Contemporary Amperex Technology Co., Limited

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CATL Brochure September 2022

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our official website

CATL

Commercial Application Solutions

Earn more with each mile

Contemporary Amperex Technology Co., Limited

About CATL

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

Company Philosophy

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 realize integrated innovation of market applications

Innovation in Four Dimensions

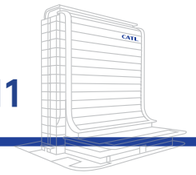
- Innovation in Material and Electrochemistry System
- Extreme Manufacturing Innovation
- Structure System Innovation
- Business Model Innovation

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 Zhangbei 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.

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.

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

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

Selected as a member of the Global Lighthouse Network.

Put Yibin and Lingang production bases into operation.

Established strategic cooperation with China Huadian Corporation, State Power Investment Corporation, China Three Gorges Corporation, China Energy, Energy China and other companies.

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.

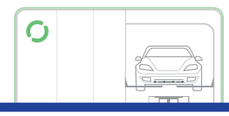
Released its first-generation sodium-ion battery with the world's leading energy density of its kind.

Established a joint lab with the Institute of Physics, Chinese Academy of Sciences.

Co-founded the CATL Xiamen Institute of New Energy with Xiamen University.

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

2022



Yibin production base was certified as the world's first zero-carbon battery factory.

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

Launched CTP 3.0 battery "Qilin."

Global Locations

Headquarters

Ningde, Fujian

5 R&D Centers

China | Ningde, Fujian / Liyang, Jiangsu / Shanghai
Xiamen, Fujian

Germany | Munich

12 Production Bases

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

Germany | Erfurt

Hungary | Debrecen

Erfurt Production Base
Erfurt

Xining Production Base
Xining

Jining Production Base
Jining

Liyang Prodution Base
Liyang, Changzhou

Contemporary Amperex
Technology (USA), Inc.
Detroit

Contemporary Amperex
Technology GmbH
Munich

Debrecen Production Base
Debrecen

United Auto Battery Co., Ltd.
Liyang, Changzhou

Contemporary Amperex
Technology France
Paris

Contemporary Amperex
Technology Japan KK
Yokohama

Shanghai R&D Center
Lingang Production Base
Shanghai

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

CATL-FAW Auto Battery Co., Ltd.
Xiapu, Ningde

Yibin Production Base
Yibin

CATL Headquarters
Ningde Production Base
21C Lab
Ningde

CATL-GEELY
EV Battery Co., Ltd.
Yibin

Guiyang Production Base
Guiyang

Yichun Production Base
Yichun

Zhaoqing Production Base
Zhaoqing

Guangdong Brunp Recycling
Technology Co., Ltd.
Foshan

CATL-GAC
EV Battery Co., Ltd.
Guangzhou

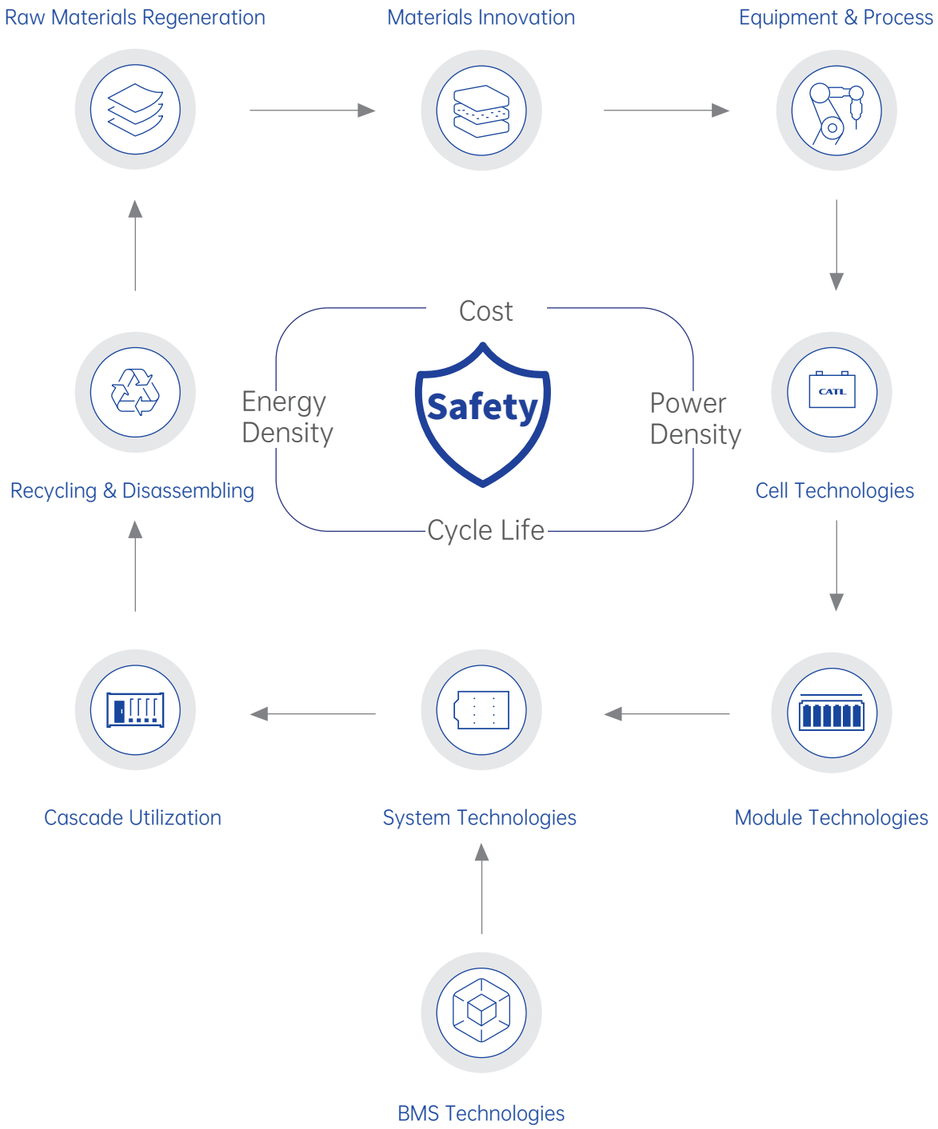
Xiamen R&D Center
Xiamen Production Base
Xiamen

