luoyang Production Base
Luoyang

Debrecen Production Base
Debrecen

Contemporary Amperex
Technology GmbH
Munich

Contemporary Amperex
Technology France
Paris

Dongfeng Amperex (Wuhan)
Battery System Co., Ltd.
Wuhan

Yibin Production Base
Yibin

CATL-GEELY
EV Battery Co., Ltd.
Yibin

Guiyang Production Base
Guiyang

Zhaoqing Production Base
Zhaoqing

Guangdong Brunp
Recycling Foshan
Technology Co., Ltd.

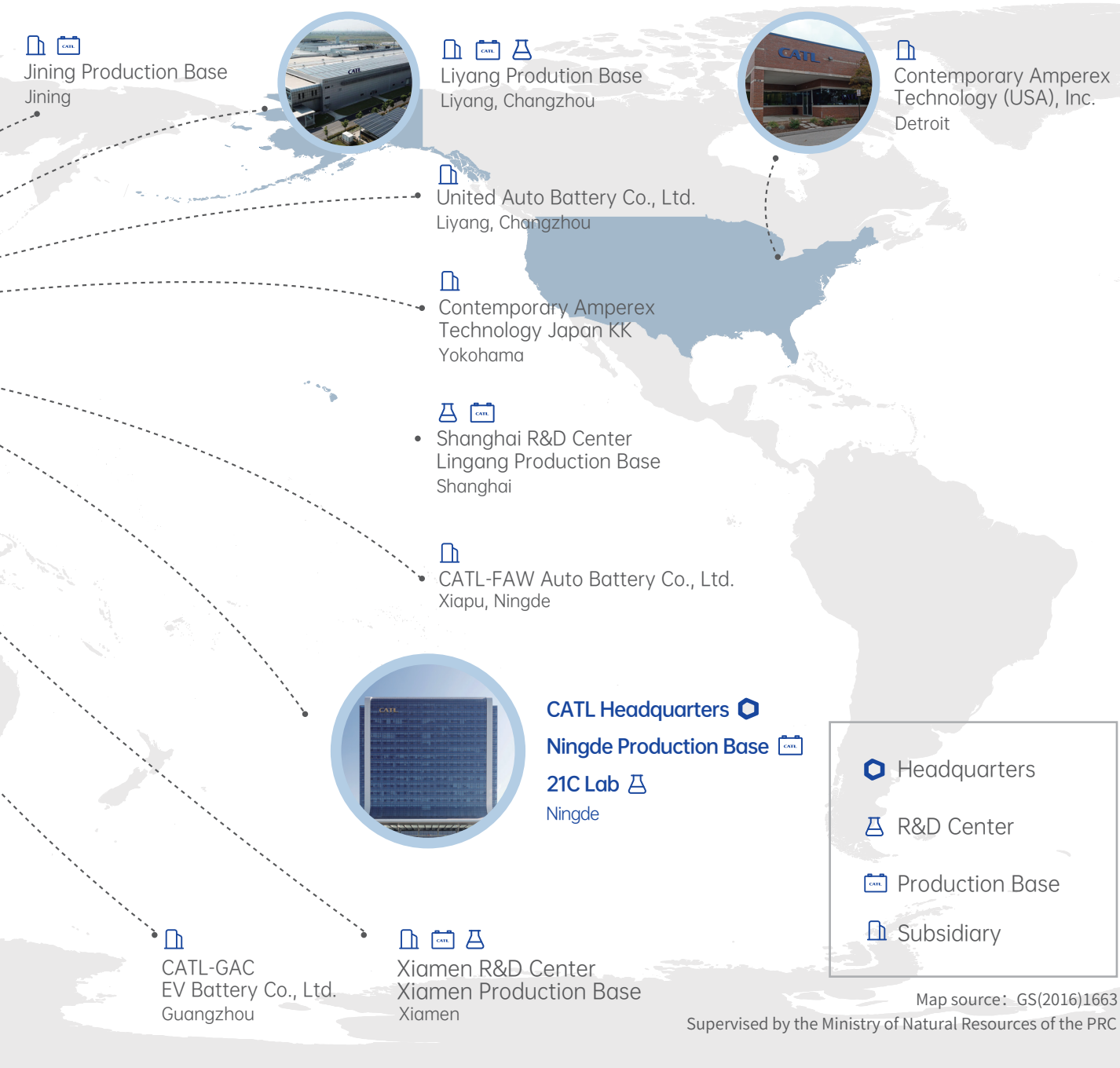
Yichun Production Base
Yichun

13 Production Bases

China | Ningde , Fujian / Xining, Qinghai / Liyang, Jiangsu / Yibin, Sichuan / Zhaoqing, Guangdong
Shanghai / Yichun, Jiangxi / Xiamen, Fujian / Guiyang, Guizhou / Jining, Shandong / Luoyang, Henan

