


# CATALOG 2026

## Products & Solutions & Services


ENNEAGON
ENERGY



# CONTENTS


01 Company Profile

07 Battery Pack Assembly

15 Charging Equipment

25 Battery Swapping Equipment

41 Power Electronics & Control

49 Cloud Platform

53 Solution Advantages

67 Applications

# Shanghai Enneagon Energy Technology Co.,Ltd. (Enneagon Energy)

Founded in 2014 and headquartered in Jiading, Shanghai, Enneagon Energy is a leading provider of integrated energy solutions for electric heavy-duty trucks in China. The company was listed on the National Equities Exchange and Quotations (NEEQ, stock code: 874949) in December 2025, with a registered capital of RMB 83.95 million.

### Core Products & Market Position

The company specializes in three product lines: battery pack assemblies, battery swap stations, and charging equipment.

• Battery Pack Assemblies — Cumulative deliveries exceeding 100,000 units, compatible with 50+ OEMs and 800+ vehicle models. Charge-and-swap compatible packs hold over 70% market share in the heavy-truck battery swap segment.

• Battery Swap Stations — 724 stations delivered, accounting for approximately 60.33% of the total market.

• Charging Equipment — High-power DC chargers ranging from 240 kW to 3,000 kW, with module efficiency up to 98.5%.

### Applications & Network

Products cover heavy trucks, mining trucks, construction machinery, and electric vessels. The company operates 700+ swap stations and 1,100+ charging stations across 250+ cities in 31 provinces.

### R&D & Credentials

A national "Little Giant" specialized enterprise and high-tech enterprise, Enneagon employs 167 R&D professionals (17.71% of staff), holds 249 granted patents (including 120 invention patents), and has led or contributed to 50+ national, industry, and group standards.

### Customers & Markets

Key customers include FAW Jiefang, XCMG Automobile, Sinotruk, Qiyuan Core Power, and China Southern Power Grid. Sales are concentrated in East China, North China, Southwest, and Northwest China.

### Future Strategy

Enneagon will continue to anchor on heavy-truck battery swapping while expanding into high-power charging, intelligent energy management, chassis-level battery swapping, electric vessels, and overseas markets. The company is building a digital charging and swapping platform, co mmitted to becoming a world-leading provider of integrated green energy solutions.

* Company operating data as of December 31, 2025; patent data as of March 12, 2026.



# Nationwide Network ENNEAGON ENERGY

**Headquarters:** 258 Xupan Road, Xuhang Town, Jiading District, Shanghai

**Sales & Service Centers:**

Room 3301A, Hechuang Center, 353 Yijing Road, Haizhu District, Guangzhou

Room 803, 257 Zhiyin Avenue (China Overseas Plaza), Hanyang District, Wuhan, Hubei Province

Room 2002, Unit 2, Building 3, Jingkai Plaza, Zhengzhou Economic Development Zone, Henan Province

Room 711, Tower T7, China Resources Building, 1 Changxing Road, Changfeng West Street, Wanbailin District, Taiyuan, Shanxi Province

Room 1807, Tower A, Changhe International, Weiyang District, Xi'an, Shaanxi Province

Room 1903, 88 Jitai 5th Road, Wuhou District, Chengdu, Sichuan Province

Room 1303, Building 2, YOYO Global Harbor, No. 353 Fenghuangshan Street, Saybag District, Urumqi, Xinjiang



Shanghai Enneagon Energy Technology Co.,Ltd. (Headquarters)

Sales & Service Center

Dongshi Enneagon / Xugong Enneagon

Xi'an Factory / Yueyang Factory

# Milestones

## 2014

- Company founded in Shanghai
- Initiated participation in large-scale national infrastructure electrification projects

## 2016

- Delivered automated charging station systems for Phase IV of Shanghai Yangshan Deep-Water Port
- Designed, built, and co mmissioned Shanghai's first BOT-model charging station

## 2018

- Launched China's first intelligent battery swap station for electric heavy-duty trucks
- Established a joint venture with State Power Investment Corporation for co mmercial vehicle operations
- Invested in Shanghai's largest public charging station (Bao'an Highway)