Headquarters
R&D Center
Production Base
Subsidiary

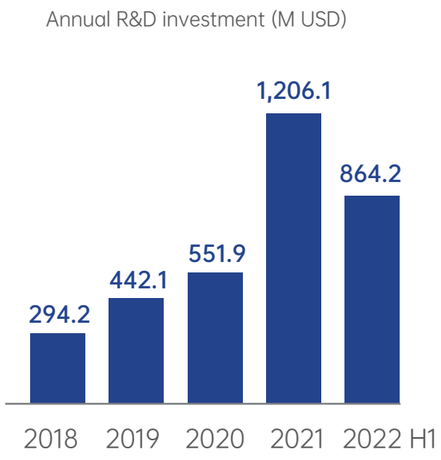
Map source：GS(2016)1663
Supervised by the Ministry of Natural Resources of the PRC

R&D Strength

R&D Scope



R&D Investment and Talents



12,132 R&D Talent

193 Doctors

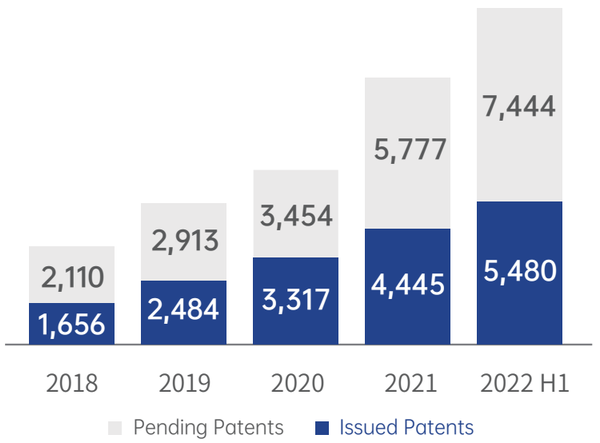
2,233 Masters

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 national and international standards **70+**

*Data : CATL's 2022 semi-annual report

Material Characterization Analysis & Product Test and Validation

Capable of performing **100** analyses of material characterization

CATL has led and contributed to setting numerous national, industrial and corporate standards.

Leading technologies

- Single particle micro-electrode analysis
- In-situ swelling analysis
- Ultra-high precision charger analysis
- Electrochemical & material simulation platforms

Test & analysis capabilities

Large-scale and multifunctional characterization capability from atomic/molecular level to device/battery level, including element, chromatography, mass spectrometry, thermal, surface structure and electrochemical analysis. CATL has created a comprehensive standard testing manual for material, process and battery design.

Multi-level: material, cell, module, BMS, pack.
Multi-dimension: mechanism, safety & reliability, electrical performance, etc.
Standards: cover GB/T, ISO, IEC, UN, ECE, which also enable the establishment of a complete corporate standard in the company.

400+ Product testing & validation items

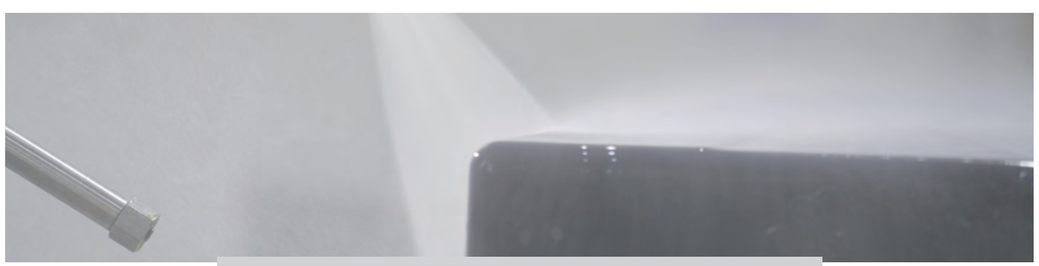
Mechanical Shock Test

Crush Test

External Fire Test

Immersion Test

Vibration Test



IP Test

Extreme Green Manufacturing

The first battery plant recognized as a member of the Global Lighthouse Network by the World Economic Forum

Self-adaptive Production Lines

We integrate cloud computing and artificial intelligence into the manufacturing processes, thus making the production lines self-adaptive

