

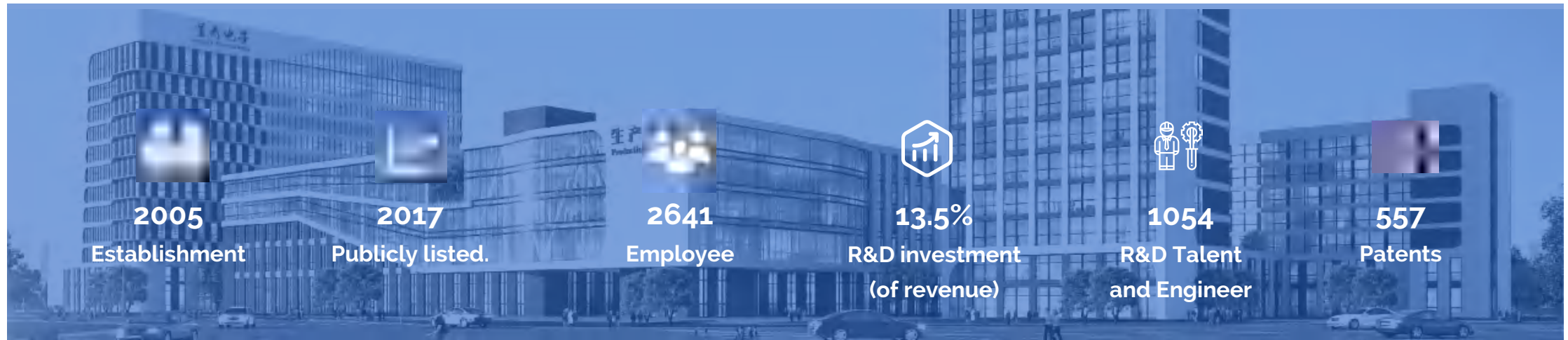
# Nebula Electronics

A global leader in battery testing solutions

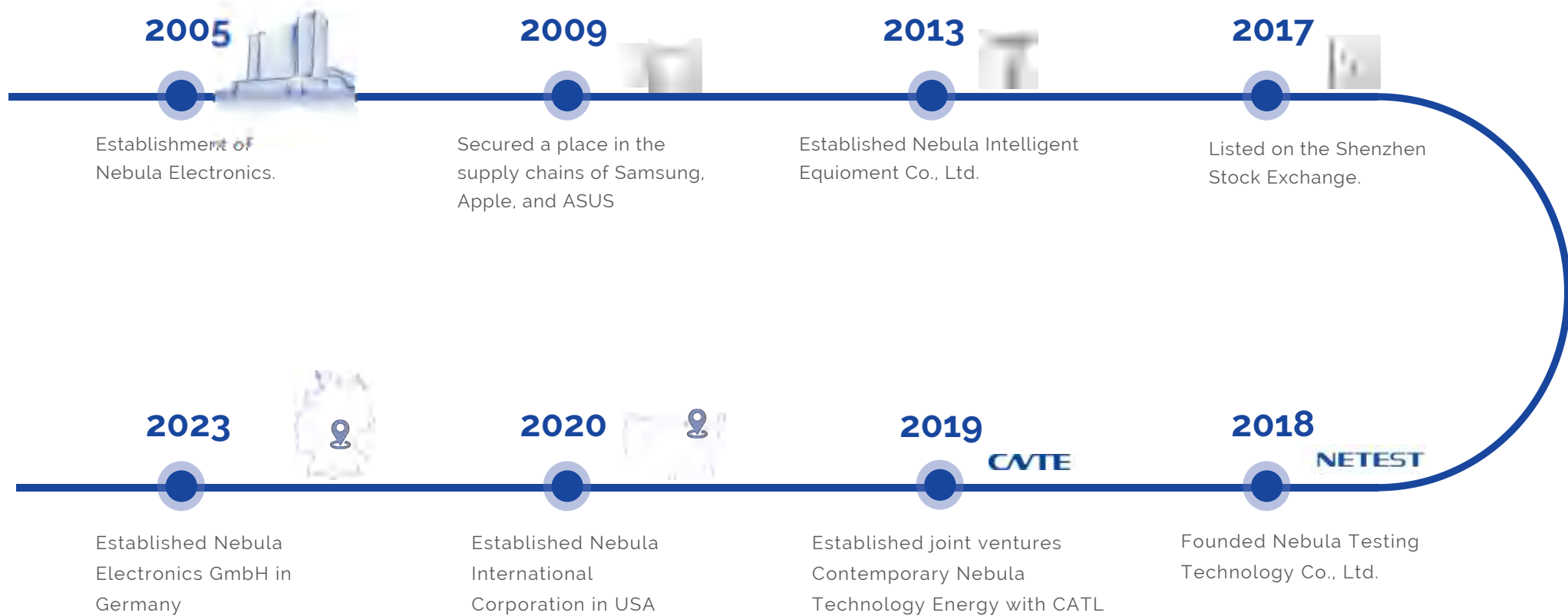
# Company Overview

# About Nebula

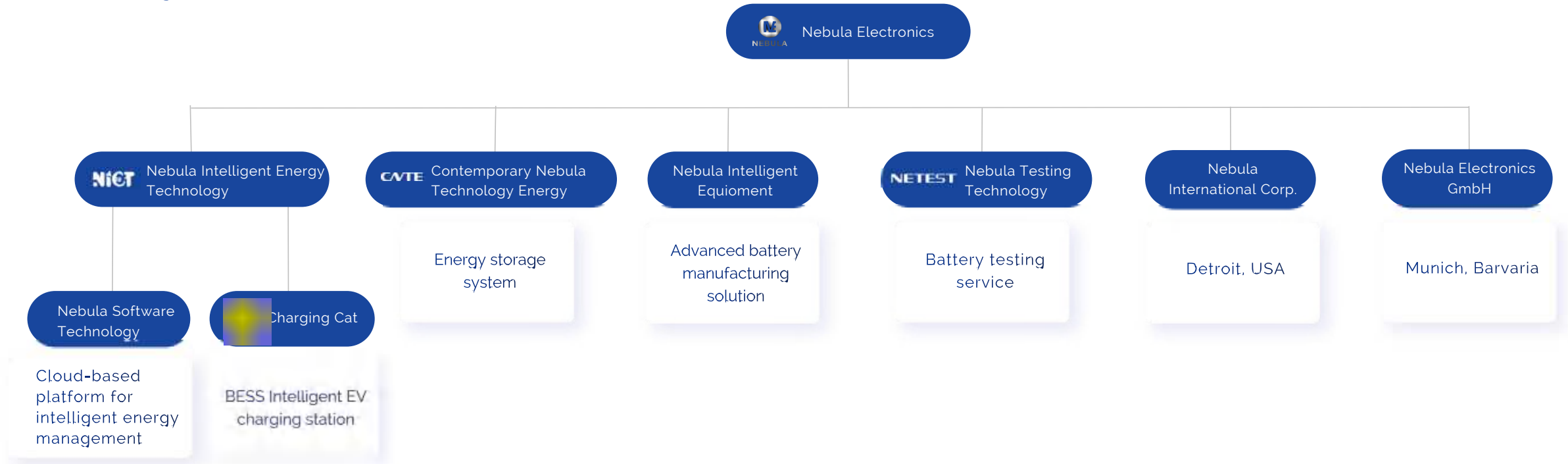
Nebula, a leading battery test system manufacturer, offers cutting-edge solutions for comprehensive battery testing, battery manufacture automation, EV chargers, and Energy Storage Systems. Our unwavering focus on quality, accuracy, reliability, and longevity is driving us towards a carbon-neutral and sustainable future.