## 2019

- Co-established the State Grid Smart Energy Transportation Technology Innovation Center in Suzhou
- Delivered the world's first co mmercial heavy-duty truck battery swap station project in Miyun, Beijing
- Selected as a core supplier by China Southern Power Grid for electric vehicle solutions

## 2020

- Became a core supplier to State Grid Electric Vehicle Service Company
- Co mmissioned China's first dedicated airport taxi charging station at Shanghai Hongqiao Airport

## 2025

• Listed on the National Equities Exchange and Quotations (NEEQ)
• Awarded the New Energy Technology Innovation Golden Bull Award
• Established Enneagon manufacturing subsidiaries in Yueyang and Xi'an

## 2023

• Unveiled the autonomous heavy-duty truck battery swap station at Yangshan Port
• Project jointly invested by major central state-owned enterprises
• Cumulative delivery of battery swap stations exceeded 400 units
• Total battery pack production surpassed 40,000 units
• Market-approved heavy-duty truck models exceeded 550 variants

## 2026

• Designated Shanghai Innovative Enterprise Headquarters

## 2024

• Recognized as a National Specialized, Refined, and Innovation-Driven Enterprise
• Awarded First Prize in the China Association of Transportation Science and Technology Progress Awards

## 2021

• Cumulative delivery of heavy-duty truck battery swap stations exceeded 100 units
• Total installed power battery packs surpassed 10,000 units
• Market-approved heavy-duty truck models exceeded 200 variants



# Core Products

## Integrated software and hardware technologies delivering competitive advantages in EV charging and battery swapping infrastructure

With independent R&D and manufacturing capabilities for a complete suite of equipment—including charging systems, battery swapping, power electronics, and battery pack assemblies—combined with advanced digital cloud platforms, we are co mmitted to providing customers with efficient green electric transportation solutions.



### Battery Pack Assembly

- Battery Pack Assembly
- B-Box & T-Box
- Battery Pack Recycling, Disassembly & Second-Life Applications



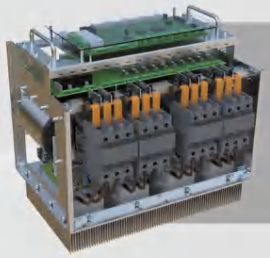
### Charging Equipment

- Charging Module
- Monitoring and Metering System
- Connection Cable
- Safety Protection Device




### Battery Swapping Equipment

- Battery Swapping Robots
- Gantry Systems
- Rack-Mounted Equipment
- Mobile Station
- Station-Level Monitoring Systems
- Power Supply and Distribution Systems



### Power Electronics & Control

- Power Conversion System
- High-Power DC Charging Module
- High-Voltage Box
- High-Voltage Controller



### Enneagon Cloud Platform

- Recharge Cloud
- Battery Cloud
- Energy Management Cloud
- Autonomous Operations
- Fleet Services

# Key Achievements

Battery Swap Stations Deployed **700+**

Charging Stations Deployed **1100+**

Provincial Coverage **6+**

Cities Served **250+**

Compatible Vehicle Models **800+**

Equipment Units Delivered **100,000+**

OEM Partners **50+**

Cumulative Safe Mileage **10 Billion KM**

# Battery Pack Assembly



## Charge-and-Swap Series

**Enhanced Safety**

- Fully developed in-house, highly integrated products, with system data accessible anytime, anywhere

**Extended Service Life**

- New high-strength locking mechanism secures the upper frame, ensuring stable operation for over 10 years

**Superior Stability**

- Exceeding GB/T 31467.3-2015 vibration testing standards, passed 10,000 km of enhanced road-surface testing on a proving ground, and meets the mandatory inspection certification requirements of GB/T 40032-2025

**Reduced Energy Consumption**

- Intelligent and efficient thermal management utilizing highly integrated modular wiring harnesses and molded tubing

**Reduced Weight**

- Compared to products with the same battery capacity, weight is reduced by 20–30%, with product space optimized by 0.45-1.1 $m^3$



## Non-Road Series

- Platform architecture, adaptable to various batteries
- The frame structure meets the most stringent vibration test road profile requirements
- 1400A high-current charging and discharging capability, boosting capacity without extending charging time
- Global full-temperature-range adaptability, meeting the requirements of high-end customers for 426 to 1200 kWh mining applications on a unified platform