↓42%
production cost

↑50%
takt time

Higher Quality

Our AI defect detection system has a higher consistency than humans

PPM→PPB
safety performance control level

6σ→9σ
defect rate level

Greener Manufac-turing Process

The smart energy management system optimizes the energy consumption of our equipment through real time monitoring of various energy data

↓57%
carbon emissions

↓10%
annual unit energy consumption

Full Lifecycle Data Tracing

Digital factory with high efficiency and high level of safety
Precise product optimization through tracking from the raw material to recycling

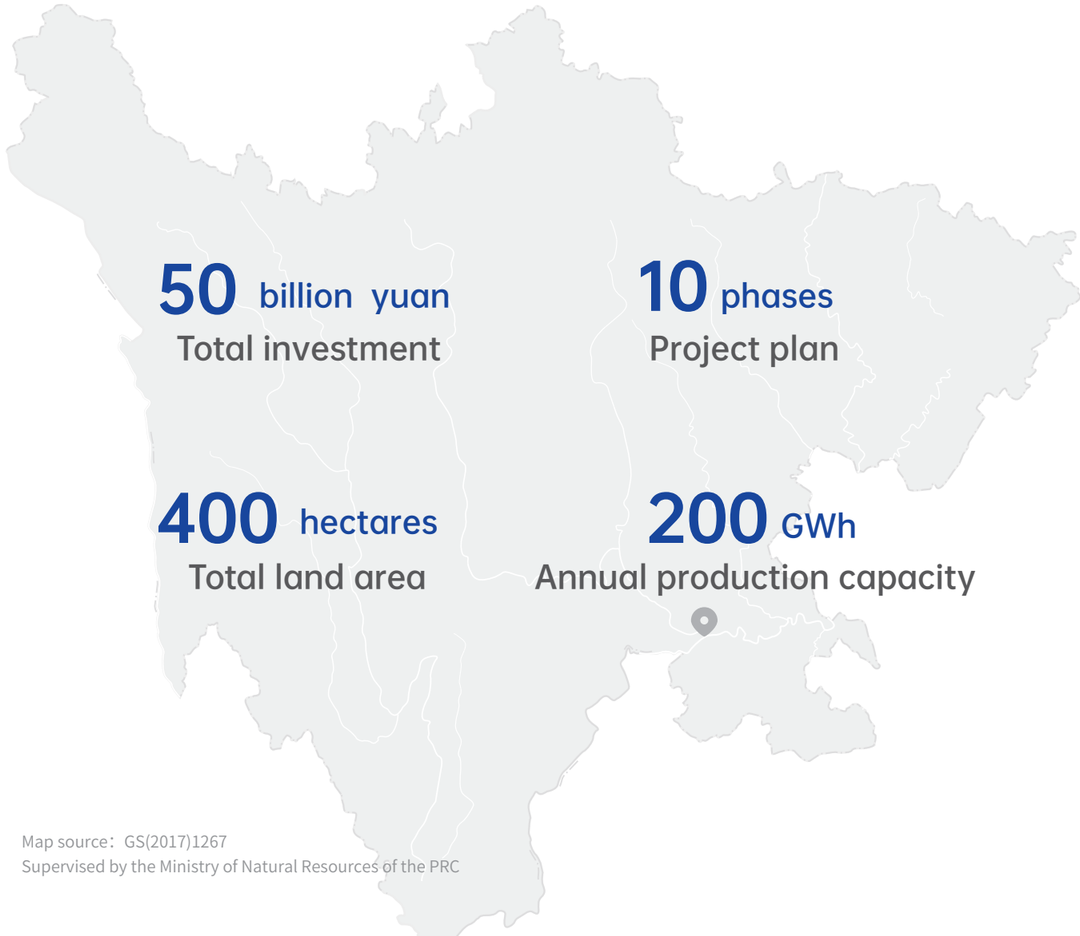
1 trillion
data assets accumulated

20 years
traceable big data

The World's First Certified Zero-Carbon Battery Factory

Overview

In March 2022，SGS awarded Sichuan Contemporary Amperex Technology Limited(CATL-SC), a wholly-owned subsidiary of Contemporary Amperex Technology CO., Limited(CATL), the PAS 2060 certification on carbon neutrality, making the plant the world's first zero-carbon battery factory.
With a total investment of over RMB 50 billion (about USD 7.58 billion), CATL-SC was established in October 2019. It has been planned that the project will be executed in 10 phases and cover a lot area of over 6,000 mu (400 hectares). After the whole project is completed, its annual production capacity will exceed 200 GWh and it will become a world leading lithium-ion battery production base.