# Milestone



# Company Structure



## Headquarters

Fuzhou, Fujian

## 4 R&D Centers

Xian, Shanxi  
 Fuzhou, Fujian  
 Kunshan, Jiangsu  
 Dongguan, Guangdong

## 11 Subsidiary

**China** Ningde, Fujian | Kunshan, Jiangsu | Liyang, Jiangsu | Dongguan, Guangdong | Tianjin | Beijing  
 Chongqing | Yibin, Sichuan  
**USA** Detroit, Michigan  
**Germany** Munich, Bavaria

# Roadmap

The first laptop Li-ion battery PCB test system in China

**2005**



Consumer electronics final product battery test system

**2006**



The first automated sorting system and automatic welding system for 18650 battery cells in China.

**2010**



400kW EV battery pack cycle test system with 0.05% F.S. voltage accuracy

**2011**



The first fully automated production line for mobile phone pouch batteries in China

**2013**



Battery cell cycle test system  
DC EV charger  
Level 2 EV charger

**2018**



Combined vertical warehousing, AGV, and fully automated testing to create a smart li-ion battery production line

**2017**



Battery module cycle test system

**2016**



Take the lead in developing the battery Pack EOL (End-of-Line) test system and PCS (power conversion system)

**2014**



Cell formation system

**2020**



Smart BESS Charging & Testing Station

**2021**



1000V Battery pack cycle test system  
Distributed DC busbar system solution

**2022**

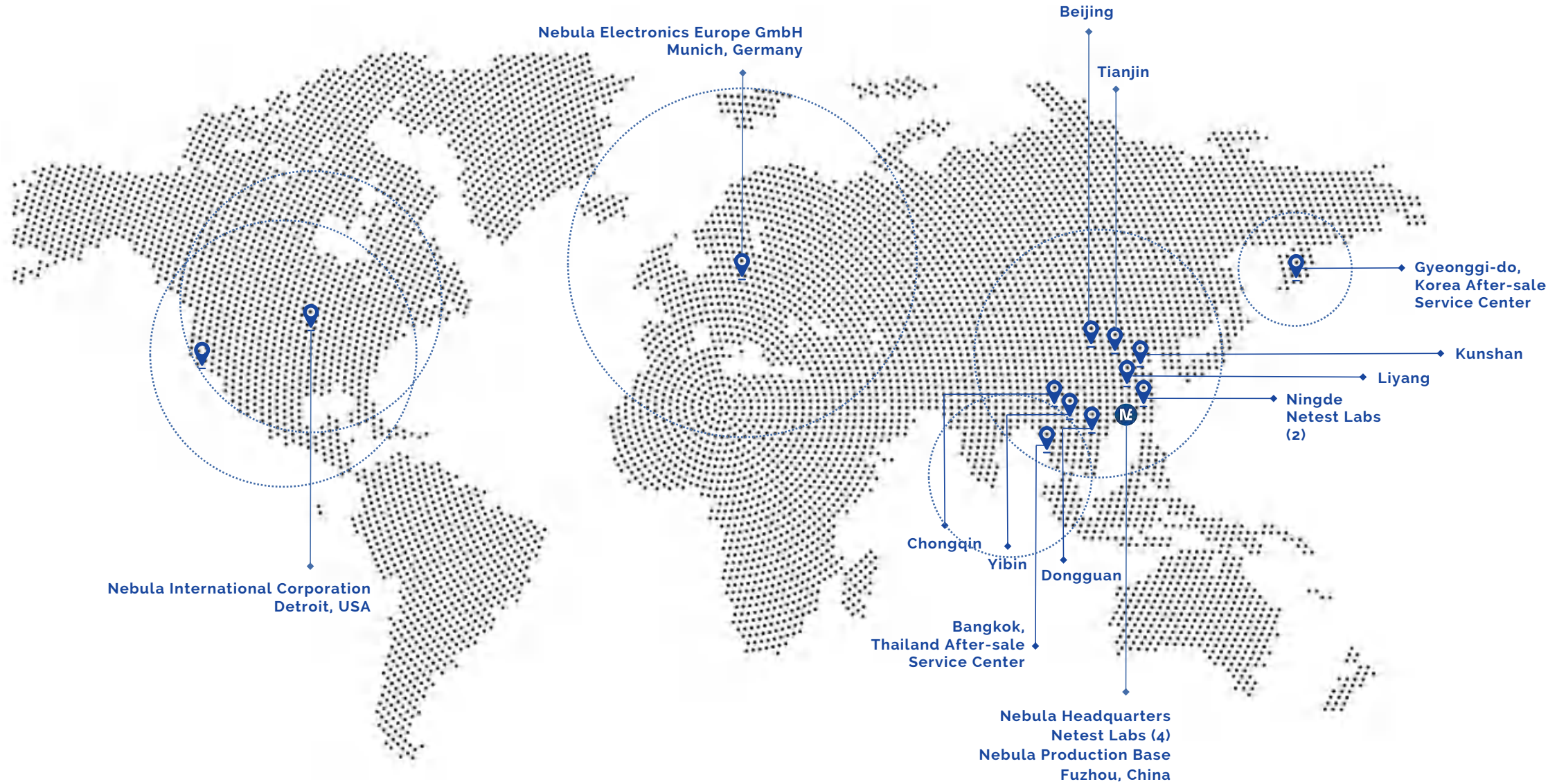


1725kW/3450kW PCS  
60kW Modular EV charger  
1000V EV charging station system

**2023**



# Global Presence

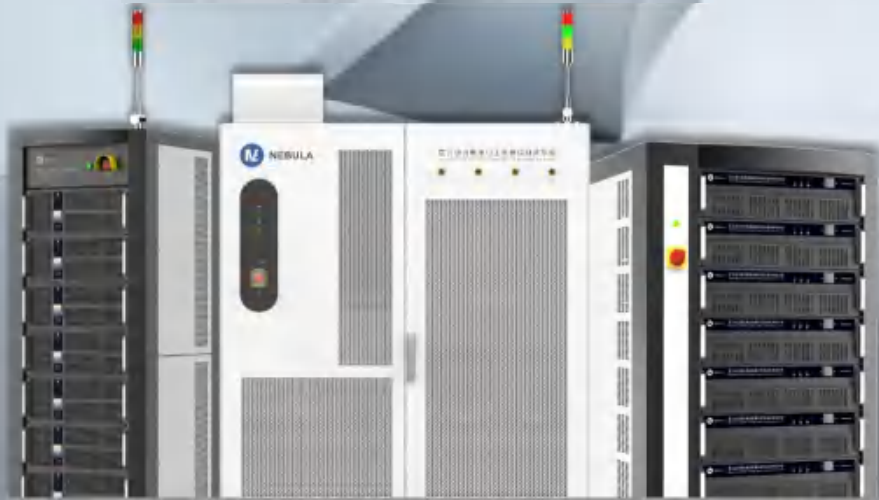


# Products and Application

# Products Overview

## Battery Cycle Test System

Cell | Module | Pack | EOL



## PCS

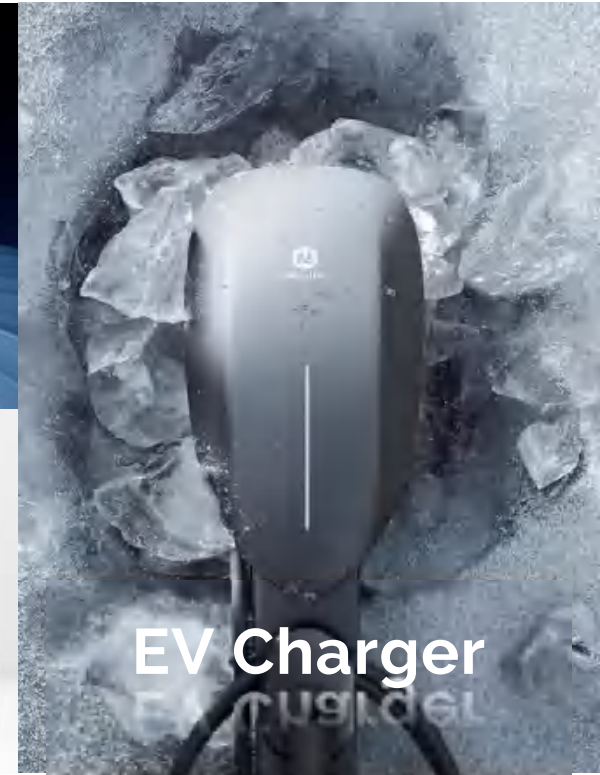


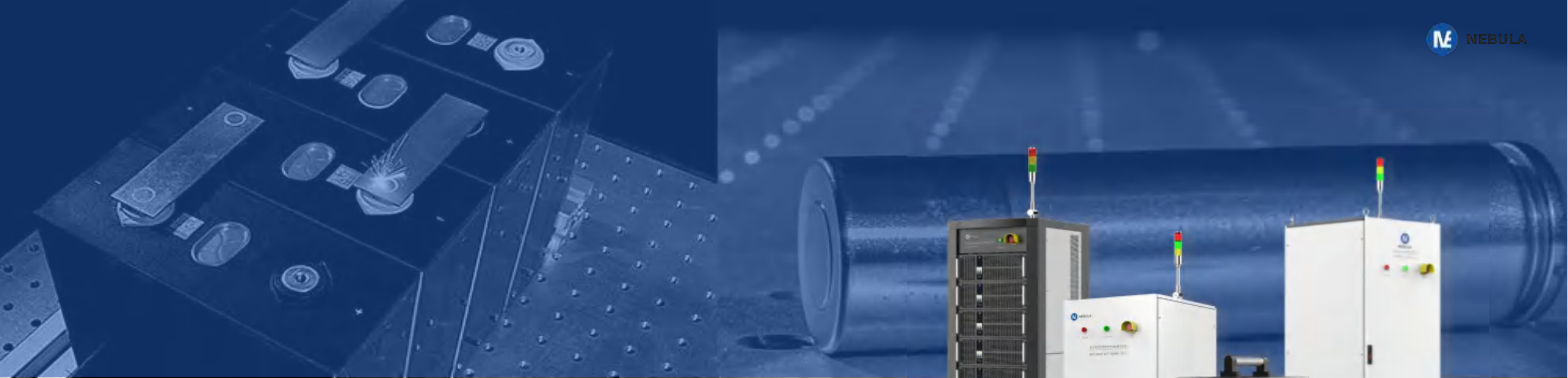
## Consumer Electronics Test System

PCM | Final Product



## EV Charger





## Regenerative Battery Cell Cycle Test System

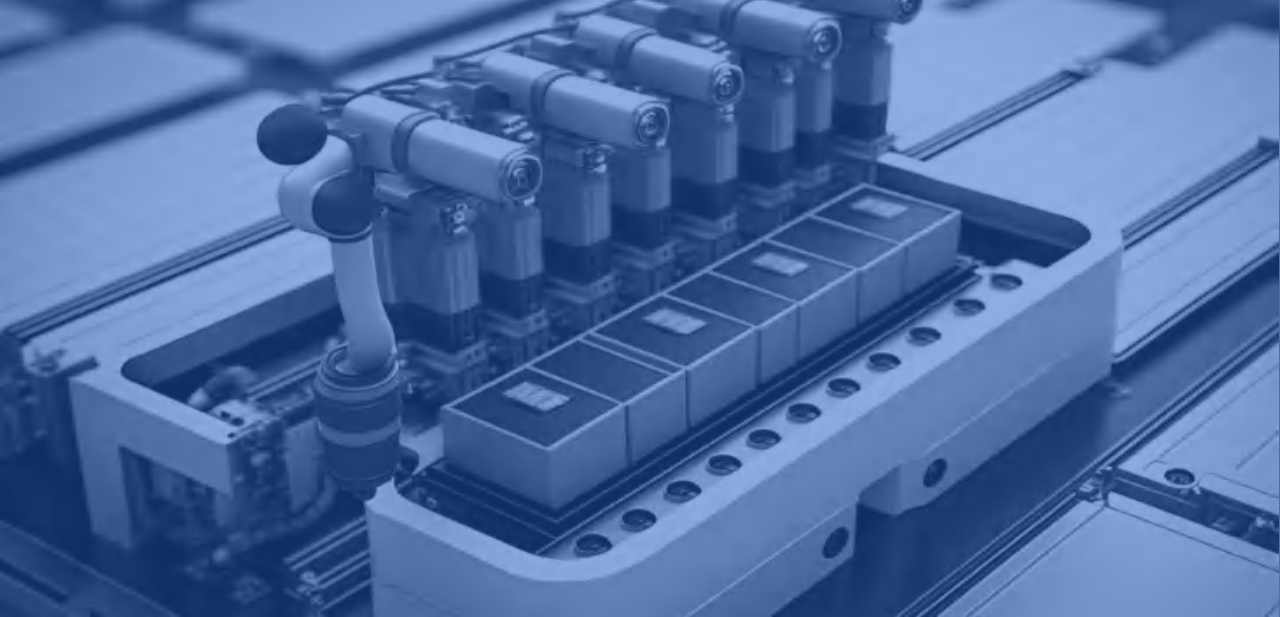
<b>0.02% F.S.</b>	<b>0.03% F.S.</b>	<b>4ms</b>	<b>3000A</b>
Voltage accuracy	Current accuracy	Current rise	Max. Current

## Voltage Temperature Data Acquisition System

<b>0.02% F.S.</b>	<b>0.03% F.S.</b>	<b>-50°C~+200°C</b>
Voltage accuracy	Current accuracy	Measurement range

## Battery Cell Balancer

It improves the consistency of battery by charging and discharging the cells, thereby enhancing battery life and safety.



