



中建科工

Innovative Practices in Zero Carbon Buildings Exploration of Building-Vehicle-Grid(BVG) Integration

零碳建筑创新实践 建筑-交通-能源 (BVG) 融合探索

Chen tao

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The people's housing needs are shifting towards safe, comfortable, green and smart "good houses"

居住需求转向安全、舒适、绿色、智慧的“好房子”



"Good houses" was included in the government work report of the national people's congress for the first time

全国两会《政府工作报告》首次写进“好房子”

Meet the people's need for high-quality living, refine standards and regulations, promote the construction of safe, comfortable, green, and smart "good houses".

适应人民群众高品质居住需要，完善标准规范，推动建设安全、舒适、绿色、智慧的“好房子”。



"Good houses" was further elaborated by the minister of MOHURD at the press conference

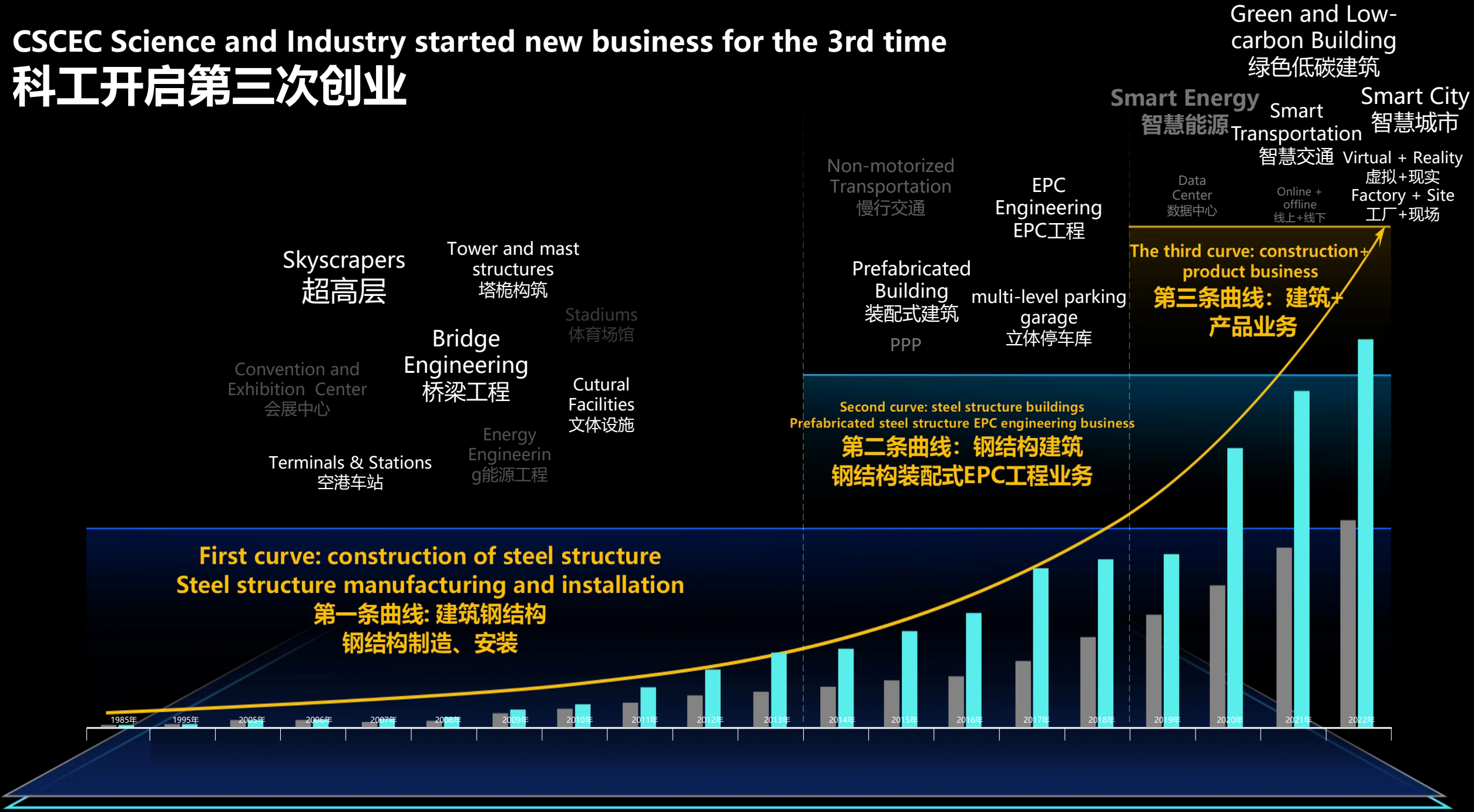
住建部部长在记者会进一步阐述“好房子”

The focus will be on implementing the policy in three aspects: setting standards, strengthening technology, and focusing on projects. Building "good houses" will be a new track for industrial transformation and development.

将重点从三个方面抓好落实：立标准、强科技、抓项目。
建设“好房子”，将是产业转型发展的新赛道。

CSCEC Science and Industry started new business for the 3rd time

科工开启第三次创业



Vision Shapes Direction
思路决定出路

Scenes Define Products
场景定义产品

Models Create Value
模式创造价值

Innovation Leads the Future
创新引领未来



01 Vision Shapes Direction

思路 决定 出路

Cross-border integration, from “construction” to “construction+” —Building-Vehicle-Grid (BVG) Integration

跨界融合，从“建筑”走向“建筑+”——建筑-交通-能源（BVG）融合



House-Car-Internet Integration Green Smart House 房-车-网融合绿色智能住宅

Premier Li Qiang Inspects House-Car-Internet Integration Green Smart House on November 18, 2024

2024年11月18日，李强总理深入调研房-车-网融合绿色智能住宅

Good Houses Integrate Energy Generation, Energy Efficiency, Energy Use, Energy Storage, and Microgrids Development to Achieve Energy Self-sufficiency.