Germany | Erfurt

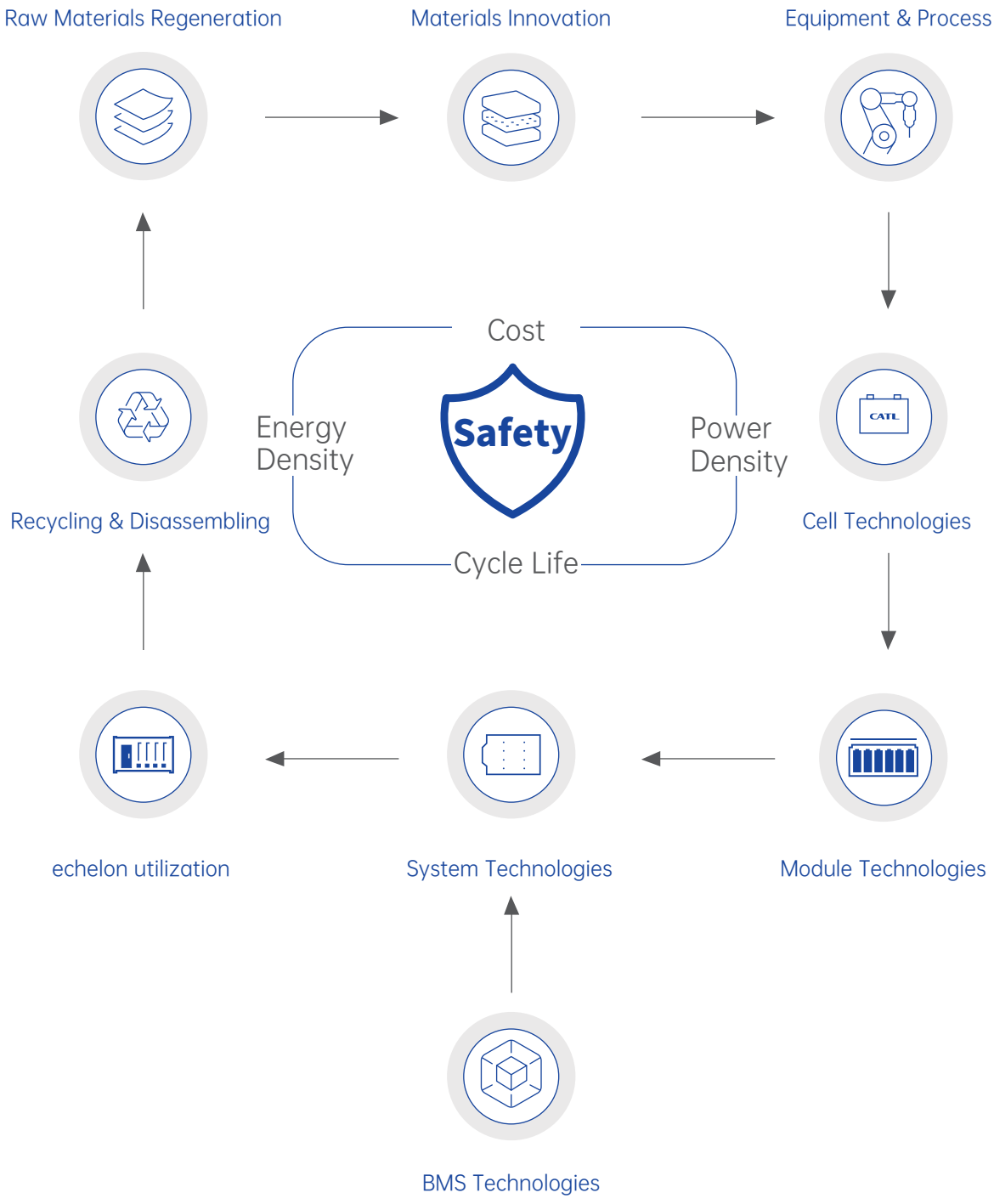
Hungary | Debrecen



Map source：GS(2016)1663
Supervised by the Ministry of Natural Resources of the PRC

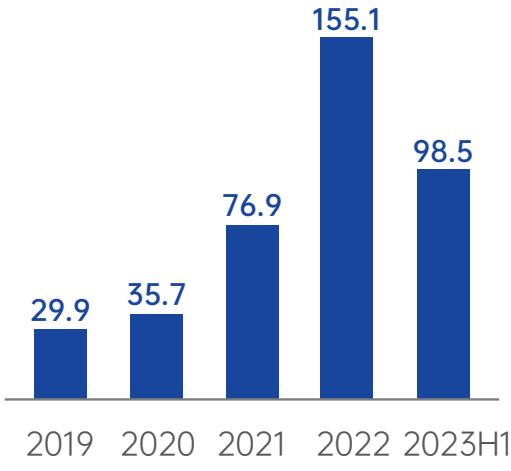
R&D Strength

R&D Scope



R&D Investment and Talent

Annual R&D investment (M USD)



17,998
R&D Talent

283 Doctors

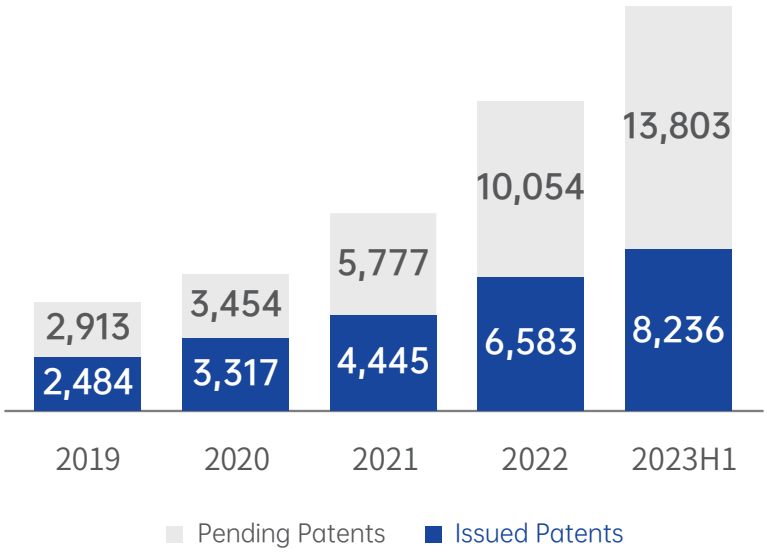
2,972 Masters

21C Innovation Lab

National Engineering Research Center for Electrochemical Energy Storage Technology

Key Laboratory of Lithium-ion Battery Enterprise of Fujian Province

Rapidly Increasing Number of Patents



Led or participated in the formulation or revision of **110+** national and international standards

*Data : CATL's 2023H1 annual report

Technology Highlights

5

Technology Highlights

Substantial Safety

Aircraft-grade safety and reliability

CATL ensures safety and reliability in real scenarios with well selected and designed raw materials, multi-level protective structures, automated manufacturing processes, comprehensive testing and verification, 24-h monitoring, and big data-based early warning.