## Regenerative Battery Module Cycle Test System

**0.05% F.S.**

Voltage  
accuracy

**0.05% F.S.**

Current accuracy

**5ms**

Current  
rise

**90%**

Regenerative Efficiency

## Portable Battery Module Cycle Test System

**0.02% F.S.**

Voltage  
accuracy

**0.02% F.S.**

Current accuracy

**5ms**

Current  
rise

**92%**

Regenerative Efficiency



## Regenerative Battery Pack Cycle Test System

**0.01% F.S.**

Voltage  
accuracy

**0.03% F.S.**

Current accuracy

**4ms**

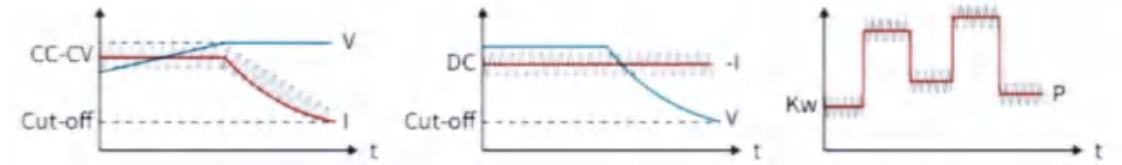
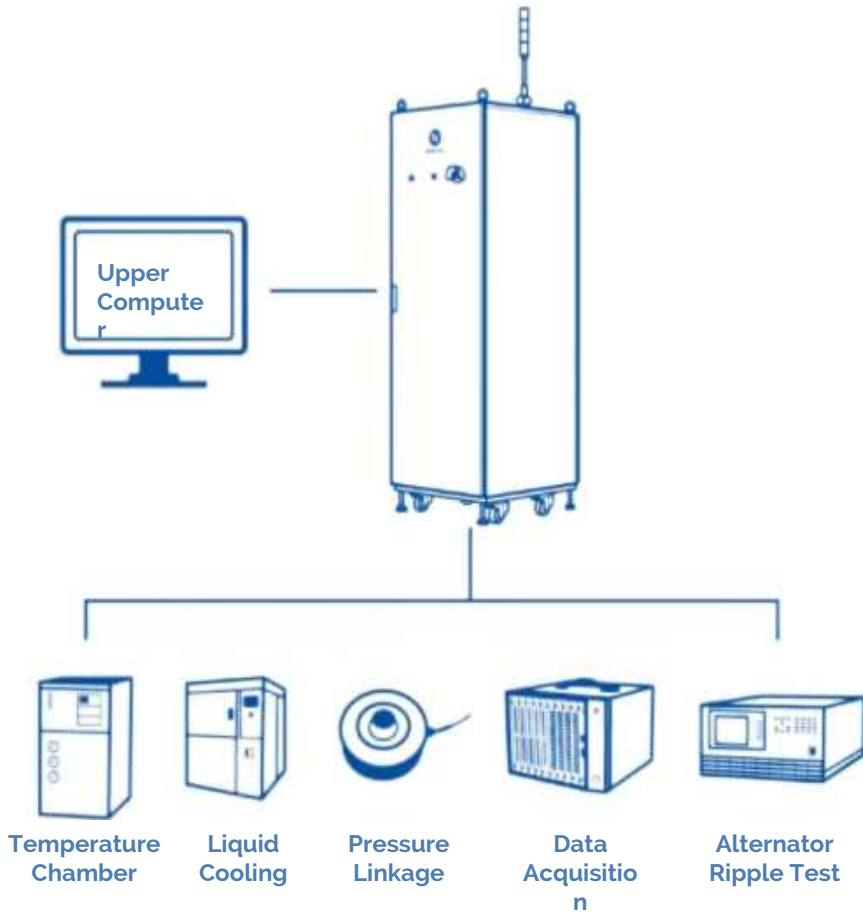
Current  
rise

**96%**

Regenerative Efficiency

# Hardware Features

## offline operation

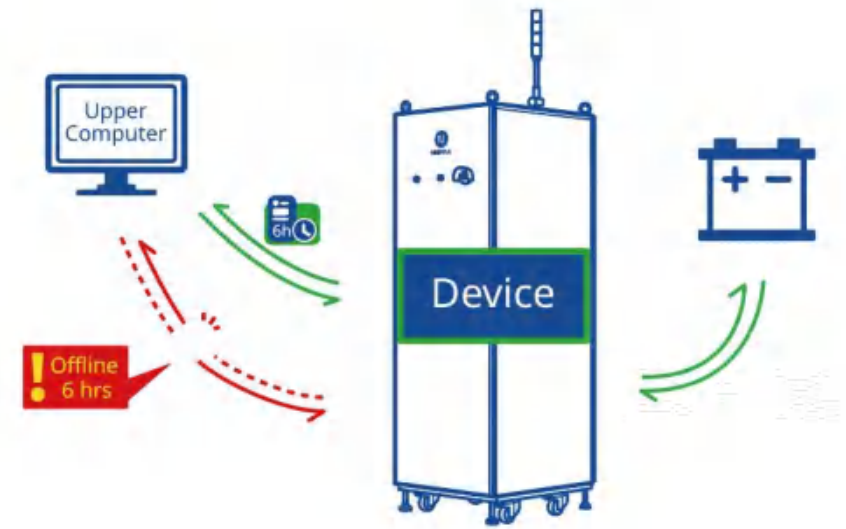


R Charge Curve V-I

R Discharge Curve V-I

R Power Curve P-t

Even in the event of a complete shutdown of not only the upper computer but the entire test bench, the device has the capability to retain data for over 24 hours. Once the computer is restored, data retrieval will occur automatically.

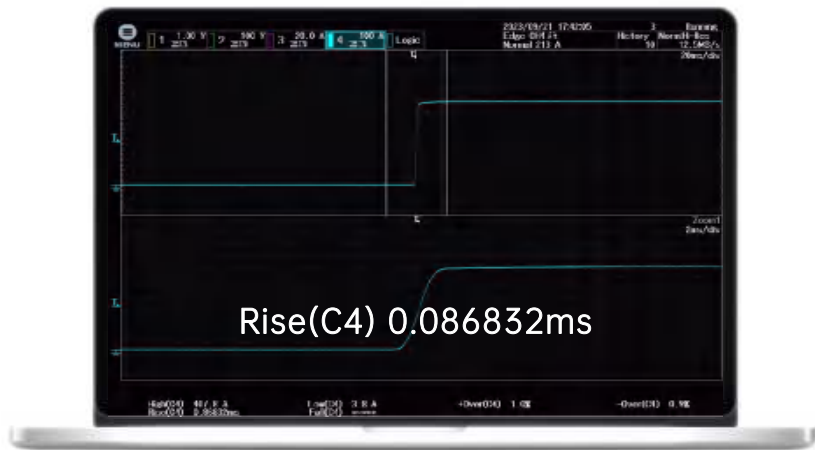


# Hardware Features

## Current rise

Current rise is an indicator of how quickly a power supply can handle rapid load changes and transitions, and it is applied in driving profile simulation and pulse functions.

Traditional current rise refers to the response capability at one single point, while the Nebula current rise refers to the ability for continuous responses.



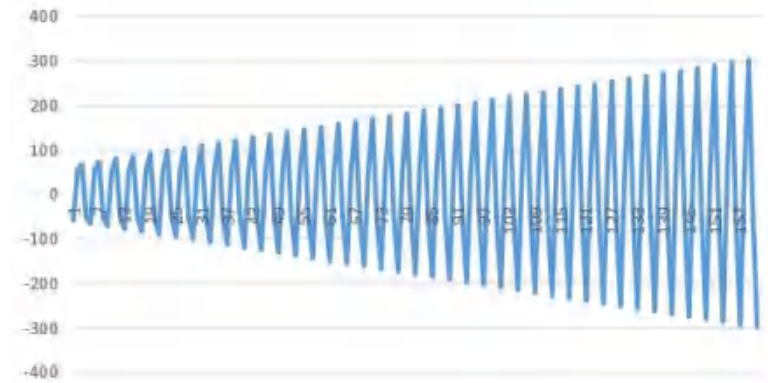
BAT-NEEFLCT-150300/400S

**≤ 1ms**  
Current rise

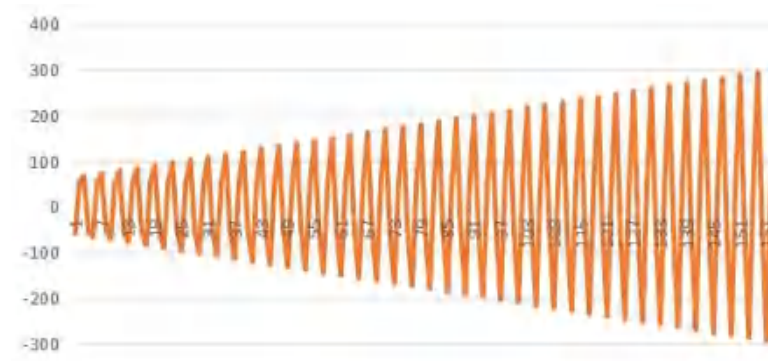
**≤ 1ms**  
Sampling

**≤ 10ms**  
Simulation

Actual Current (A)



Setting Current (A)



The setting and actual current waveform graph with a 20ms interval. Nebula NEH series excellently supports 20ms driving profile simulation.