好房子融入**产能、节能、用能、储能及微电网**，能源自给自足



[视频]李强参观调研中国建筑科技展

简介



Build CSCEC Science and Industry steel structure technical system
of good house by four dimensions and five key measures

四个维度，五好举措，构建中建科工钢结构好房子技术体系



Good Design

Build a demonstration benchmark for high-quality residences with the Steel Structure Quality Housing Technical System of China Construction Sci. and Ind. Corp. Ltd.
以科工钢结构好房子技术体系，打造高品质住宅示范标杆

Zhixin Resettlement Housing Project (under construction) in Huangpu District, Guangzhou, consists of 10 steel structure residential buildings, with the tallest one reaching 78 meters.
广州黄埔知信安置房（在建），10栋钢结构住宅，最高78m



Enable rebuild as is, co-develop and co-share, and eco-friendly development for the people by using prefabricated steel structure

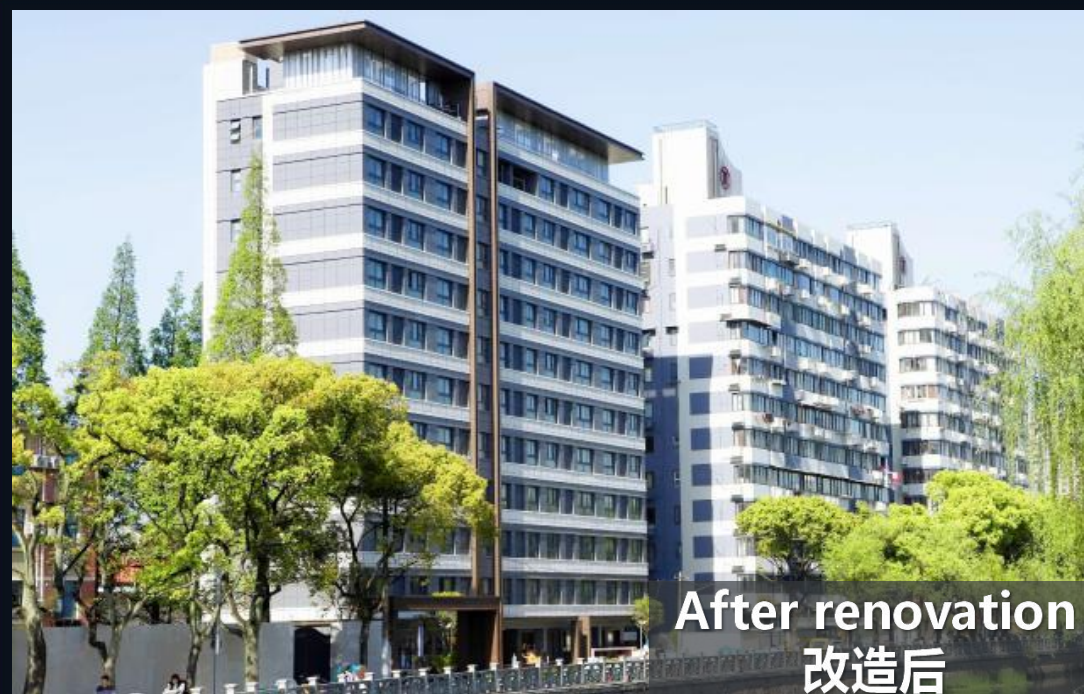
以装配式钢结构建筑实现**原拆原建，共建共享，绿色惠民**

Lane 341, Kangjian Road, Shanghai, a landmark project of "Renovation of old urban areas, comprehensive renovation of old housing units and renovation of 'villages in the city' ", was highly praised by the government and residents.

上海康健路341弄，上海“两旧一村”改造标志性工程，获政府与住户高度评价



Before
renovation
改造前



After renovation
改造后

Demonstration project of Building-Vehicle-Grid(BVG) integration
of the Ministry of Housing and Urban-Rural Development
住建部建筑-交通-能源 (BVG) 融合的示范项目

中建科工惠州绿色科技办公楼

Integrate new energy products into existing construction scenes to make
buildings greener and more low-carbon
在既有建筑场景中，融入新能源产品，让建筑更绿色低碳

The first office building in China's hot summer and warm winter region to be renovated to zero energy
consumption.

中国夏热冬暖地区首个既有建筑零能耗改造办公楼

International EDGE Green Building Advanced Certification
国际EDGE绿色建筑高级认证

已获得“零能耗建筑”设计标识和“产能建筑”运行标识

It has obtained the "zero energy consumption building" design mark and
the "productive building" operation mark.



02

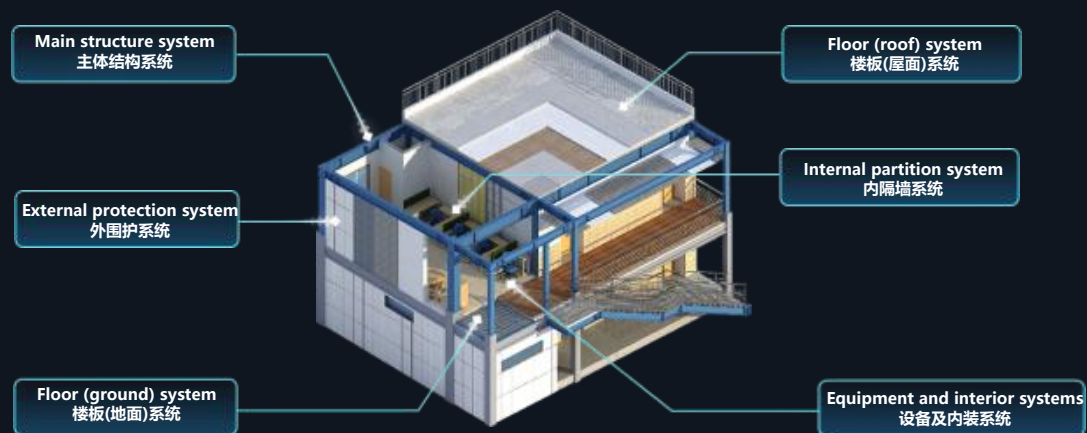
Scenes Define Products
场景定义产品

Focusing on the building scene, two major systems have been developed: prefabricated steel structure buildings and modular steel structure buildings.

围绕建筑场景，研发了装配式钢结构建筑、模块化钢结构建筑两大体系



GS-Building



Steel frame + three plates + SI system
钢框架 + 三板 + SI 体系



ME-House



Three-dimensional modular system of steel structure
钢结构三维模块化体系

Defined six types of products, implemented more than 600 projects and more than 50 million square meters

定义六大类型产品，累计实践了600余个项目，5000余万平方米

Schools 学校

BUTUKA Academy PNG and China Friendship School
中国巴新友谊学校布图卡学园
Shanwei Polytechnic College
汕尾理工学院
Shijiazhuang Information Engineering Vocational College
石家庄信工学院
.....

Hospitals 医院

Xichang People's Hospital
西昌人民医院
Renshou Maternity Hospital
仁寿妇幼保健院
First Hospital of Qinhuangdao
秦皇岛第一人民医院
.....

Office Buildings 写字楼

CCSIC Tower
中建科工大厦
Shenzhen Hanking Center
深圳汉京金融中心
Shenzhen Public Security Bureau Third Generation Command Center
深圳市公安局第三代指挥中心
.....



Public Buildings 公共建筑



Parks 园区



Village Houses 乡村宜居



Residences 住宅

Residences 住宅

Tianjin Saida White Collar Apartment
天津赛达白领公寓
Xishan Compensated Housing Communities
蓼山还建楼
Zhanjiang Dongsheng Road and
Nonglin 2nd Road Public Rental Housing
湛江东盛路、农林二路公租房
.....