Long Service Life

Life up to 12,000 cycles

CATL has upgraded key components such as the cathodes, anodes, electrolytes, and pole pieces of the battery to slow down the battery capacity loss, extend the battery life, and reduce LCOS throughout the battery life cycle.

High Energy Density

Volumetric energy density higher than 350 Wh/L

Advanced high-energy density materials and original CTP high-efficiency group technology enable the container system to achieve a floor space energy density of over 250 kWh/m^2.

Intelligent Temperature Control

Automatic temperature adjustment to cope with cold and heat

The intelligent thermal management system effectively avoids the bucket effect caused by the series connection of cells, guarantees the attenuation of life consistent of each cell to the greatest extent, ensures a temperature difference of cells in the container within 5℃, and improves the discharge capacity of the battery system. The integrated liquid-cooled units selected are featured in adaptive adjustment of the operating state, reducing the auxiliary loss by 30%.

Intelligent Management

24/7 protection

The BMS monitors the battery health status and identifies unhealthy batteries in advance. Intelligent internal short-circuit detection with early warning of battery fire hazards can reduce the probability of relevant fires by more than 90%. The online early warning system ensures the safe operation of battery throughout the life cycle.

Quality Assurance

Extreme manufacturing

Defect rate of a single cell reduced to 1/1,000,000,000

Extremely strict processes

- Strict shape and performance control
- Strong coupling of multiple fields
- Size control from nanometer level to kilometer level

Extremely fast production speed

- Produce a cell in **1.7 s** on average
- Produce a module in **20 s**

Extremely high quality requirements

- 6,800+ quality control points
- More than **10,000 items** of traceability data for a battery on average
- **100+ tests** on each cell before delivery to warehouse

Comprehensive testing and verification

100 items
of material testing and analysis capabilities

Comprehensive system of standards,
covering R&D, production and manufacturing fields, with
CATL's leading and involvement in developing a number
of national, industrial and company-level standards

World-leading characterization technology

- Characterization and analysis of single-particle microelectrodes
- High-precision in-situ expansion analysis
- UHPC analysis
- Electrochemical simulation and material simulation analysis

Laboratory testing capabilities
Material atoms, molecules, battery cells and devices, including crystal structure, element composition, chromatography, mass spectrometry, micro-area surface structure, thermal analysis, electrochemical analysis and many other fields

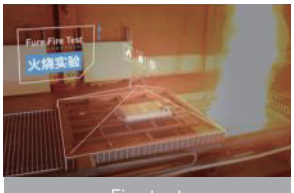
400+ product tests

Multi-level: materials, cells, modules, BMS, packs
Multi-dimensional: mechanism, electrical performance, safety and reliability, etc.
Standards: GB/T, ISO, IEC, UN, ECE, etc., with complete company-level standards developed

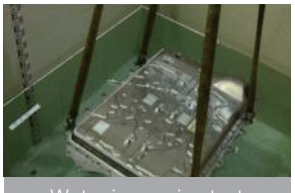

High-pressure water spray test

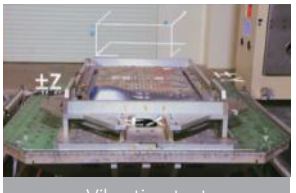

Impact test


Crush test



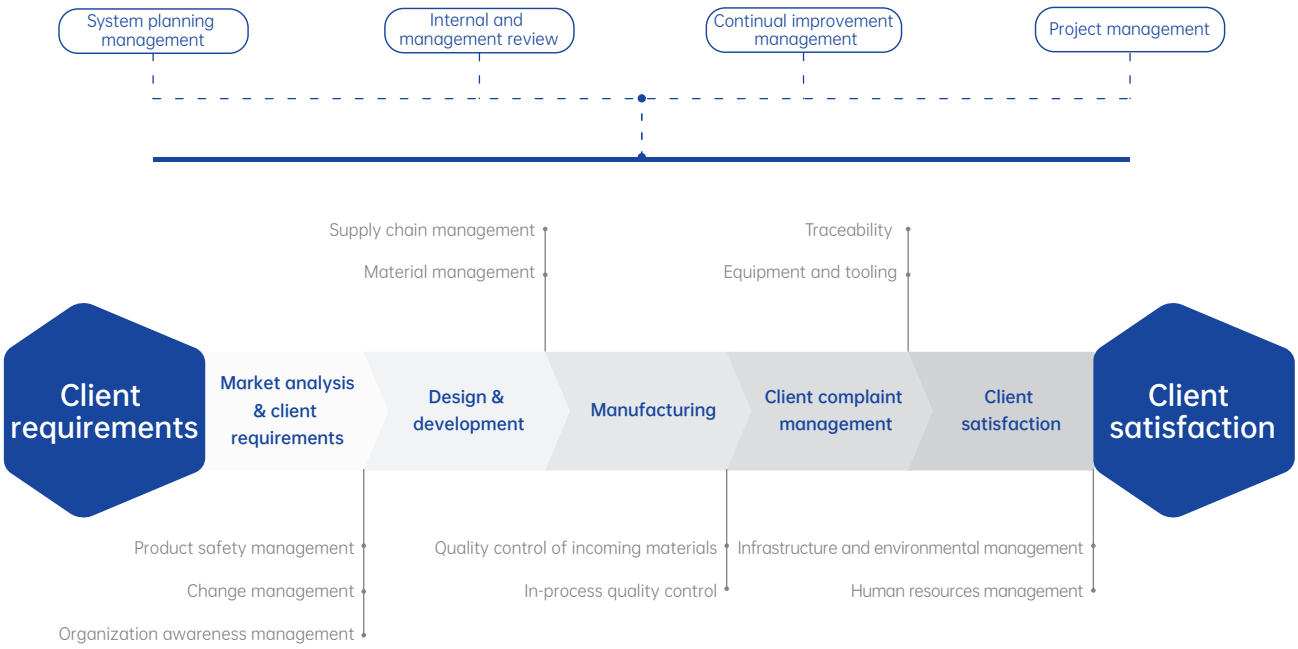
Fire test


Water immersion test



Vibration test

Quality management system



Quality policy

Providing clients with the perfect quality beyond expectations is our unremitting pursuit.