# Hardware Features

## Modular Design



Modular Design of  
Cell/Module/Pack Cycler

Easy Maintenance and  
Replacement

Independent DC Bus

Tidy interior facilitates heat  
dissipation and cleaning

# Software Features



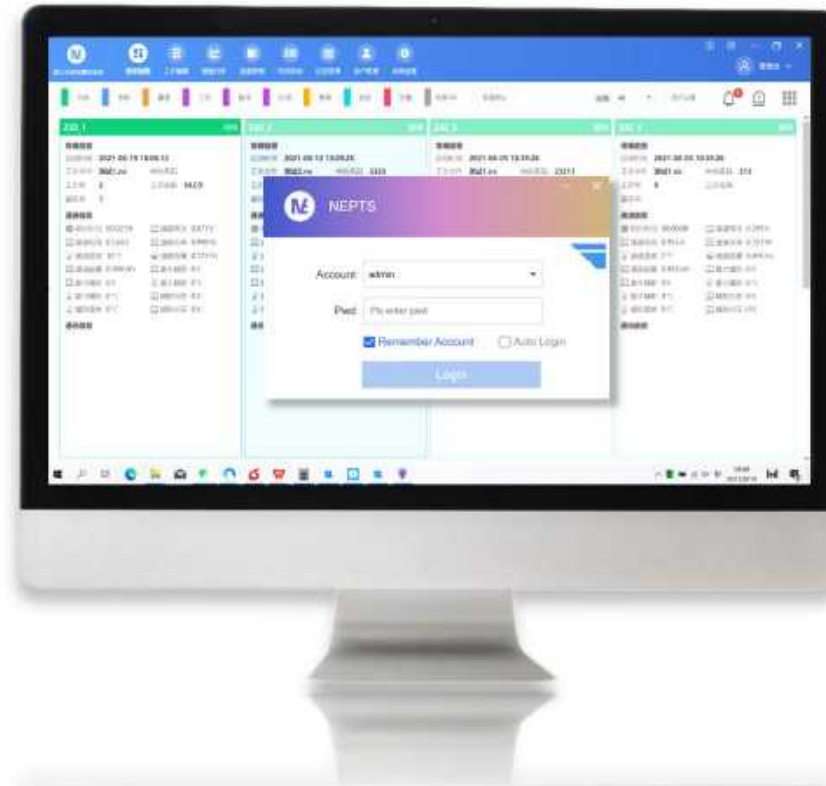
## External Device

Control and monitor third-party hardware such as temperature chamber, data acquisition system, etc



## Offline Operation

The high-performance middleware reduces communication latency, enhances device's edge computing capabilities, computational control capabilities, and stability, enabling extended periods of offline testing.



## Easy Operation

Simple GUI to add test steps, set control type, values and termination conditions and customize simulation profiles



## Real-time Data

View, plot, and analyze battery test data in real-time, providing immediate information and insights



# Testing Services



## About NETEST

NETEST is a leading third-party testing institute for Lithium-ion batteries in China. The laboratory implements various projects related to battery performance, reliability, safety, and environmental adaptability. Leveraging their extensive professional proficiency and experience, NETEST furnishes comprehensive analysis and verification of battery safety and lifespan.



Battery Testing  
Covers:

Cell | Module | Pack



Qualification:  
CNAS | CMA



E-bike



EV



Energy  
Storage

# NETEST Lab



## Netest Headquarter

245 Module Channel  
32 Pack channel



## Minhou Lab

2000 Cell Channel  
200 Module Channel  
40 Pack channel



## Yunyou Lab

664 Cell Channel  
40 Module Channel  
26 PACK channel



## Jiayi Lab

2088 Cell Channel  
208 Module channel



## Bailianhua Lab

1200 Cell Channel  
36 PACK channel



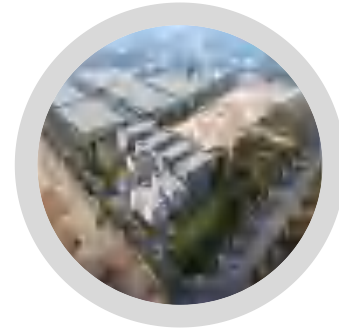
## Zhongqi Lab

1908 Cell Channel



## Fuzhou Testing Center, 2024 Ningde Testing Center, 2026

4000 Cell Channel  
60 PACK Channel



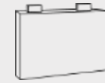
10000 Cell Channel  
120 PACK Channel



Test Equipment **1912**

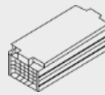


Total Area **34972m<sup>2</sup>**



Cell Channel **7860**

14000 CH in plan



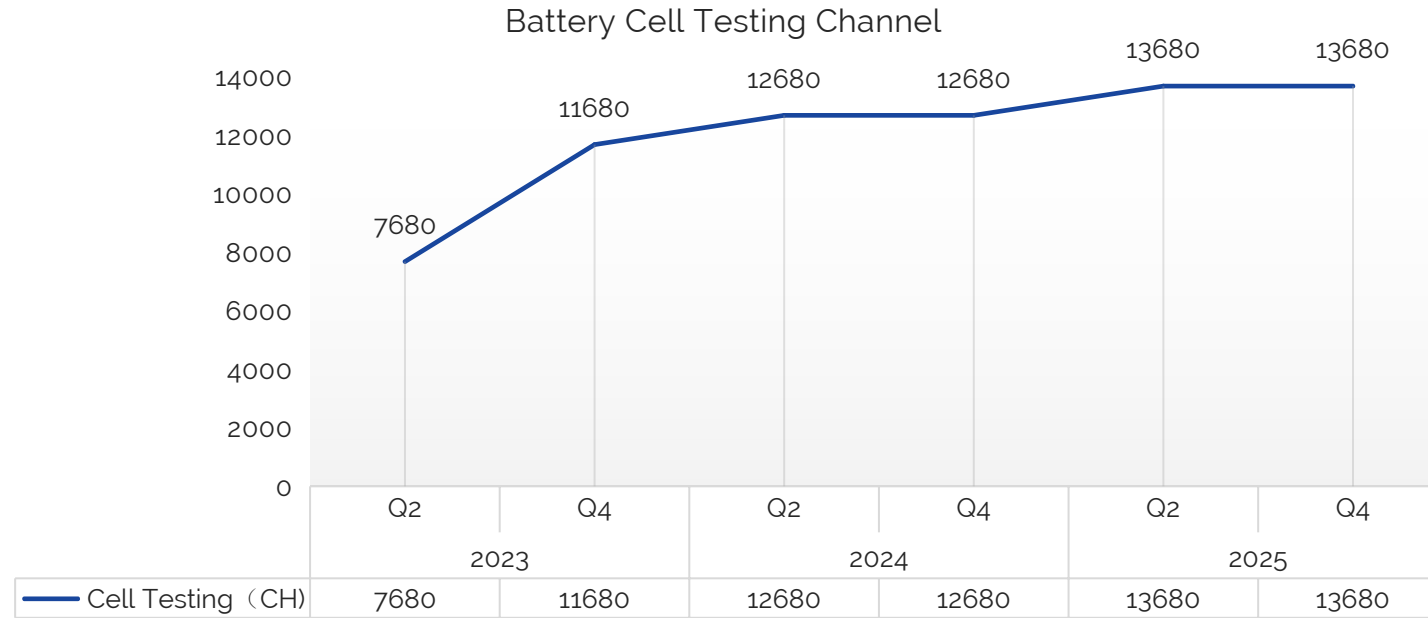
Module Channel **693**



Pack Channel **134**

180 CH in plan

# Testing Capability Overview



Cell Testing Capability

Up to **1200A** **-5V~5V**



Module Testing Capability

Up to **1000A** **0V~500V**



Pack Testing Capability

Up to **1000A** **1500V**



Temperature Chamber

**-40°C~100°C** **10%~90% RH**

# Testing Item Overview

-  Electric Performance
-  Simulation Profile
-  Cycle Performance
-  Environmental Adaptability

Capacity and energy efficiency  
Resistance and power  
No load/in storage capacity loss  
BMS function

...