Industrial Parks 产业园

Shenguang Qujiang Cloud Valley
深广·渠江云谷
JD Intelligent Logistics Park
京东智慧园区
.....

Hotels 酒店

Shenzhen Emergency Hotel
深圳市应急酒店
PNG Hilton Port Moresby Hotel
巴新星山广场酒店
.....

The leading intelligent production line for steel structure modules in China

Make it possible to "building houses like building cars"

国内领先的钢结构模块智能化生产线，实现“像造汽车一样造房子”



Intelligent production line for steel
structure modules
钢结构模块智能生产线



Flexible Manufacturing
柔性制造



High-precision detection
高精度检测



Automatic welding
自动装焊

Save Water
节水100%

Save Electricity
节电70%

Yard Reduction
堆场减少80%

Material Loss
材料损耗5-10%

Green and Energy Saving
绿色节能

Hong Kong Simple Public Housing SS M518 Project

香港简约公屋SS M518项目

Hong Kong's first Full-MiC (modular integrated construction) project
180,000 square meters, 13 residential buildings, up to 19 floors, 9,366 modules

全港首个Full-MiC（全钢结构模块高层体系）项目

18万平方米，13栋住宅，最高19层，9366个模块

Hong Kong Simple Public Housing SS N520 Project

香港简约公屋SS N520项目

Hong Kong's first Full-MiC (modular integrated construction) project
250,000 square meters, 10 high-rise residential buildings, 15,000 modules

全港Full-MiC（全钢结构模块高层体系）项目

25万平方米，10栋高层住宅，15000个模块



Focusing on traffic scenes, we define a series of smart transportation products that integrate parking and charging, also combine charging and battery swapping

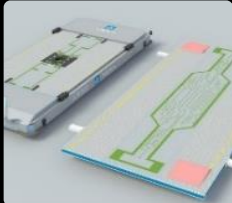
围绕交通场景，定义“停充一体化、充换结合”智慧交通系列产品

Smart Multi-level Parking Garage
智能立体车库

Mechanical parking garages, parking buildings
Comprehensive transportation stations, hubs
机械式停车库、停车楼
综合交通场站、枢纽



Bus Depot
公交库



AGV Robot
AGV机器人

Integrated on-street parking
路内一体化停车

Roadside parking (video, geomagnetic sensor)
Upgrade and renovation of flat parking lots
路侧停车（视频、地磁）
平面停车场升级改造



Geomagnetic
Sensor
地磁



Barrier
Gate
道闸

New Energy Charging
新能源充电

Slow charging station, fast charging station
Super fast charging station
慢充站、快充站
超级快充站



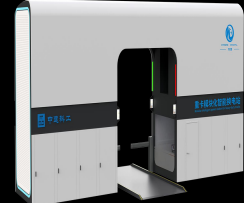
Super
Charging Pile
超充桩



Fast
Charging Pile
快充桩

New Energy Battery Swap
新能源换电

Passenger car battery swap station
Box truck, light and heavy truck battery swap station
乘用车换电站
箱货车、轻重卡换电站



Fast Version
极速版



Standard Version
标准版

Multi-storey Steel Structure Bus Garage In the Central Area of Nanshan Shenzhen

南山中心区智慧公交车库

COMPANY INTRODUCTION CASE

智慧停车代表案例

南山中心区智慧公交车库
Multi-storey Steel Structure Bus Garage
In the Central Area of Nanshan, Shenzhen