IATF16949 ISO9001

Energy Storage Station of the Luneng Haixi Complementary Multi-energy Demonstration Project (50MW/100MWh)

Energy Storage Solutions

Since energy storage is a key part of energy transition and power transformation, CATL has always been committed to providing first-class energy storage solutions to the world. CATL has developed a safe, efficient, and economical electrochemical energy storage system that is widely adaptive to the fields of power generation, power transmission and distribution, and power consumption, helping to optimize the energy structure, enhance the safety of the power system, and reduce the cost of energy use.

CATL Cell Solutions

Cell

280Ah

Basic Parameters		
Capacity [Ah]		280
Charge/discharge rate [P]		0.5
Cycle life [25℃, @80%SOH, 70%SOH]	6,000	8,000
Dimensions [L*W*H] [mm]		173.9*71.7*207.2

Testing and certification

IEC 62619 | UL 1973 | UL 9540A | UN 38.3

Cell

280Ah

Basic Parameters		
Capacity [Ah]		280
Charge/discharge rate [P]		1
Cycle life [25℃, @80%SOH, 70%SOH]	5,000	7,000
Dimensions [L*W*H] [mm]		173.9*71.7*207.2

Testing and certification

IEC 62619 | IEC 62133 | UL1642 | UN 38.3

Cell

306Ah

Basic Parameters		
Capacity [Ah]		306
Charge/discharge rate [P]		0.5
Cycle life [25℃, @80%SOH, 70%SOH]	8,000	10,000
Dimensions [L*W*H] [mm]		173.9*71.7*207.2

Testing and certification

IEC 62619 | UL 1973 | UL 9540A | UN 38.3

Cell

285Ah

Basic Parameters		
Capacity [Ah]		285
Charge/discharge rate [P]		1
Cycle life [25℃, @80%SOH, 70%SOH]	7,000	9,000
Dimensions [L*W*H] [mm]		173.9*71.7*207.2

Testing and certification

IEC 62619 | IEC 62133 | UL1642 | UN 38.3

Liquid Cooling Solution

EnerC Plus

Containerized Liquid Cooling Battery System

High level of safety

- LFP batteries with high thermal stability
- Design of multi-level short circuit protection, C-box breaking capacity reaches 250kA
- Support Explosion-Proof Fan with ATEX certification, Optional Dry Pipe
- Fire protection system satisfies with multiple security certifications, such as NFPA855
- Protection level of IP55 to meet the requirements of outdoor applications

Long service life

- Available for integration with CATL's advanced technologies (e.g. optional cell with super-long cycling up to 12,000 cycles)
- Integrated modular high-efficiency redundant liquid-cooling system, with the temperature difference in the container limited to 5℃
- Resistance up to C5 corrosion level, with 20-year reliability

High integration

- Single container projected area energy density reaches 252kWh/m² (for 280Ah) and 275kWh/m² (for 306Ah)
- Non-walk-in/modular design supports back-to-back installation, saving the floor space by 20% (compared with EnerC)
- Modular design for the 1,500V system
  Separate arrangement of electrical room and battery room for convenient maintenance

Basic Parameters		
Configuration	10P416S	
Cell capacity [Ah]	280	306
Rated voltage [V]	1331.2	
Rated energy [MWh]	3.72	4.07
IP Rating	IP55	
Product weight [T]	35	36
Dimensions [L*W*H] [mm]	6058*2438*2896	

Testing and certification

IEC 62619 | UL 1973 | UL 9540A | IEC 62477-1 | UN38.3

EnerOne Plus

Outdoor Liquid Cooling Battery System

High level of safety

- LFP batteries with high thermal stability, module /rack level UL9540A.
- Protection level of IP56 to meet the requirements of outdoor applications
- Resistance up to C5 corrosion level, with 20-year reliability
- Alternative fire suppression system for different markets.
- Deflagration venting and dry pipe are optional. NFPA68 compliant.

Long service life

- Available for integration with CATL's advanced technologies (e.g. optional cell with super-long cycling up to 12,000 cycles)
- Integrated frequency conversion liquid-cooling system, with cell temperature difference limited to 3℃, and a 33% increase of life expectancy

High integration

- Modular design, compatible with 600 - 1,500V system
- Separate water cooling system for worry-free cooling
- Modular design with a high energy density, saving the floor space by 50%
- Transportation after assembly, reducing on-site installation costs and commissioning time
- Alternative foot margin installation
- Alternative cable outlet position

Basic Parameters		
Configuration	1P416S	
Cell capacity [Ah]	285	306
Rated voltage [V]	1331.2	
Rated energy [kWh]	379.4	407.3
IP Rating	IP66	
Product weight [kg]	3515	3650
Dimensions [L*W*H] [mm]	1344.1*1390*2343.5	

Testing and certification

IEC 62619 | UL 1973 | UL 9540A | IEC 62477-1

Solar-Plus-Storage Solution With Zero Auxiliary Power Supply

Responsible for its own "gains and losses" with its independent system

Trailblazing energy management solution with independent LEMS

Coordinated operation of PV and BESS system

Long service life cells featuring a cycle life of 15.000 cycles, ensuring safe operation withhigh temperoture tolerance

Independent constant temperature, compatible with all weathers

Self-heating technology, free from cooling systems or external duxillary power supply