High/Low-temperature startup power  
The dew point temperature change  
Fast-charging energy efficiency  
Driving profile simulation cycle lifespan

...



Standard cycle lifespan  
Rate performance  
High/Low temperature cycle capacity  
Operating SOC range

...



Temperature Cycle  
Insulation testing  
Dielectric strength testing  
Storage testing

...



# Real-time Monitoring Dashboard



# Testing Lab Management System

## Application



R&D

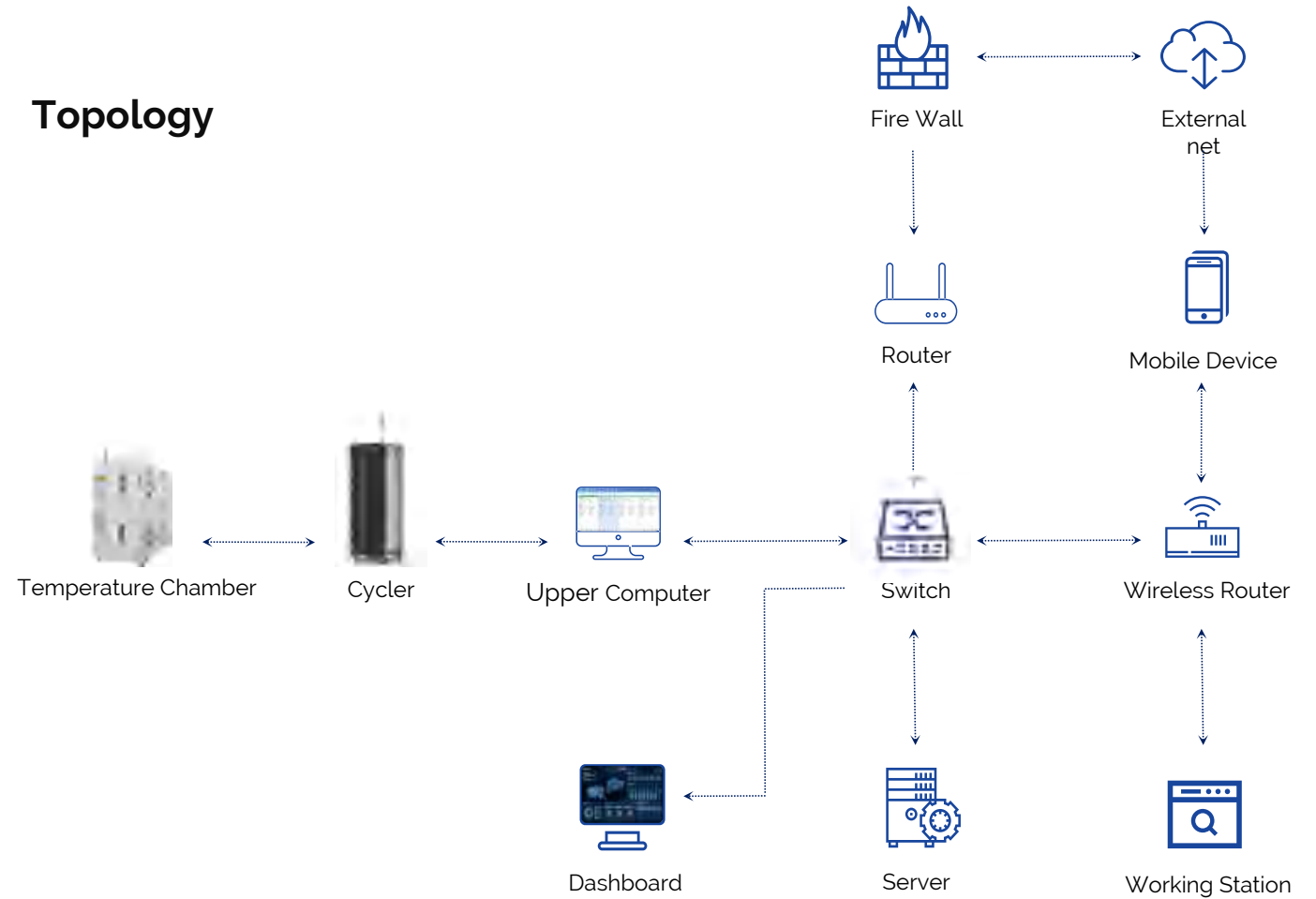


Quality Control



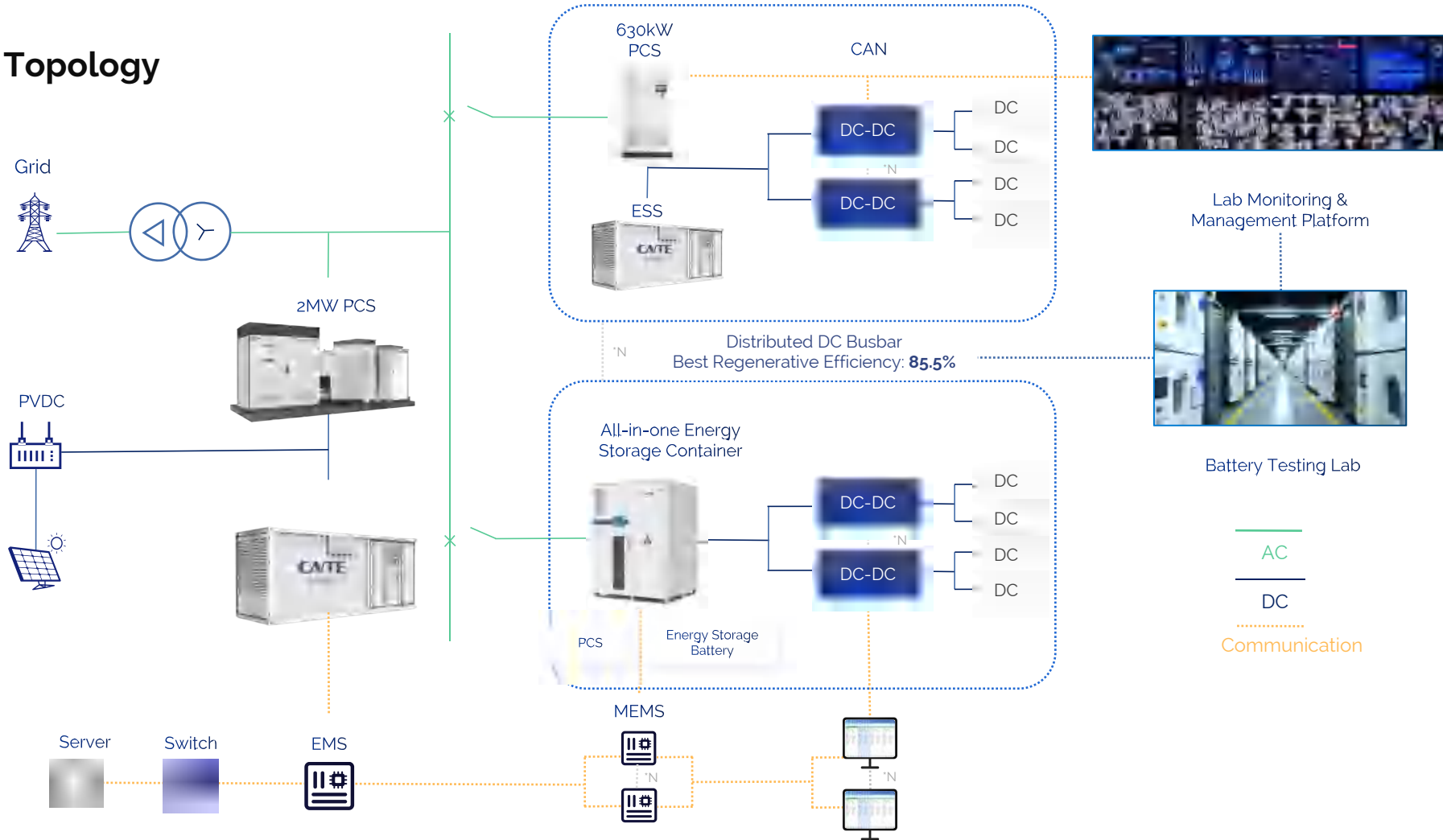
Production

## Topology

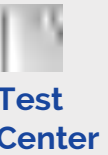


# Lab Energy Management System

## Topology



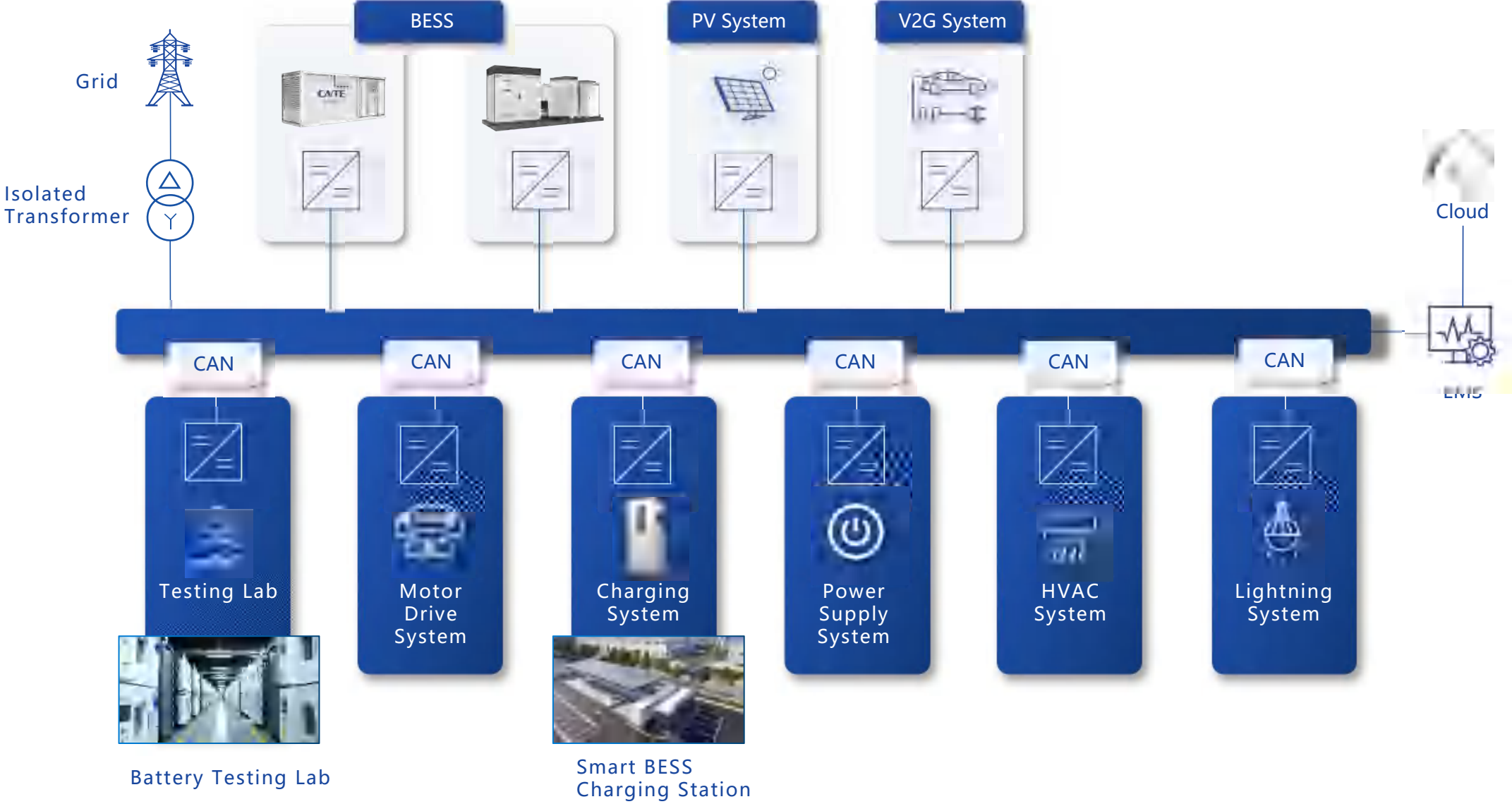
## Application



Battery Testing Lab

— AC  
— DC  
- - - - - Communication

# Industrial Park Energy Management System





PV System



HVAC System



2.8MWh  
BESS x2



Smart BESS  
Charging Station

# Success Stories

## Success Stories

### Provided large-scale testing equipments and services for CATL's next generation batteries

Since 2011, Nebula has engaged in a profound strategic partnership with CATL. Through continuous expansion of its production capacity and improvement of standards, Nebula has pioneered the establishment of China's first third-party large-scale lithium battery testing laboratory. This milestone achievement has enabled CATL, with approximately 40% of its upcoming battery releases, to successfully completed R&D stage testing.