50 billion yuan
Total investment

10 phases
Project plan

400 hectares
Total land area

200 GWh
Annual production capacity

Map source：GS(2017)1267
Supervised by the Ministry of Natural Resources of the PRC

Market Performance

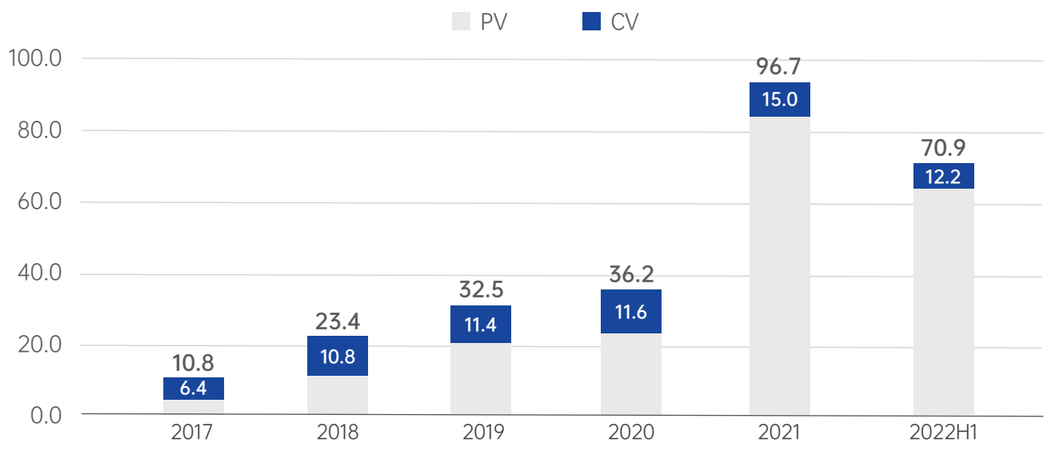
EV Market

SNE Research: CATL ranked No.1 globally in EV battery consumption volume for five consecutive years.

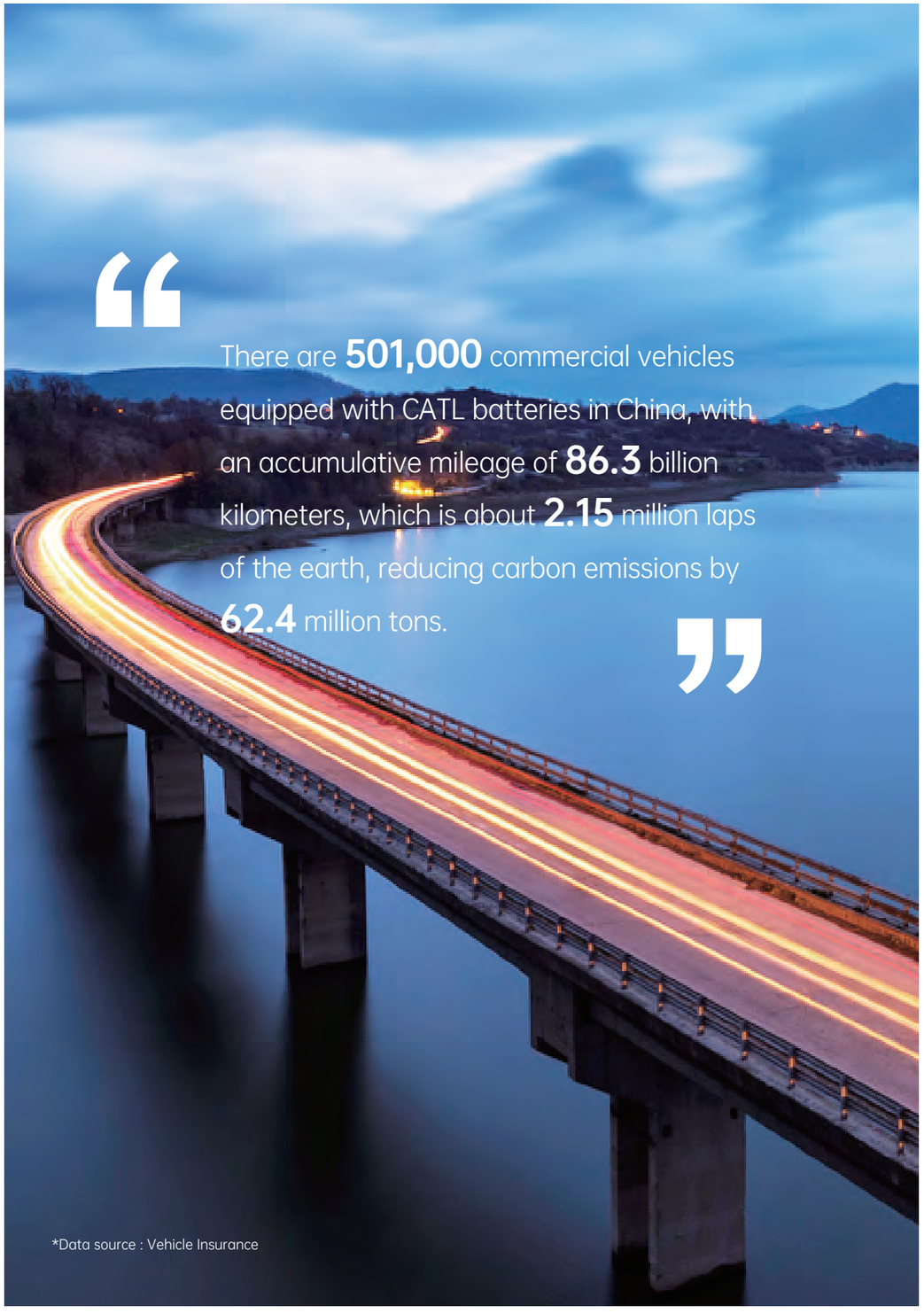
Global	Chinese Mainland	Overseas
5.06M	**346**	**56**
EVs in operation with CATL batteries	Cities	Countries and regions