EnerP

Energy Storage Battery System

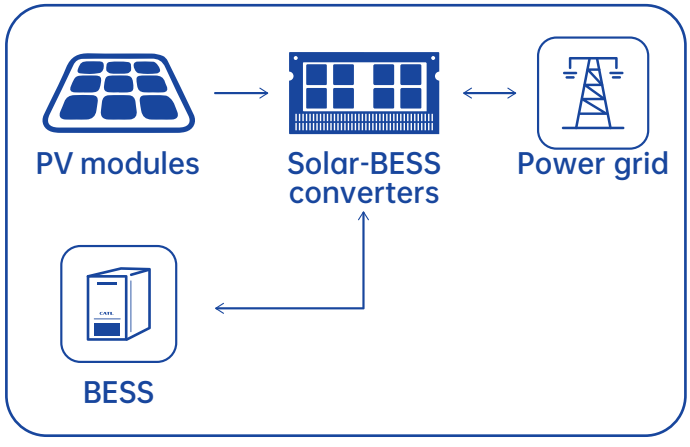
System functions	
Energy storage coupling	DC bus terminal
Energy management system	integrated LEMS
Power Control Accuracy	>99%
Response speed of control	<20ms

Photovoltaic storage converter	
Rated AC power	output: 320kW input: 100kW
Rated grid voltage	800V, 3/PE
Grid voltage range	640V-920V
Rated grid frequency	50Hz/60Hz
Maximum efficiency	>99%

Photovoltaic input	
Maximum input voltage	1500V
Maximum capacity ratio	>2
Number of MPPTs	15(OR 18. 21)
MPPT maximum input curret	40A

Energy storage input	
Maximum number of input	3
Capacity of single rack	95kWh

Energay storage rack	
Cell	95Ah LFP cell with high temperature tolerance
Thermal management	Natural cooling,pulse heating
Rated charge and discharge power	48kW
Protection level of battery rack	IP66

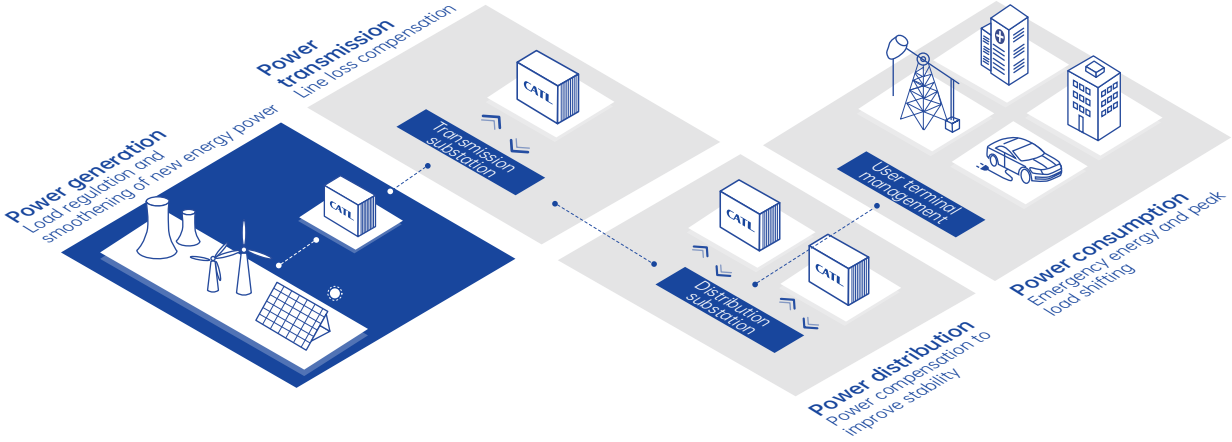


10 times ↑
Millisecond-level response

10% ↑
Charging-discharging efficiency

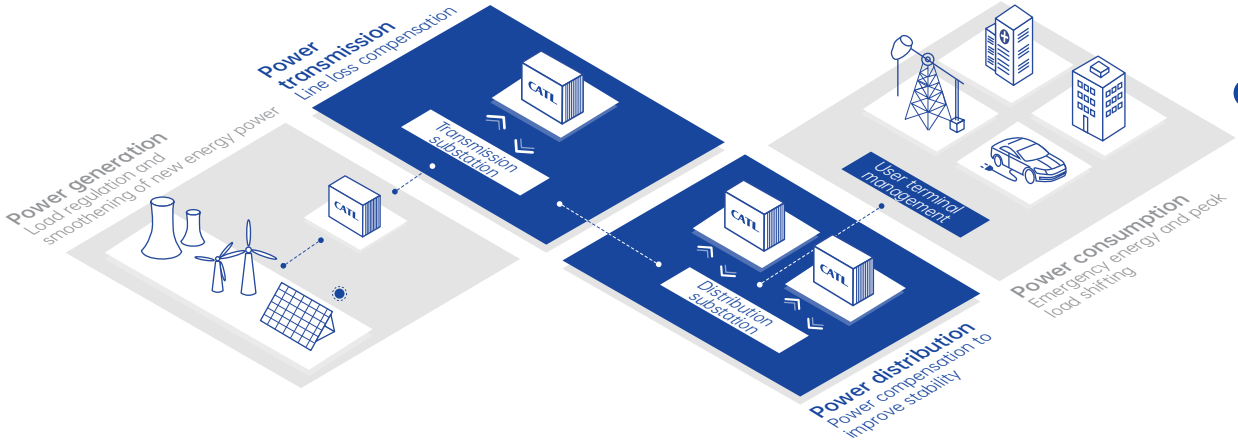
Energy Storage on Power Generation

The energy storage system can realize storage and output management on the power generation. It is a system combining the electrochemical energy storage technology and the renewable energy power generation technology. With the good consistency of cells and the strong computing ability of the battery management system (BMS), CATL's solution helps, on the power generation, restore the stability of the power grid, optimize the energy output curves of power generation and reduce waste of wind and photovoltaic energy, and provides functions such as system inertia, frequency and peak regulation, thus increasing the proportion of renewable energy power generation and optimizing the energy structure.



Energy Storage on Power Transmission and Distribution

The energy storage system enables intelligent load management on the power transmission and distribution, and makes timely peak and frequency regulation based on grid loads. Featuring capacity expansion and backup power supply, CATL's electrochemical energy storage system can help utilize more renewable energy on the power transmission and distribution to ensure safe, stable, efficient and low-cost operation of the power grid.