全国首个智慧新能源公交机械立体车库。

Overall land utilization rate increased by **5** times

整体土地利用率提高 **5** 倍

Depot dispatching efficiency increased by **45%**

场站调度效率提高 **45%**

Comprehensive operation and maintenance
costs reduced by **60%**

综合运维成本减低 **60%**

4335 m²

建筑面积

Construction Area

1076 m²

占地面积

Floor Area

68 ↑

公交车位数

Bus Parking Spaces

17 ↑

地面充电车位

Ground Charging Parking Spaces

Independently Developed 7kW-600kW Chongmei Full Range of Charging Piles

自主研发7kW-600kW充美全系列充电桩

Modular PEDF Smart Energy Product、New-Type Energy Storage Product

模块化光储直柔智慧能源产品、新型储能产品

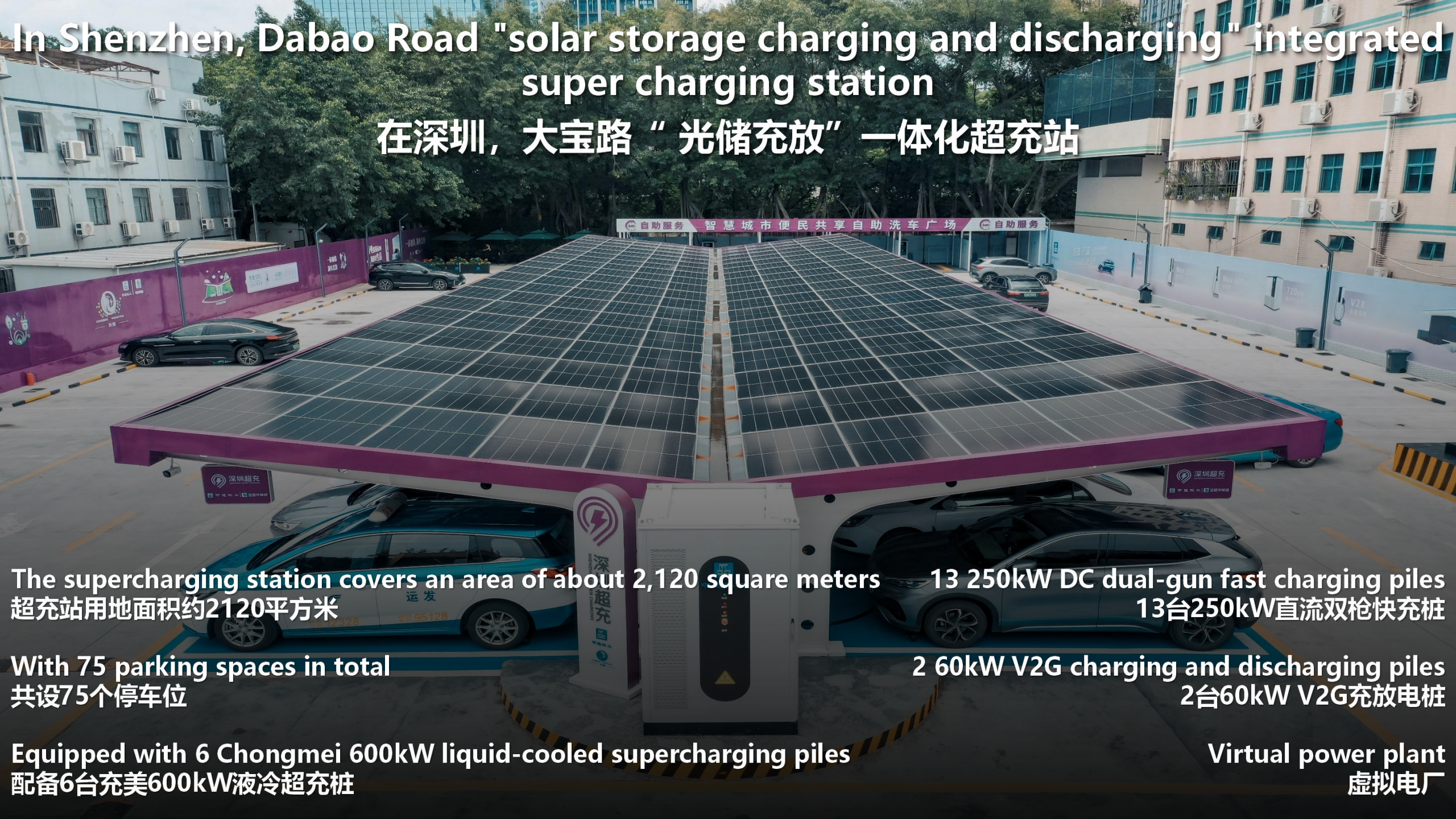


Applicable to supercharging stations, low-carbon buildings, and zero-carbon parks

适用于超级充电站、低碳建筑、零碳园区

In Shenzhen, Dabao Road "solar storage charging and discharging" integrated super charging station

在深圳，大宝路“光储充放”一体化超充站

- 
- The supercharging station covers an area of about 2,120 square meters
超充站用地面积约2120平方米
- With 75 parking spaces in total
共设75个停车位
- Equipped with 6 Chongmei 600kW liquid-cooled supercharging piles
配备6台充美600kW液冷超充桩
- 13 250kW DC dual-gun fast charging piles
13台250kW直流双枪快充桩
- 2 60kW V2G charging and discharging piles
2台60kW V2G充放电桩
- Virtual power plant
虚拟电厂

In Chongqing, Mingyuehuguang Storage and Charging Supercharging Station
在重庆，明月湖光储充放超级充电站



In Shaanxi, the photovoltaic storage super charging station in Xixian New District
在陕西，西咸新区光储充超级充电站



In Wuhan, Fanhai CBD Integrated Super Charging Station
在武汉，泛海CBD综合超级充电站



In Foshan, No. 9 Tianhong Road Supercharging Station
在佛山，天虹路9号超级充电站

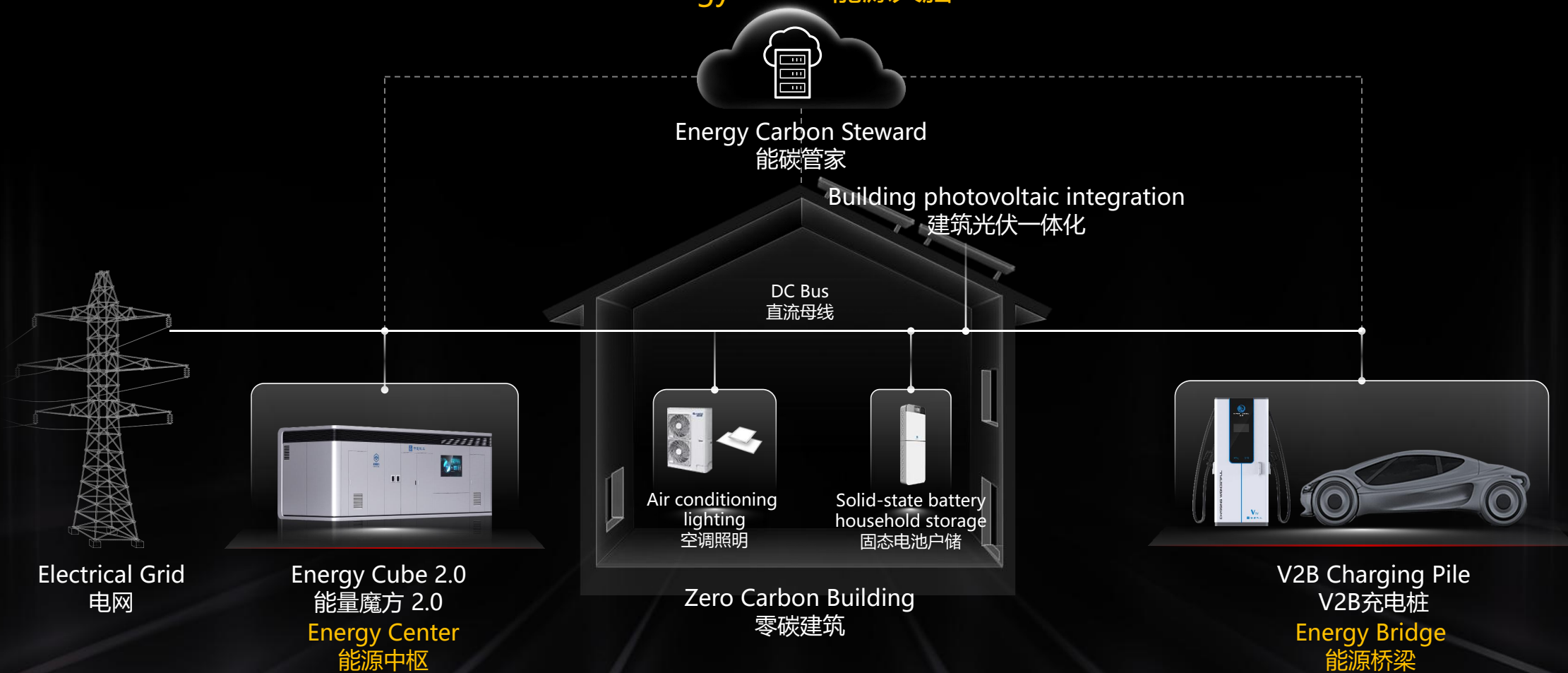


Independently developed the building-electric vehicle-microgrid new energy system

“Energy saving, production capacity, energy use, and energy storage” organically integrates to make buildings and cities more low-carbon

自主研发了建筑-电动车-微电网新能源系统
“节能、产能、用能、储能”有机融合，让建筑、城市更低碳

Energy Brain 能源大脑



Energy center - Energy Cube, reducing operating costs
Integrating "power transformation, distribution, charging, photovoltaic, energy storage, discharging,
intelligent operation and maintenance" into one, one-stop energy management

能源中枢 — 能量魔方，降低运营成本

集“变电、配电、充电、光伏、储能、放电、智能运维”七大功能于一体



Top Ten Case Studies in China
中国十佳案例



Top Ten Creative Production in China
中国十佳创新产品



American Design Award
美国设计大奖



Carbon Footprint Certification
碳足迹认证

5% ↓

Green power loss
绿电损耗

100%

Green power utilization rate
绿电利用率

30% ↓

AC/DC cost
AC/DC成本

40% ↓

Laying wire
敷设线材

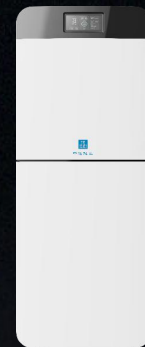
Solid-state battery household storage, high safety, high density,
bringing clean energy into thousands of households