## Success Stories

### Customized testing solution for BYD's LFP blade batteries

Nebula secured a significant order for testing equipment from BYD since 2018, thus provided reliable testing services for BYD's blade batteries, ensuring the safety and longevity of their batteries for extended-range driving. This successful collaboration with BYD exemplifies Nebula's contribution to the overall growth of the electric vehicle industry.



# Reference Customer

# Reference Customer



# Global Presence

# Global Service Overview



## Europe

- Nebula Europe GmbH was founded in 2023
- Germany: 6 dedicated staff members (including sales, application, and after-sales engineers).
- Hungary: 6 after-sales personnel are stationed at CATL Hungary.
- Battery Test Center: Set to be established in 2024, operations scheduled to commence by year-end, offering testing services to meet customer demands.
- Spare warehouse to be founded in 2025



## America

- Nebula International Corporation was founded in 2020
- Operating in two service points, one in Michigan and the other in California, including sales, pre-sales, application, and after-sales engineers.
- From 2024 to 2026, the plan is to develop testing and energy storage businesses around major clients for both the northern and southern subsidiaries, comprehensively enhancing regional service capabilities



## East Asia

- A sales representative office in Korea with one sales and two service personnel.
- A service agent and distributor in Japan
- Local services are guided by major client projects
- Plans to establish a subsidiary in Korea in 2025