*Data source: SNE Research , data as of June 30,2022
Cities include prefecture-level city, municipality, region, autonomous prefecture and league

CATL's Global EV Battery Consumption Volume (GWh)



*Data source: SNE Research



Comprehensive Performance

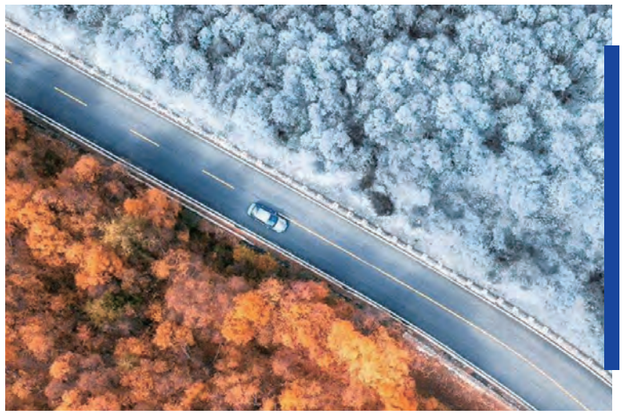
An intelligent way to the green future

Standing the test of time

Through a futuristic tech combination in software and hardware, and the material mechanism of self and external maintenance, CATL batteries achieve more cycles, longer service life, better performance and greater economic benefits.

Confidence comes with reliability

Safety guarantees in design, testing, materials, production and processing procedures make every battery safe, reliable and durable.



Easy drive in cold and heat

Whether in high temperatures, low temperatures or on rainy days, CATL can provide you with comprehensive protection.

Services beyond expectations

With rapid response standards and a global after-sales network, CATL provides customers with high-quality after-sales services.

Smart, instant feedback

The intelligent battery management system makes the battery safer, the system more efficient and your travel experience more comfortable.

Cell Solutions

228Ah Cell

Product Type	High Energy Density
Capacity(Ah)	228
Chemistry	LFP
Dimensions (L*W*H, mm)	53.7×173.9×204.6
Weight (kg)	4.12
Energy Density (Wh/kg)	**178**
Cycle Life (25℃, 100%DOD)	4000
Operating Temperature (℃)	-35~65
Certification	UN 38.3、IEC 62619、IEC 62660

- Compacted LFP chemistry and lightweight structure **significantly improve energy density and achieve better cost performance.**

228Ah Cell

Product Type	Long Service Life
Capacity(Ah)	228
Chemistry	LFP
Dimensions (L*W*H, mm)	53.7×173.9×204.6
Weight (kg)	4.2
Energy Density (Wh/kg)	176
Cycle Life (25℃, 100%DOD)	**15,000**
Operating Temperature (℃)	-35~65

- Low lithium consumption anode, passivated cathode and bionic self-repairing electrolyte enable the cell to reduce the consumption of active lithium and improve its cycling and storage performance, **achieving zero fading over 1,000 cycles.**

119Ah Cell

Product Type	High Power
Capacity(Ah)	119
Chemistry	LFP
Dimensions (L*W*H, mm)	33.2*200.3*169.6
Weight (kg)	2.37
Energy Density (Wh/kg)	161
Cycle Life (25℃, 100%DOD)	6,000
Operating Temperature (℃)	-35~65
Application Scenarios	**BEV, PHEV**

- Super electronic network and fast Ion ring design allow **a 80% charge in 15 minutes** at room temperature and **2C discharge** at -10 ℃;
- Superconducting electrolytes boost the battery's charging speed, **generating 10% less heat than similar products.**

28Ah Cell

Product Type	High Power
Capacity(Ah)	28
Chemistry	LFP
Dimensions (L*W*H, mm)	26*148*95
Weight (kg)	0.73
Energy Density (Wh/kg)	123
Cycle Life (25℃, 100%DOD)	8,000
Operating Temperature (℃)	-35~65
Application Scenarios	**HEV、PHEV**

- Isotropic graphite technology enables **6C** fast charging;
- With microstructural design in electrode sheets, the "ion and electron high-speed channel" is constructed to enable **10C** recharging;
- The standard-size PHEV2 allows flexible configuration for different vehicles.

Module & Pack Solutions

High Energy Density Pack

Basic Parameters	
Cell Capacity (Ah)	228Ah
Chemistry	LFP
Dimensions (L*W*H, mm)	1060*630*240
Energy (kWh)	35.23
Pack Energy Density (Wh/kg)	**160**
Nominal Voltage (1/3C, 25℃, V)	154.56
Operating Voltage Range (V)	120~175.2
Charge Rate@25℃ (C)	1.0
IP ratings	IP68、IP6K9K
Operating Temperature (℃)	-35~65
Certification	ISO26262、ECE R100/R10
Application Scenarios	Bus, truck, construction machinery, etc.

More than **2 million** battery systems have been shipped to **55 countries and regions** worldwide

Lightweight

- Substantially safe LFP cells and high-strength pack structure enable the pack to **meet international safety standards;**
- With highly integrated structure design, the groundbreaking CTP (cell to pack) technology significantly boosts the integration efficiency, which can reach **91%**, and the system energy density can reach **160Wh/kg**.