固态电池户储，高安全、高密度，让清洁能源走进千家万户



red dot

Red Dot Award Design Team
红点奖设计团队



SIZE 尺寸 430 × 150 × 1100 mm

STORAGE 储能 $\leq 20\text{kWh}$

LOAD 负荷 $\leq 6\text{kW/AC}$

0

Thermal
runaway
热失控

High Security
高安全

Non-flammable even
under cell puncture
电芯穿刺不燃

50% ↓

Occupied
area
占地

DCDC technology
DCDC技术

New and old batteries are
compatible for mixed use
新旧电池可混用

Energy bridge - V2B charging pile, connecting buildings and electric vehicles

Turn electric vehicles into "mobile energy storage"
and improve the flexible regulation ability of building energy

能源桥梁— V2B充电桩，连接建筑和电动汽车
让电动汽车变成“移动储能”，提升建筑能源柔性调节能力

Slow Charge and Discharge

慢充慢放



7 kW

SIZE 尺寸 0.6x 0.2 x 0.75 m

POWER 功率 7 kW

Quick Charge and Discharge

快充快放



60 kW

SIZE 尺寸 0.7x 0.4 x 1.6 m

POWER 功率 60 kW

Super Charge and Discharge

超充超放



720 kW

SIZE 尺寸 1.6x 1.0 x 1.8m

POWER 功率 720 kW

40%

More Economical
更经济

Energy storage investment 储能投资 40%↓

98.5%

More Effective
更高效

Full load efficiency 满载效率 95% → 8.5%

10ms

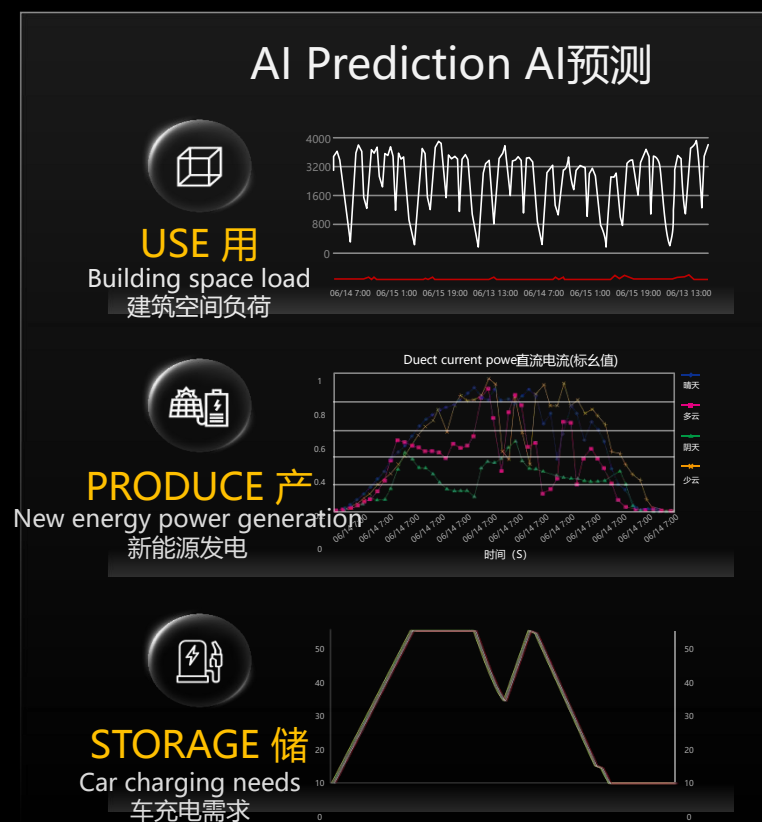
Quicker
更敏捷

Charge and discharge switching 充放切换
<10ms

Energy Brain - Energy Carbon Manager, smart energy prediction and flexible scheduling

Able to make energy interaction of building complexes,
making building energy carbon visible, manageable and optimized

能源大脑—能碳管家，能源智能预测及柔性调度
可实现建筑群能源互动，让建筑能碳可视、可管、可优



Created a flexible and intelligent production line for new energy products to
promote the industrialization of energy products

打造了新能源产品柔性智能产线，推动能源产品产业化



Flexible smart production line for new energy products

新能源产品柔性智能产线

AI robot
AI机器人

Smart warehouse logistics
智能仓储物流

Fully automatic testing
全自动测试



PEDF product line
光储直柔系列产品



Solid-state battery
household storage
固态电池户储

V2B bidirectional charging
and discharging pile
V2B双向充放电桩

Modular energy storage
模块化储能



03

Models Create Value
模 式 创 造 价 值

Contract Energy Management EMC, share energy-saving benefits and new energy benefits

-zero carbon emission demonstration community renovation public construction project in Ganquan Road, Futian District, Shen

Shenzhen's first "near-zero carbon" emission zone demonstration project

合同能源管理EMC，分享节能效益、新能源收益

深圳市福田区甘泉路近零碳排放示范社区改造公建项目

深圳首个“近零碳”排放区示范工程



Issued by National Center for
Quality Inspection & Testing of
Building Energy Efficiency
国家建筑节能质量检验检测中心颁发