# Global Service Overview



## Southeast Asia

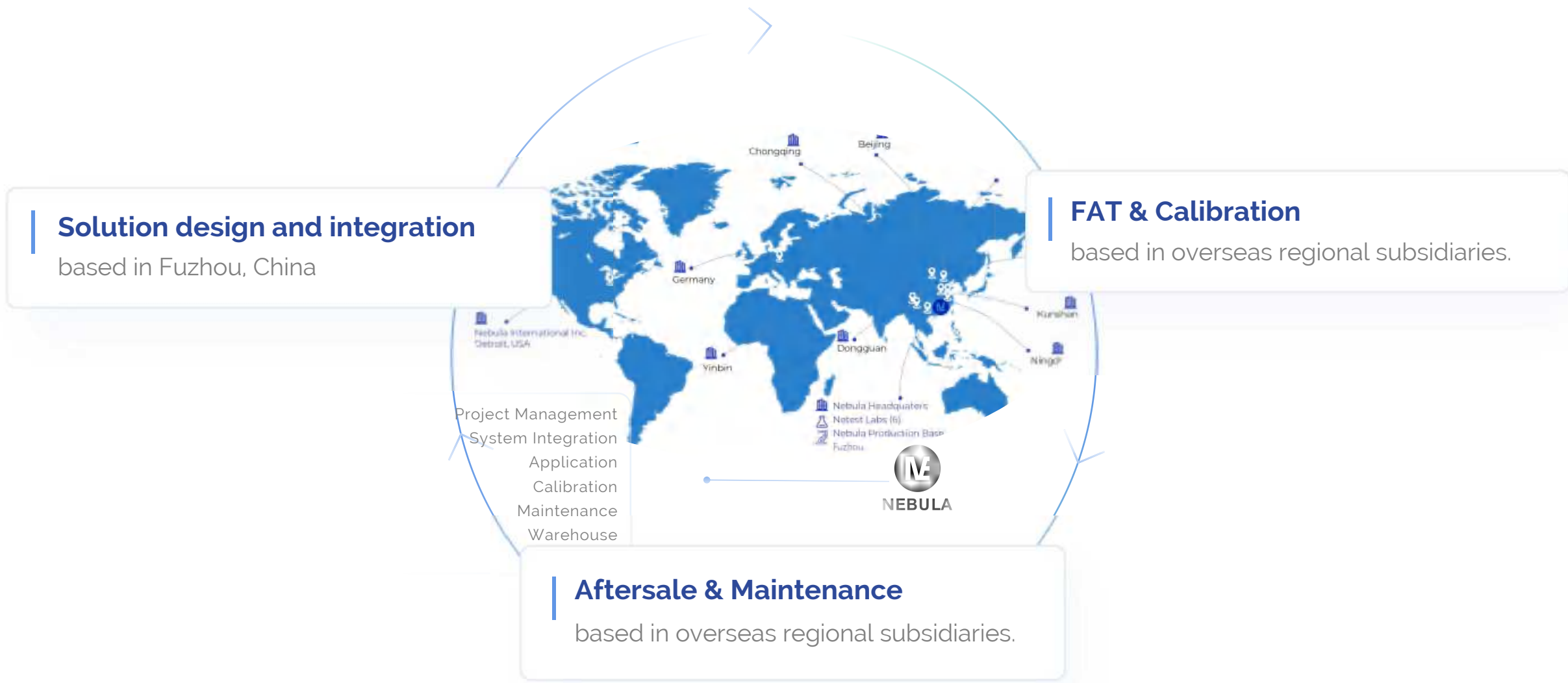
- Establishing an office in Thailand for primary service operations, with sales covering Malaysia and Vietnam, extending service coverage across Southeast Asia. Currently, there is one service agent, and in 2024, plans include appointing one sales and one service representative.



## Oceania

- In 2024, an office will be established in Australia, primarily focused on service and without sales functions. Currently, we are engaged in the BESS Charging Station project business in New Zealand

# Support Workflow



## Solution design and integration & OAT

The Intelligent Equipment Department at Nebula Headquarters takes the lead in designing and developing project solutions, as well as overseeing equipment production, manufacturing, integration, and conducting trial operations and debugging

### Advantages



Technical expertise and industry experience based on 18 years background in battery testing of Nebula HQ



Comprehensive understanding of the specific localization needs by Nebula Global






Cost-effective and highly efficient advantages of China's local resources



## FAT & Calibration

Nebula China and Nebula Global collaborate together to accomplish the on-site installation, commissioning (FAT), and production support

### Advantages




-  To ensure the continuity of project execution, enhance product delivery quality, and mitigate risks
-  Nebula Global excels in professional project management
-  Technical personnel with a strong background in battery testing



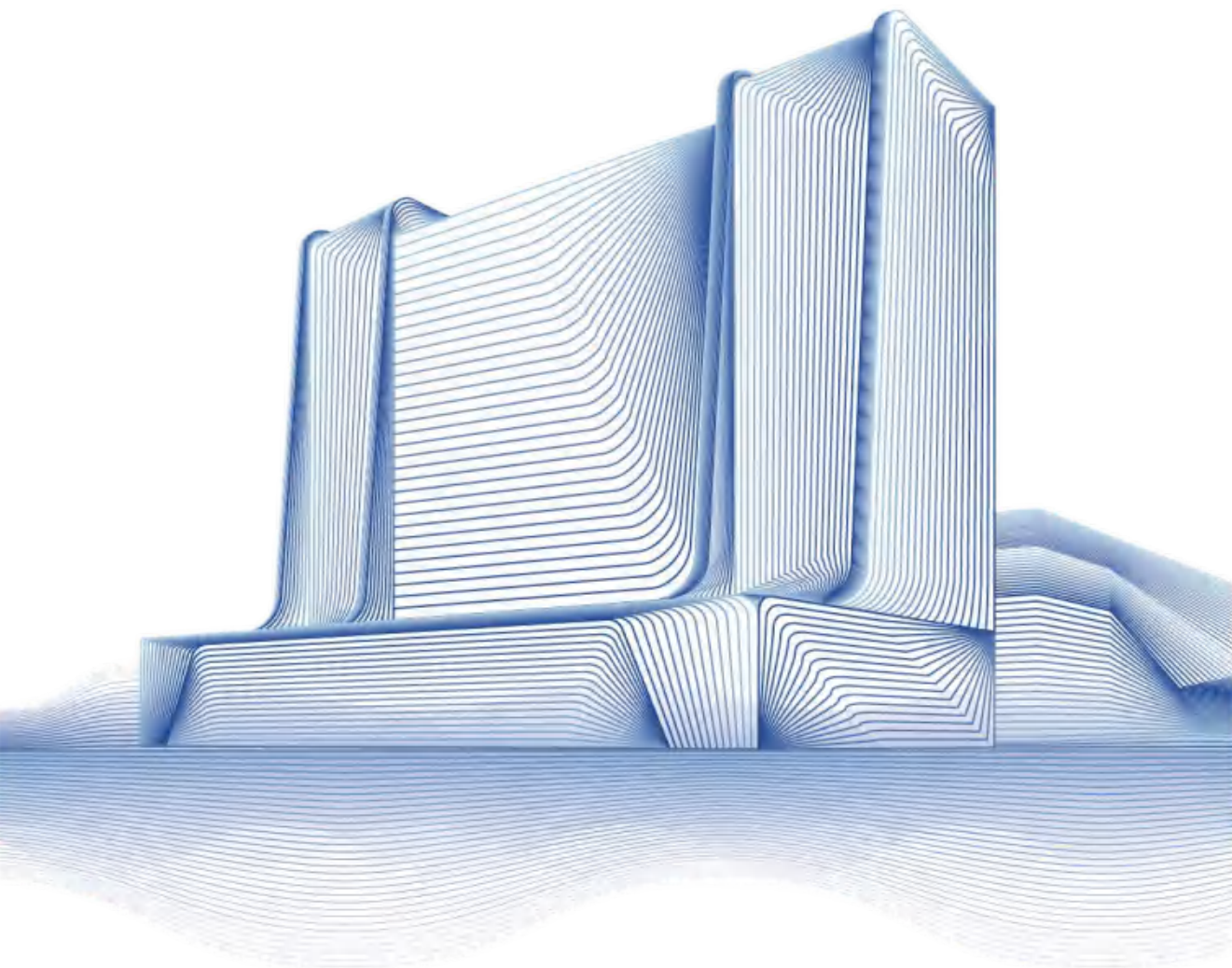
## Aftersale and Maintenance

Nebula Global takes over the maintenance and after-sales support for the production line

### Advantages

-  Localized technical support and service
-  Short time delivery from Nebula Global technical center and spare parts warehouse to customer
-  Bilingual talents allow for seamless cross-border communication over technical details and project management





# THANKS

## **Nebula Electronics Co., Ltd.**



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