Long Service Life

- Meet **8 years or 800,000 kilometers** warranty requirements (80% SOH or above).

Flexible Configuration

- **Modular design** allows flexible configuration of packs for a variety of voltages and energy scenarios.

MTV (Module to Vehicle)

Basic Parameters	
Cell Capacity (Ah)	268Ah
Chemistry	LFP
Dimensions (L*W*H, mm)	1055*424*240
Energy (kWh)	32.79
Module Energy Density (Wh/kg)	**175(10% ↑)**
Volume Energy Density (Wh/L)	**305(40% ↑)**
Nominal Voltage (1/3C, 25℃, V)	122.36
Operating Voltage Range (V)	95~138.7
Charge Rate@25℃ (C)	1.0
Operating Temperature (℃)	-35~65

Lightweight

- Equipped with the latest generation of high energy LFP cells, MTV technology increases the vehicle utilization space by **40%** and is compatible with various types of buses, facilitating vehicle weight reduction.

Authentic Safety

- Battery modules can be integrated into the vehicle roof, **preventing the battery from flood damage and thermal runaway caused by vehicle collision**.

High Reliability

- Centralized installation improves module consistency and **lower the subordinate fault rate of the buses**.
- Modular assembly enhances operation efficiency.

Module & Pack Solutions

Long Service Life Pack

Basic Parameters	
Cell Capacity (Ah)	228Ah
Chemistry	LFP
Dimensions (L*W*H, mm)	2160*644*243
Energy (kWh)	70.5
Pack Energy Density (Wh/kg)	150
Operating Voltage Range (V)	240~350.4
Charge Rate@25℃ (C)	1.0
IP ratings	IP68、IP6K9K
Operating Temperature (℃)	-35~65
Application Scenarios	Applications with long life requirements such as buses, heavy-duty trucks

Low-Voltage Platform Module

Basic Parameters	
Item	228Ah-1P4S
Chemistry	LFP
Dimensions (L*W*H, mm)	267*178*237
Energy (kWh)	2.94
Module Energy Density (Wh/kg)	154
Nominal Voltage (1/3C, 25℃, V)	12.88
Operating Voltage Range (V)	**10~14.6**
Charge/Discharge Rate@25℃ (C)	1.0/1.0
Operating Temperature (℃)	-35~65
Certification	UN38.3、UL2580

High level of Safety & High Reliability

- Supported by cells with substantially safe LFP chemistry and ultra high-strength box structure design, the pack is able to **operate in harsh working conditions including mining areas**.

Long Service Life

- **10 years or 8,000 cycles** warranty for heavy-duty and cascade utilization application scenarios.

Automatic Temperature Control

- **Vertically arranged thermal management structure design** leads to a threefold increase of the heat exchange area, greatly improving the heating and insulation performance.

Multiple Configurations

- Energy capacities ranging from **130~160kWh** are available to meet the diverse needs of vehicles.

Authentic Safety

- Cells with substantially safe LFP chemistry to **meet international safety standards**.

High Temperature Adaptability

- Heating films in the modules ensure a wide operating window ranging from **-35°C to 65°C**.

Flexible Adaptation

- A wide operating voltage range, **adaptable to a variety of industrial vehicles and application scenarios.**

Forklift | Golf cart | Lift machine | Aircraft towing tractor | Tricycle

Road Passenger Transport Solutions

CATL provides safe, reliable, and durable scenario-based solutions for the high-frequency use and high stability requirements of road passenger transport, which are widely used in city buses, intercity buses, tour buses, and shuttle buses, to help customers reduce costs and increase efficiency, thus creating a beautiful, comfortable and clean image of public transport.

Customer Benefits

Safe and Reliable

- Battery design has passed more than 400 rigorous tests, which is above the international safety standards
- Outstanding battery performance ensures low failure rate and stable operation throughout its full life cycle

Smart Control

- Supported by advanced BMS control, vehicles are able to adapt to a wide range of temperatures and monitor battery health in real time, ensuring vehicles' great performance during operation

Cost-effective

- Lightweight and long service life battery design enable low capacity attenuation and long driving range, thus reducing total cost of ownership (TCO)

Applications

Application in Cold Areas

Located in northeast China, Harbin is dubbed as China's "Ice City," where the lowest temperature can reach -35°C. Since 2014, CATL started to facilitate the city's bus electrification. Its solutions successfully withstood the test of extremely cold weather, and have been gradually promoted in Iceland, Norway and other Arctic countries.

Application in Hot Areas

Hainan, the southernmost province of China, features tropical climate which could hit 40°C in the summer. The vast majority of electric buses in Hainan are equipped with CATL EV batteries, which enjoy wide recognition by partners and have been successfully applied in hot places such as Qatar and Dubai.

Application in Metropolis

Big cities have high population density, which need stronger transportation networks and vehicle stability. Buses equipped with CATL EV batteries have functioned well in Shanghai, Beijing and other big cities, ensuring safe urban travel.

Application in High-altitude Areas

The Everest Base Camp has an elevation between 4,657 m and 5,168 m. Buses equipped with CATL EV batteries were officially put into operation at the Everest base camp starting July 24, 2017, providing passengers with a more comfortable and safer travel experience.