Benefits for clients

· Improve the utilization proportion of new energy power generation channels and improve access capacity for power generation
· Reduce waste of wind and photovoltaic energy, and effectively handle the energy utilization
· Improve the power quality of PV power stations
· Enhance output characteristics of PV power stations

Features

· High-power batteries in modular design, with safe and fast charge and discharge
· Cells with square aluminum shells, with excellent thermal performance, long life and high level of safety
· Operating automatically based on the state of the wind-solar plant EMS and according to the dispatching plans to improve grid-connection convenience.
· Quick response of the battery system to frequency regulation command

Benefits for clients

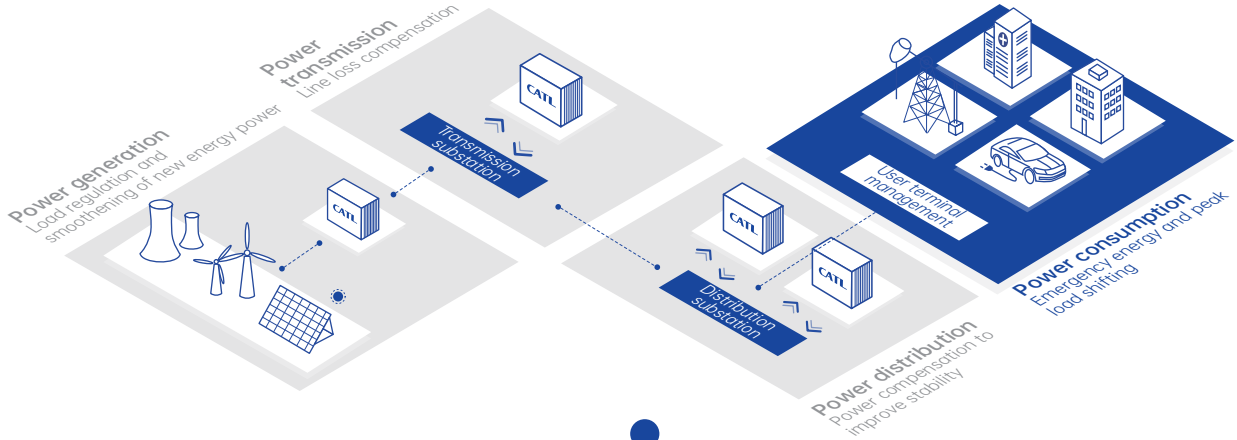
· Undertake the government's deep frequency regulation instructions for the power grid to obtain benefits
· Abide by regulatory requirements for electricity to avoid fines and receive rewards
· Extend the life of thermal power units, reduce the fault rate, and reduce the labor intensity of workers
· Assist in the stable operation of the power grid and reduce line losses

CATL's Advantages

· Industry-leading LFP battery manufacturing technolgy, with high level of safety
· Availability of high rate charge and discharge, with multiple large projects constructed under stable operation
· Long cycle life and long project period of benefits
· Fully automated production lines, with high level of safety and reliability

Energy Storage on Power Consumption

The energy storage system enables power users to carry out peak shifting & valley filling and stable power quality management. CATL's electrochemical energy storage products have been successfully applied in large-scale industrial and commercial projects and residential fields, with the applications extended to emerging fields such as backup power supply for communication base stations, UPS, micro grids for islands, and intelligent BESS charging stations, which has enabled and secured the power supply, reduced social cost of power consumption, thus maximizing energy efficiency to achieve social and economic benifits.



Benefits for clients

· Provide sufficient backup power for peak shifting and valley filling, ensure power supply, and reduce costs and increase efficiency
· Explore the peak-to-valley price arbitrage model
· Address issues of power grid capacity expansion and new energy vehicle charging

Features

· Peak shifting and valley filling to reduce electricity expenses
· UPS to guarantee power supply
· Real-time dispatching for intelligent life
· Diversified energy storage applications, covering all aspects of power consumption

CATL's Advantages

· Self-developed high-performance LFP batteries that are safe, reliable, and long-life
· Unattended operation, with the operation of the energy storage and charging station automatically controlled by the EMS in the power station
· Fast charging technology & leading BMS technology

Applications of Electrochemical Energy Storage Solutions

CATL Energy Storage Application Cases

Power Generation

Luneng National Energy Storage Power Station Demonstration Project

Scale: 50MW/100MWh
Functions: virtual synchronization-based control, tracking of power generation plan, and support of second frequency regulation

Power Generation

National wind and solar energy storage and transmission demonstration project

Scale: 4MW/16MWh
Functions: smoothening of wind and solar power generation, tracking of planned power generation, peak load shifting, frequency regulation in the grid system

Power Generation

New energy storage power station in Southern California, the U.S.

Scale: 70MW/70MWh
Functions: energy integration, frequency regulation in the system, peak-to-valley price arbitrage

Power Generation

Minety Battery Storage Project in the U.K.

Scale: 99.8MW/99.8MWh
Functions: peak and frequency regulation in the power grid, black start, and capacity market

CATL Energy Storage Application Cases

Power Transmission & Distribution

Jinjiang 100MWh Energy Storage Power Station

Scale: 30MW/108MWh

Functions: new energy utilization, peak loading shifting, and frequency regulation

Power Transmission & Distribution

Guantang Energy Storage Project, Huai'an

Scale: 15MW/26MWh
Functions: peak load regulation and frequency regulation of 110KV transformer substations on the power distribution

Power Transmission & Distribution

Zhenjiang Xinba Power Station, Jiangsu

Scale: 10MW/20MWh
Functions: peak load regulation of 110KV transformer substations on the power distribution

CATL Energy Storage Application Cases

Industrial & Commercial Energy Storage

ADN Comprehensive Demonstration Project of Smart Grid Application Demonstration Area in Suzhou Industrial Park