Air conditioning energy
consumption and expected goals

空调用能情况
及预期目标

2.17 million kWh
Average value from
2018 to 2021
217万kWh
2018-2021年平均值

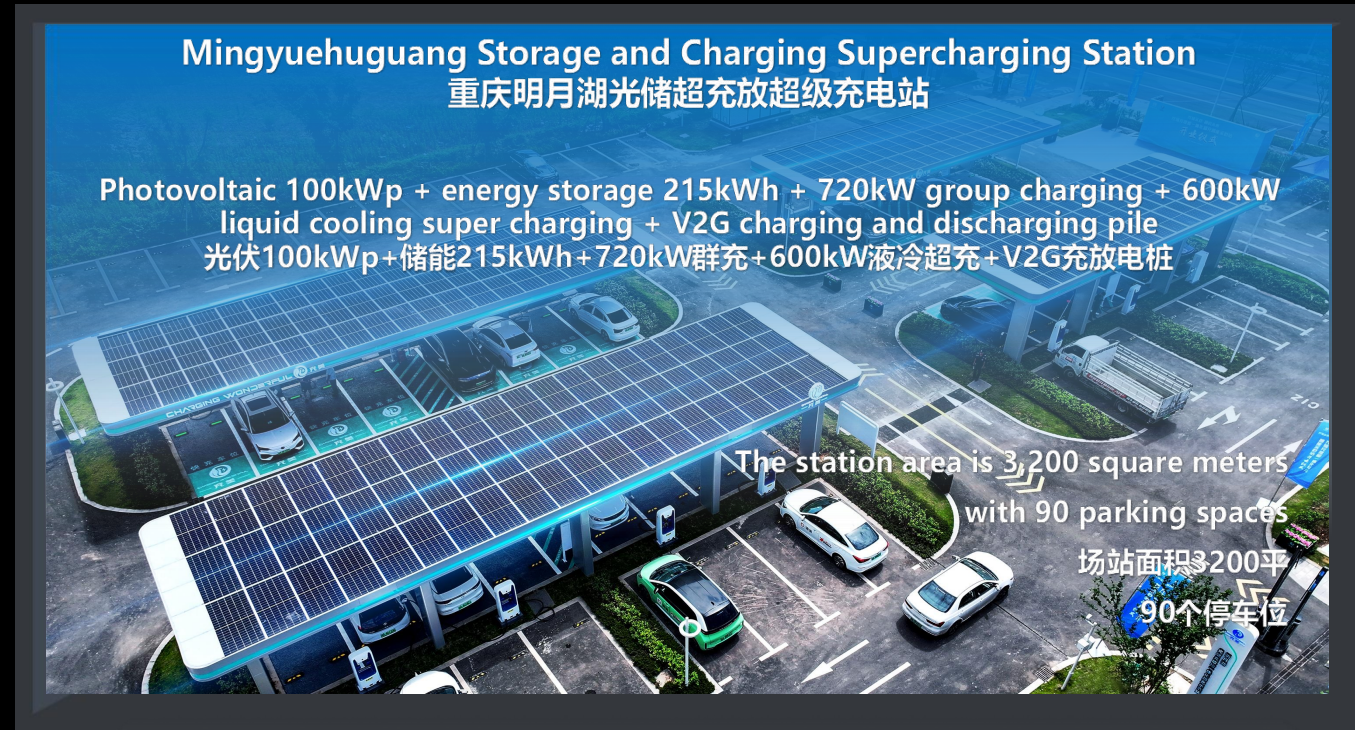
1.3 million kWh
Target value
130万kWh
目标值

1.08 million kWh
Actual forecast value
108万kWh
实际预测值

↓ 50%

Recruiting global "city partners" to jointly promote the supercharging "hundreds of millions" project

招募全球“城市合伙人”，共同推进超充“百千万”工程



Goal for 2025 : "100 cities, 1,000 stations, 10,000 piles"
2025年目标：“百城、千站、万桩”

Virtual power plants enable energy aggregation and intelligent dispatch, boosting per-kWh revenue by over 3.5 times — turning every building and every photovoltaic storage and charging station into a micro power plant.

虚拟电厂对能源聚合和智慧调度，让度电收益提升超3.5倍 让每一栋建筑、每一个光储充换场站都变成微型发电厂



04

Innovation Leads the Future

创 新 引 领 未 来

Develop cutting-edge low-carbon building materials and components for low-carbon/zero-carbon buildings

布局面向低碳/零碳建筑的前沿低碳建材与部品



Perovskite BIPV 钙钛矿BIPV

Three Signature Series: Aluminum Panels, Stone-Textured Finishes, and Iridescent Coatings

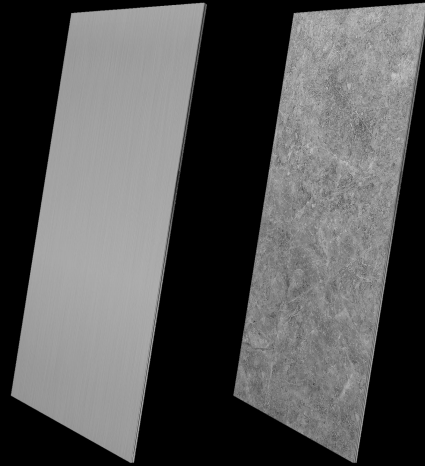
Achieving power conversion efficiency of up to 17%, seamlessly integrating architectural aesthetics with solar generation.

High performance, stunning appearance, low carbon footprint, and high return on investment.

铝板/仿石材/炫彩3大系列

发电效率最高达17%，建筑装饰与发电良好融合

高性能、高颜值、高降碳、高回报



Aerogel Thermal Insulation Products 气凝胶保温隔热产品

Two Core Categories: Aerogel Coatings and Composite Panels

Reduce the thickness of building envelopes by over 30%, while meeting Class A fire safety standards.

Delivering superior thermal insulation, fire protection, and effective carbon reduction.

气凝胶涂料和复合板材两大类

建筑围护结构厚度减少30%以上，A级防火标准

高效保温、安全防火、有效降碳

AI + Design

AI + 设计

From "Human Brain" to "Computer"

从 "人脑" 到 "电脑"

AI + Construction

AI + 建造

From "Muscle" to "Machine"

从 "肌肉" 到 "机器"

From "On-site Construction"
to "Factory-based Production"

从 "现场" 到 "工厂"

AI + Fabrication

AI + 制造

From "Repairing"
to "Cultivating"

从 "修理" 到 "修身"

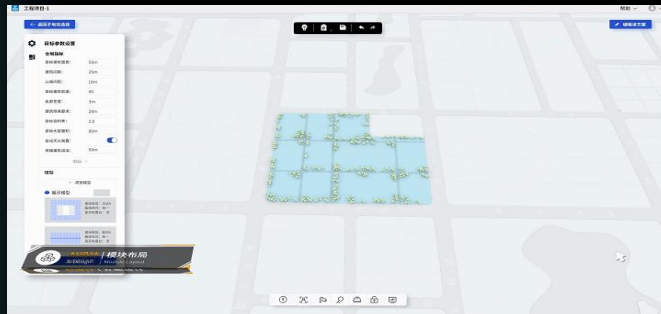
AI + Operation

AI + 运营

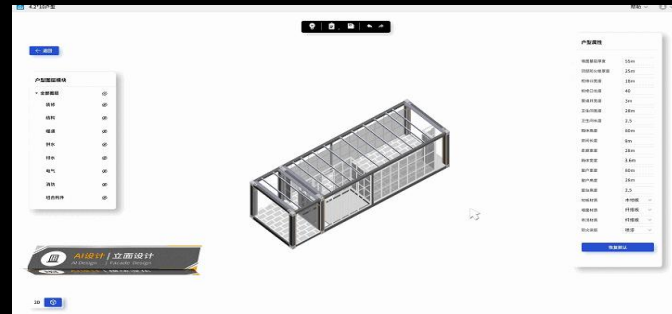
AI + design: integrated design, quality improvement and efficiency enhancement