Heavy-Duty Transport Solutions

CATL provides strong and clean power to heavy-duty vehicles for the working conditions of mining areas, ports and construction sites, greatly improving operation efficiency and offering practical solutions for the reduction of mobile source pollution.

Customer Benefits

Reliable Power

- A large amount of road spectrum and working condition data are collected and incorporated into CATL's unique heavy-duty truck pack design standard, thus ensuring the stable operation of vehicles in complex working conditions
- Support continuous high-power discharge with strong power

Excellent Adaptability

- The built-in heating film and water cooling system can effectively adapt to harsh mining environments and ensure worry-free operation
- The IP68 protection of the batteries effectively keeps off dust and water of its working conditions, making the vehicle run smoothly.

Flexible and Efficient

- Long driving range and multiple charging modes, which include both standard 1C charging and high-power 2.5C fast charging, ensure efficient driving throughout the day.

Applications

Smart Unmanned Mining Solution: EnerMagic

CATL and Yuexin Intelligent released the "EnerMagic" electric smart unmanned mining solution, which has been successfully applied in mining areas, creating a new era of "electric, intelligent, unmanned, and networked" mining.

Battery Swapping Solution for Heavy-duty Trucks

CATL provides an efficient battery swapping solution for heavy-duty trucks of the "Road-Rail Combined Transportation" scenario. China's first battery swapping commercial application scenario for heavy-duty trucks has been put into operation, promoting the electrification of road transportation industry.

Green Port

CATL has reached strategic cooperation with Xiamen Port and Tianjin Port, helping ports to achieve comprehensive electrification. Electric vehicles such as unmanned container trucks and AGVs have also been put into operation.

Factory Transportation

CATL provides reliable power for the short-haul trucking in large steel plants in the Beijing-Tianjin-Hebei region.

Urban Delivery Solutions

CATL's EV batteries are widely used in light trucks, mini buses, and minivans for express delivery, supermarket delivery, fresh food delivery and other scenarios. CATL provides customers with safe, reliable and comprehensive battery solutions, and accelerates the electrification of urban logistics to reduce costs and increase efficiency.

Customer Benefits

Safe and Reliable

- CATL batteries meets international safety standards to ensure the safe operation of vehicles.
- Excellent battery charging and discharging performance in a wide range of temperatures ensures the stable operation of a vehicle throughout the year.

Flexible Adaptation

- Customized battery design can be adapted to various kinds of vehicles to meet the requirements of various application scenarios.

Cost-effective

- A lightweight battery system reduces the weight of the whole vehicle and enables it to carry heavier loads, saving operating costs.
- Battery products degrade slowly throughout the life cycle, with a low failure rate and low maintenance costs.

Application

CATL has joined hands with Electric Vehicle Rental (Shenzhen) Co., Ltd. (DST), China's large electric logistics vehicle operator, to provide reliable transportation power for express companies and e-commerce platforms, creating new logistics ecosystem.

Special Vehicle Solutions

CATL provides customized product solutions for special vehicles which can be easily adapted to specific working conditions, thereby improving economic benefits, reducing pollution and creating a comfortable and safe working environment. The products are widely used in logistics parks, airports, ports, and other scenarios.

Applications

Airport Ground Service Equipment

In September 2019, Beijing Daxing International Airport was officially opened for operations. Meanwhile, airport vehicles equipped with CATL batteries have been put into large-scale use, helping the construction of a "green and smart airport."

Sanitation Vehicle

CATL provides reliable battery products for the industry's mainstream sanitation vehicle enterprises, which have been put into use in more than 70 cities across the country, helping to create a clean and beautiful city image.

Forklift

CATL and Hangcha Group have reached a strategic cooperation agreement. The cooperative products have been put on the market in 2018, helping the rapid development of the warehousing and logistics industries.

Construction Machinery

CATL is an active player in the field of new energy construction machinery, providing battery products that can be adapted to various vehicles including reach stackers and port heavy duty forklifts, which have been put into use in large ports.

Innovative Application Solutions

Breaking industry boundaries, together for the energy freedom

Rail Transit

CATL provides reliable power for rail transit with lithium-ion batteries, which can increase energy efficiency by 30% and reduce the burden on the grid.

On May 30, 2020, a refrigerated container equipped with CATL lithium-ion batteries was put into operation in Shanghai. It is the first refrigerated container in China that uses large-capacity lithium-ion batteries as a power system, which can meet the requirements of various transportations such as railway, road, and waterway.

Vessel

It is crucial to develop electric vessels with low energy consumption, zero carbon emissions, low noise, and zero pollution for the sustainable development of the industry. CATL is leading the electrification of vessels.

CATL provides reliable power for the maritime command ship "Deep Sea 01," which is China's first governmental maritime vessel to use lithium-ion batteries as hybrid propulsion power.

Battery Recycling

Explore urban mining

Supported by its subsidiary Brunp, CATL is working with customers to create a closed loop of battery production – application – cascade utilization – battery recycling.

CATL has reached a strategic cooperation agreement with BASF to focus on cathode active materials and battery recycling, to promote CATL's localization in Europe, which contributes to achieving both companies' global carbon neutrality goals.

Overall Network of 7 Bases

Covers the Yangtze River Delta, Pearl River Delta and central China, and expands to Indonesia;
Strategic cooperation with top automotive enterprises, battery and material enterprises, and scientific research.