Scale: 1.5MW/3MWh
Functions: peak load shifting and backup power supply

Industrial & Commercial Energy Storage

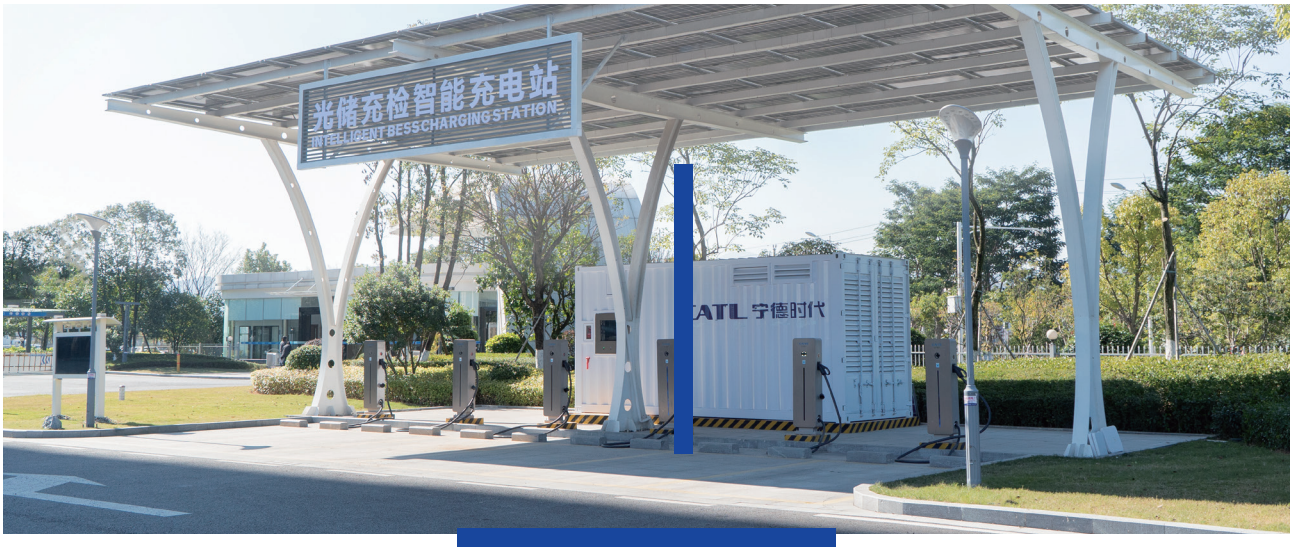
Energy Storage Power Station in Zhangjiagang Cement Plant

Scale: 8MW/32MWh
Function: peak-to-valley price arbitrage

Energy Storage for Emergency Power Supply

Mobile energy storage vehicle

Scale: 250kW/500kWh
Functions: emergency power supply and uninterrupted power supply for critical loads; flexible applications for multiple scenarios, with access available anytime and anywhere



Smart Micro-Grid Energy Storage

Intelligent BESS Charging Station

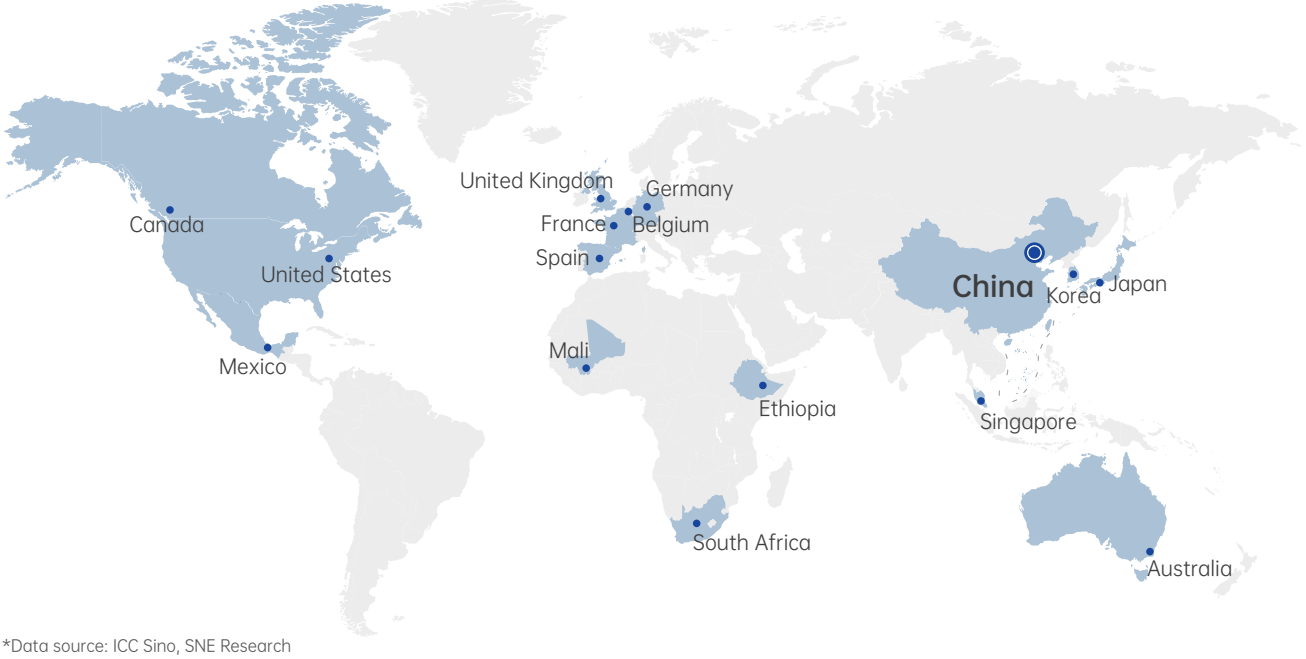
Scale: 250kW/500kWh
Functions: fast charging of new energy vehicles; online battery inspection; energy storage, cost reduction and efficiency increase; V2G, income increase; integration of renewable energy

Market Performance

Ranked No.1 globally in BESS battery shipment for two consecutive years.