AI+设计：一体化设计，提质增效

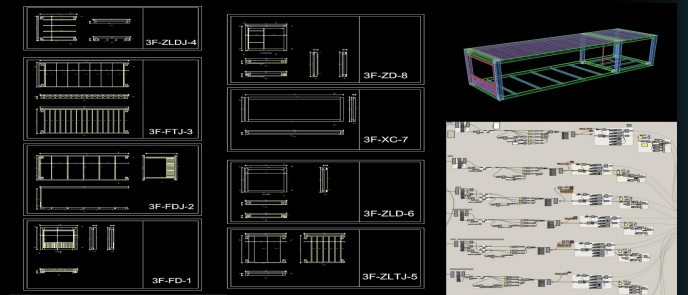
The AI-powered intelligent design platform enables digital and intelligent design of modular steel-structure buildings, shortening design cycles by **60%** and improving efficiency by **30%**
AI智能设计平台实现模块化钢结构建筑数智化设计，周期缩短**60%**，效能提升**30%**



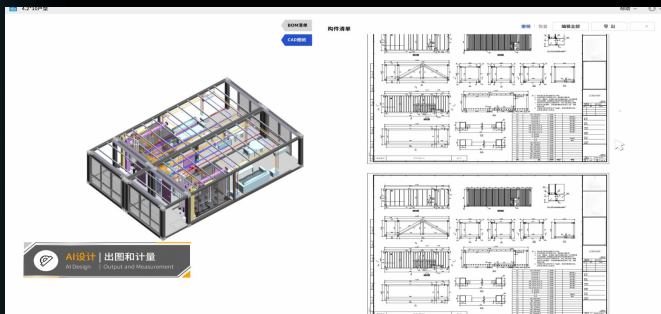
AI方案设计 AI Solution Design



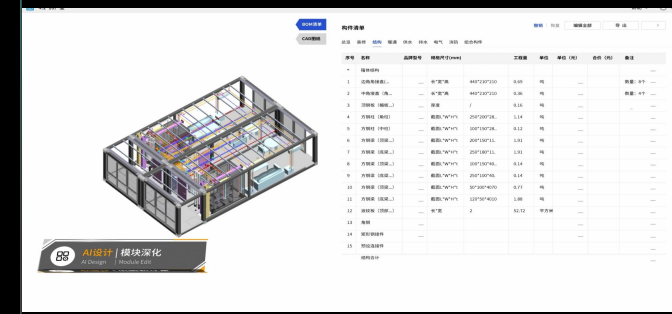
AI Module Detailing AI模块深化



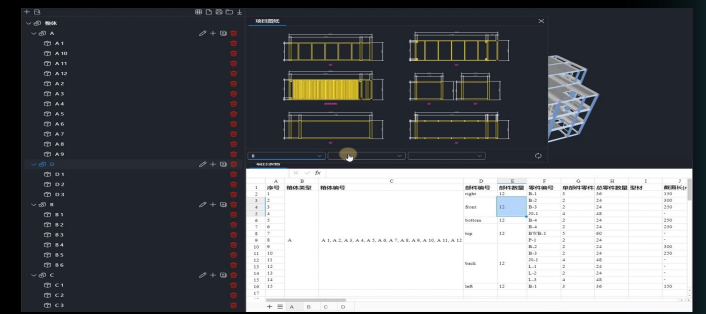
AI Drawing Generation AI图纸生成



AI Automated Drawing Generation AI自动出图



AI Automated Quantity Takeoff AI自动算量

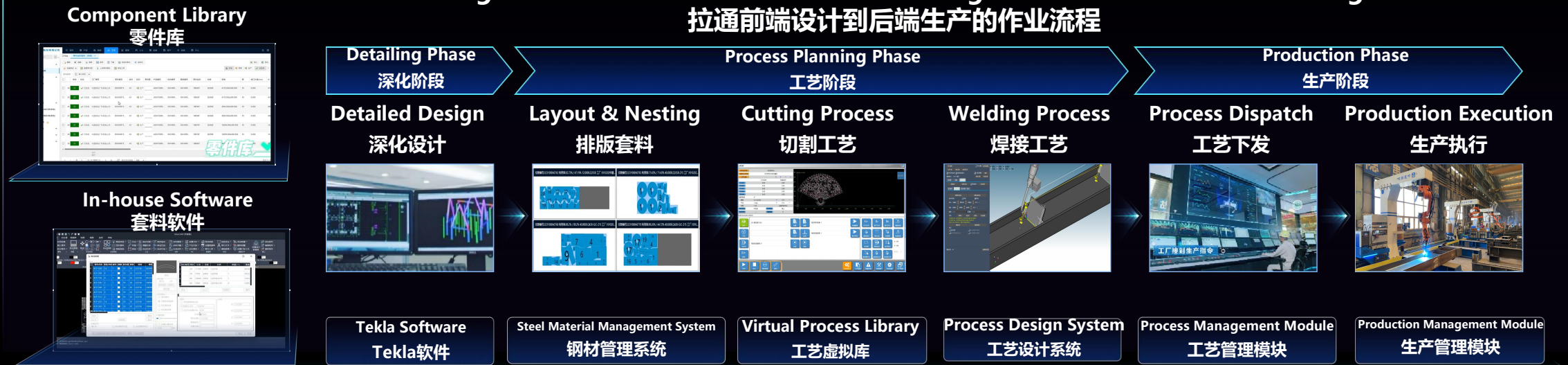


Integrated Linkage of Models、Drawings and Material Lists
模型、图纸、料单联动

AI + Fabrication: Digitalized Management and Intelligent Full-Chain Control
An AI-driven collaborative platform connects the entire end-to-end process of steel structure production—from design to fabrication—enabling **full-process digital and intelligent management.**

AI+制造：数字化管理，智控全链
AI协同平台，拉通钢结构从设计到生产的端到端流程，实现**全过程数智化管控**

Integrated Workflow from Front-End Design to Back-End Manufacturing
拉通前端设计到后端生产的作业流程



AI + Fabrication: Empowering Equipment for Excellence

AI has enabled the development of **14** intelligent robots for steel structure processes—including cutting, welding, logistics, and surface treatment—resulting in an **80%** increase in operational efficiency.