279 Standards

Participated in setting and revising standards related to waste battery recycling and battery material regeneration. Among those, 162 standards have been Issued.

1,407 Innovative Patents

Brunp takes the lead to address the issues of waste recycling through the original "reverse product positioning design" and "directional recycling" technologies.

Large-scale Recycling

120,000 Tons
Waste battery disposal ability

Nickel, cobalt, manganese: 99.3%
Lithium: 90%+
Metal recovery rate

50%
Comprehensive recycling rate of used batteries in China

*The data above are as of June 30, 2022

Aftersales Service

CATL is committed to building a global after-sales network of workshops and spare parts warehouses so as to provide customers with convenient and efficient seven-star after-sales service.

Service Network

Global Resources

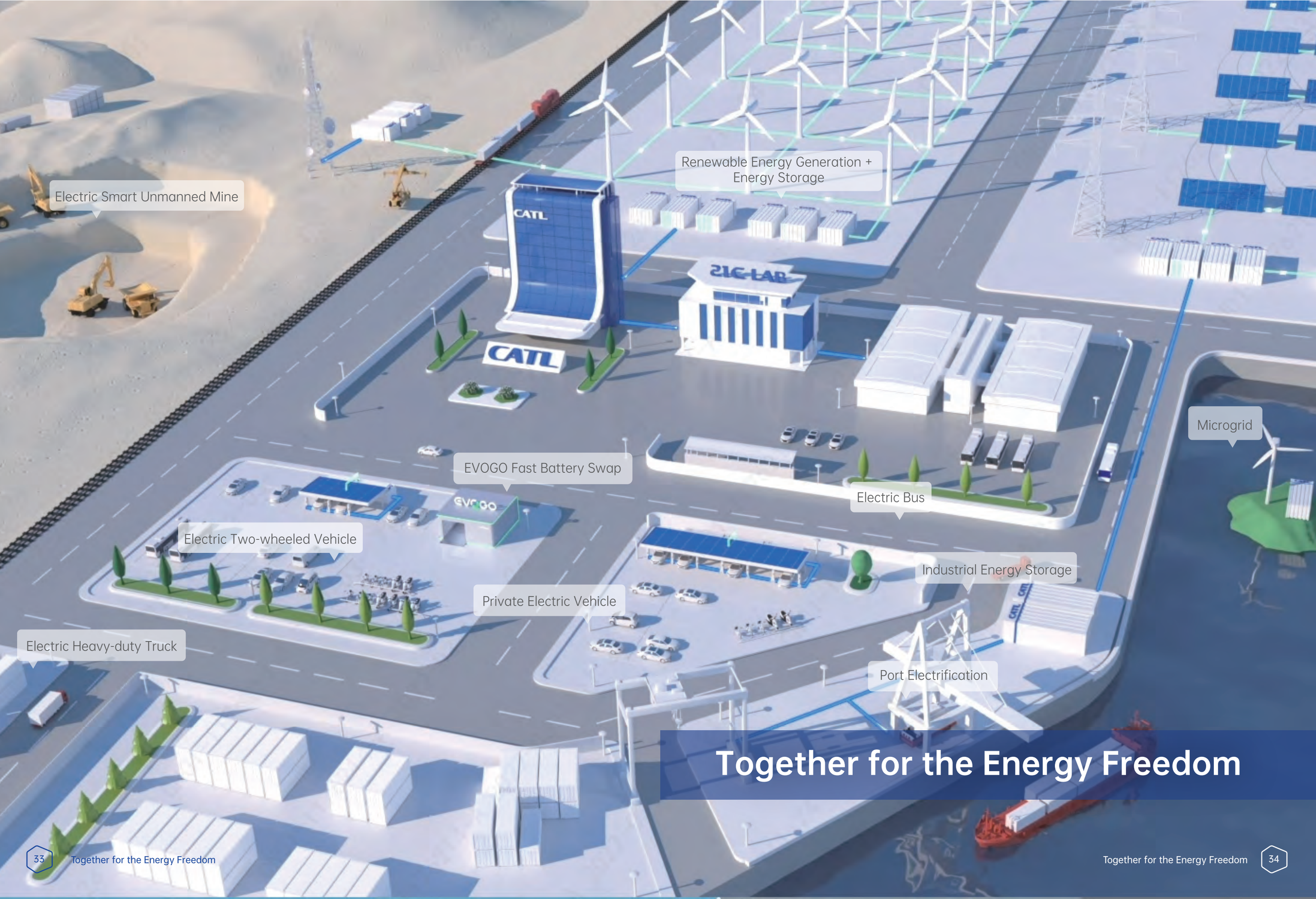
526
Service Stations

200+ Regional Supervision → **20+** Parts Stores → **20+** Technical Experts

Service Commitment

China		
Response Time	3-5-8H Commercial Vehicle	
Maintenance Time	8H Common Problem	72H Complex Problem

Overseas		
Service Model	Joint Operation & Maintenance	Self Operation & Maintenance
Timeliness	24H Response, 24H Arrival	
Maintenance Timeliness	Response time depends on our partners and supported by CATL experts	3-5D Commercial Vehicle



Together for the Energy Freedom