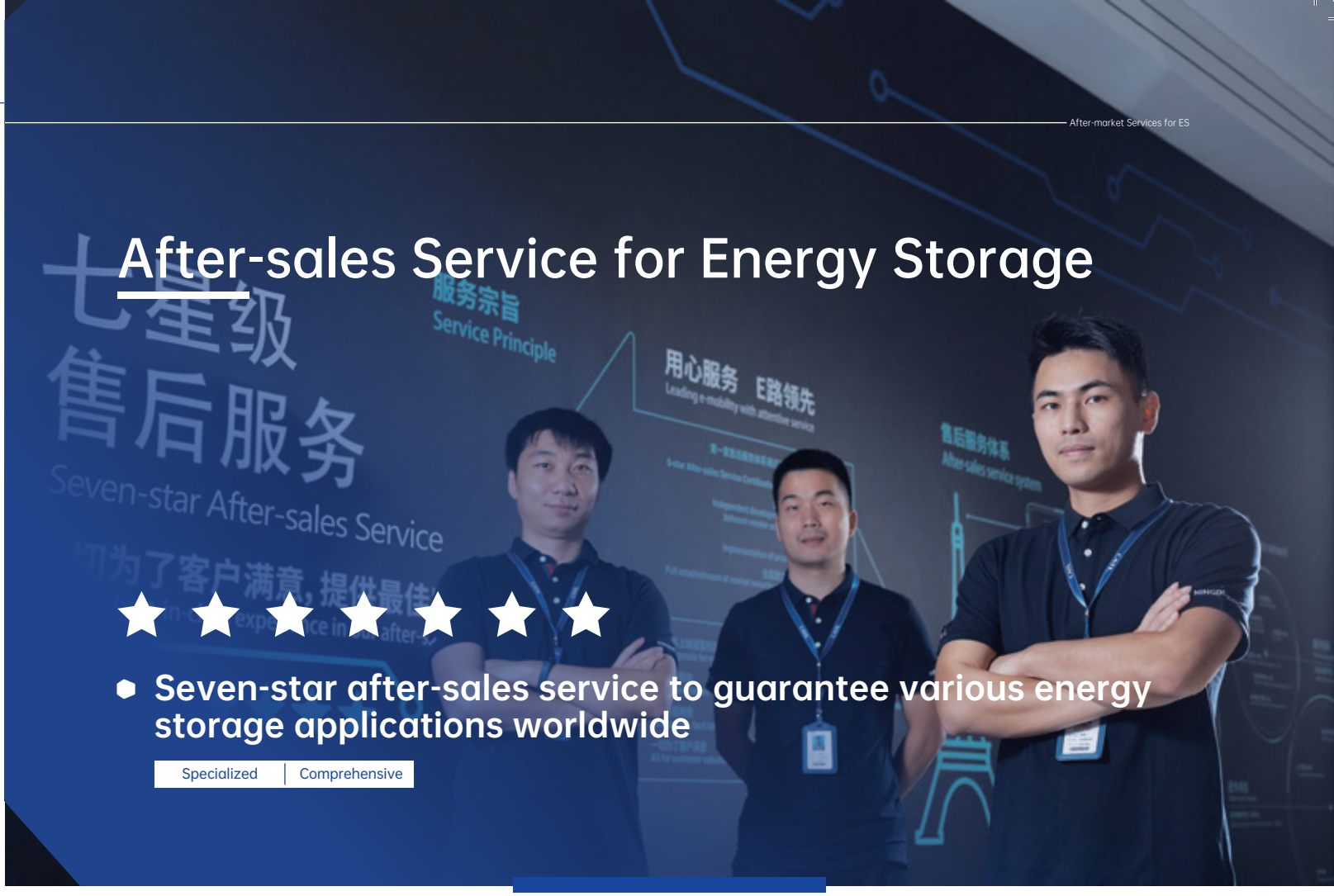
CATL's energy storage system solutions and products have been used in major energy storage markets such as the United States, China, the United Kingdom, Germany, Australia, rendering energy storage services such as clean energy utilization, auxiliary services for grids, peak-load shifting and valley filling.

Since its establishment, CATL has delivered 200+ large-scale energy storage projects worldwide. CATL hopes to provide safe and innovative energy storage solutions to improve the stability and reliability of renewable energy generation, increase the proportion of renewable energy utilization, optimize the energy structure, and help achieve the goal of carbon neutrality.



*Data source: ICC Sino, SNE Research

After-sales Service for Energy Storage



- **Seven-star after-sales service to guarantee various energy storage applications worldwide**

Specialized | Comprehensive

China

200+
Cities with service outlets

350+
Service outlets

*Data as of September 2021

Overseas

Key outlets

Europe (Iceland, United Kingdom, France, Netherlands, Bulgaria and Germany), Americas (United States, Mexico, Colombia, Chile, Uruguay and Brazil), Asia (Singapore, Kazakhstan, Indonesia, Israel, Pakistan and Nepal), Oceania (Australia and New Zealand)

System improvement

Service outlets + logistics network + central warehouses for spare parts (China, Europe and North America) + recycling of used parts

System services

On-site maintenance + empowered self-maintenance + client training + remote diagnosis consultation + spare parts/tool support + free regular inspection during the warranty period

Disclaimer:

Contemporary Amperex Technology Co., Ltd. (CATL) has made this Brochure as comprehensive and accurate as possible on the basis of the existing information, but reserves the right to modify the data, parameters and other information without further notice! CATL reserves the right of final interpretation of this Brochure.

Contemporary Amperex Technology Co., Ltd.

Address: No. 2, Xingang Road, Zhangwan Town, Jiaocheng District, Ningde, Fujian

Website: www.catl.com

Tel: +86 0593 2583668

CATL – ESS Brochure 202308

Official Website

Official WeChat