AI+制造：赋能制造装备，精益求精

AI助力研发钢结构切割、焊接、物流、表面处理等**14**款智能机器人，效能提升**80%**



Robotic Welding Workstation for Corbel Joints
牛腿机器人焊接工作站



AGV Autonomous Mobile Robot
AGV无人搬运机器人



Fully Automatic Cutting Machine / Cutting Robot
全自动切割机/切割机器人



Robotic Welding Workstation for Box Assembly
箱型总成机器人焊接工作站

AI + Construction: Empowering construction equipment, green and safe
Intelligent robots such as steel column welding, wall panel installation, and plate
nailing **can take over high-risk operations**

AI+建造：赋能施工装备，绿色安全
钢柱焊接、墙板安装、板材打钉等智能机器人，**可接管高危作业**



Arc Welding (Rail-Mounted) Robot
电弧焊接（轨道式）机器人



Wall Panel Installation Robot
墙板安装机器人



Intelligent Nailing Robot
智能打钉机器人



Intelligent Welding
智能化焊接

Line Laser Vision Sensing
线激光视觉传感

Multi-layer Multi-channel AI
Planning 多层多道AI规划

Full Simulation of Welding Molten Pool
焊接熔池全仿真

Stable and Efficient
稳定高效

Full Intelligent, Full Penetration
全智能、全熔透焊接

Adaptively Adjust Welding Parameters
自适应调整参数

150% More Effective than Manual Labor

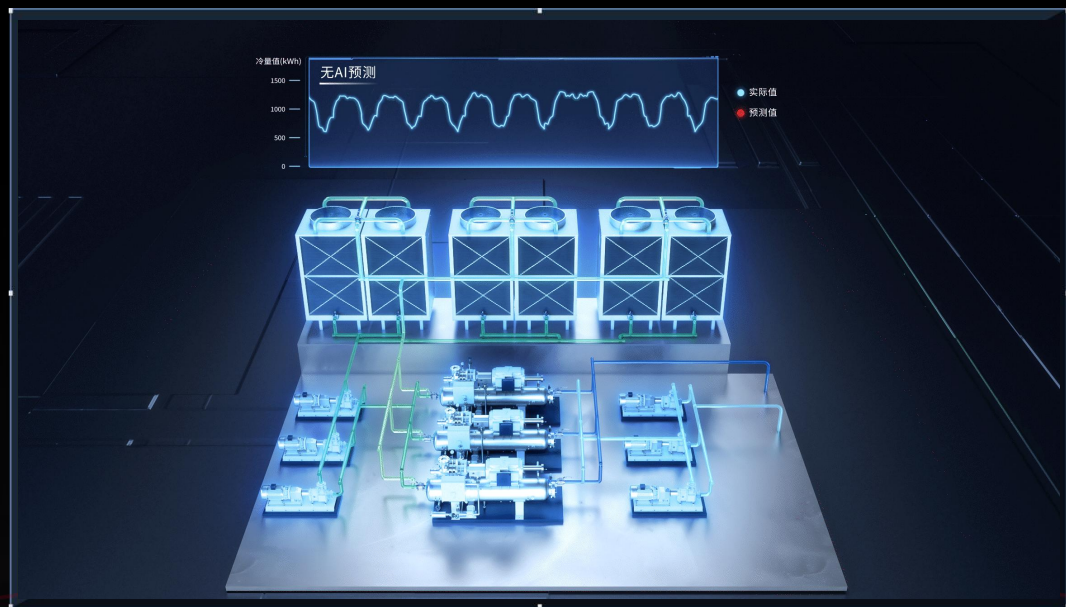
较人工提效 **1.5倍**

AI + Operation: Empowering Energy Conservation and Emission Reduction with Intelligent Energy Efficiency

Proactive Load Prediction for Cooling Stations of Central Air Conditioning,
Automated Optimization of Equipment Operation, **Achieving 15%–25% Comprehensive Energy Savings**

AI + 运营：助力建筑节能减排，智控能效

中央空调的冷站负荷主动预测，设备运行自动优化，综合节能**15% - 25%**



Sensing Parameters 感知参数

People Distribution
人员分布

Indoor/Outdoor
Temperature and Humidity
室内外温湿度
.....

Load Rate
负荷率

Intelligent Algorithm 智能算法

Xgboost

Lightgbm

Catboost
.....

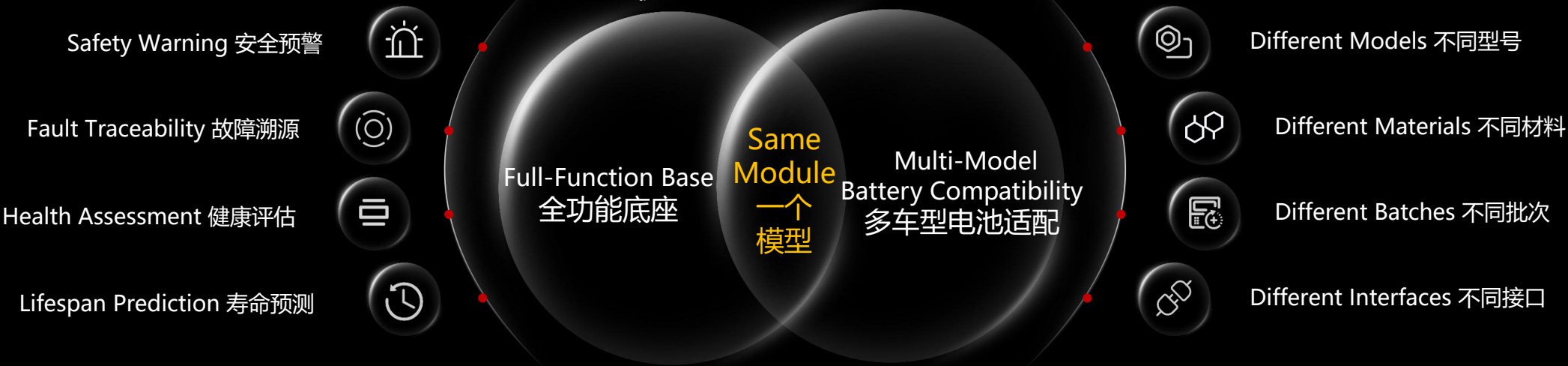
AI + Operations: Safeguarding Energy Usage Safety with Intelligent Inspection and Security

Accurately Predicting Potential Risks of New Energy Products, Battery Discharge as an Immediate “Health Check”

AI + 运营：守护用能安全，智检安防

新能源产品潜在风险精准预测，**电池放电即“体检”**

PERB 2.0: The World’s Largest Battery Large-scale Model 全球最大电池大模型PERB2.0



The World’s Largest Battery Dataset with the Most Fault Labels, Enabling
全球电池数据量和故障标签最多

1.2B

model size
模型参数量

2.5TWh

data parity
数据当量

Accurate Predictions
精准预测

93%

fault detection accuracy
综合故障识别率高于

≤6%

early-life prediction error rate
早期寿命预测误差率

The integration of building, vehicle and grid will be one of the key pathways
for the low-carbon transformation of the steel structure industry.

建筑-交通-能源融合将是钢结构产业低碳转型的重要途径之一

Join Hands for Progress, Embrace Cross-Industry Integration,
Rooted in the Domestic Market, and Venture Abroad as a Team

携手共进，跨界融合，立足国内，组团出海



Because We Believe, We See

因为相信 所以看见

Because We Have Vision, We Achieve Greatness

因为远见 所以伟大

Let Us Work Together to Create a Zero-Carbon Future

让我们一起 共创零碳未来