# Charging Edition Series

## Lighter Weight

- The overall weight reduction of the upper frame is 150 kg, with sheet metal components shedding 100 kg and trim panels reducing 50 kg
- The frame utilizes a bolted connection design, reducing logistics costs while enabling rapid assembly

## Lower Center of Gravity

- Battery layer spacing reduced by ≥ 290 mm

## Water-Cooled Unit Compatible with Heat Pump

- Water-cooled unit stands at 260 mm overall height and utilizes a 600 V high-voltage platform
- The water-cooled unit supports either cooling-only + PTC or heat pump mode, integrating with the vehicle's air conditioning heat pump for unified thermal management, achieving over 10% energy savings

## High-Voltage Box with Charging Port

- The high-voltage box features a further reduced height while incorporating charging port functionality. This design shortens high-voltage cable length and enhances the charging port's overcurrent capacity

# Battery Swap Series

## LHP

- New lightweight design with equivalent strength, compact size
- Battery capacity options from 282 to 405kWh, compatible with batteries from different manufacturers
- Standardized product lines require no secondary calibration by vehicle manufacturers



| Name | LHP 282 | LHP 350 | LHP 400 |
|---|---|---|---|
| Nominal Capacity (kWh) | 281.9 | 350.0 | 400.6 |
| Rated Voltage (V) | 618.2 | 579.6 | 618.2 |
| Rated Charge/Discharge Capacity (A) | 400 / 450 | 400 / 450 | 600 / 600 |
| Battery Brand | Applicable to all brands | Applicable to all brands | Applicable to all brands |
| Battery Model | C Box / H Box | C Box / H Box | D Box |
| Thermal Management Method | Liquid-cooled and heated | Liquid-cooled and heated | Liquid-cooled and heated |
| Overall dimensions (L × W × H) | 2460 × 810 × 2070 mm | 2460 × 810 × 2230 mm | 2460 × 810 × 2070 mm |
| Protection Rating (PACK) | IP67 | IP67 | IP67 |
| Upper Frame System Weight (t) | 2.6 | 3.1 | 3.4 |
| Weight of vehicle-mounted base support system (t) | 0.4 | 0.4 | 0.4 |

## SLP

- Greater capacity, lighter weight, smaller size, lower center of gravity
- Pack system isolated from water-cooled unit for dust-free operation
- Integrated charging and swapping design compatible with international battery swap solutions
- Capacity options from 282 to 600 kWh, compatible with batteries from various manufacturers
- Standardized modular products requiring no secondary calibration by vehicle manufacturers
- Vehicle-mounted base tray with contoured subframe design eliminating need for chassis modifications



| Name | SLP 400 | SLP 600 |
|---|---|---|
| Nominal Capacity (kWh) | 400.6 | 600.9 |
| Rated Voltage (V) | 618.2 | 618.2 |
| Rated Charge/Discharge Capacity (A) | 600 / 600 | 600 / 600 |
| Battery Brand | Applicable to all brands | Applicable to all brands |
| Battery Model | CTB Box / D Box | D Box / Q Box |
| Thermal Management Method | Liquid-cooled and heated | Liquid-cooled and heated |
| Communication Protocol | GB/T 27930 | GB/T 27930 |
| Overall dimensions (L × W × H) | 2456 × 846 × 1660 mm<br>2460 × 810 × 1690 mm | 2490 × 840 × 2230 mm |
| Protection Rating (PACK) | IP67 | IP67 |
| Upper Frame System Weight (t) | 3.3 | 4.8 |
| Weight of vehicle-mounted base support system (t) | 0.4 | 0.5 |

# Battery Swap Series

## LHP Pro



- Designed based on road profiles reflecting harsh domestic operating conditions, with structural reinforcements to accommodate poor road conditions in mining areas both domestically and internationally
- Battery capacity options range from 282 to 400 kWh, compatible with batteries from various manufacturers
- Universal vehicle vehicle-mounted base tray
- Standardized, pre-assembled products that require no secondary calibration by vehicle manufacturers

| Name | LHP 350 Pro | LHP 375 Pro | LHP 400 Pro |
|---|---|---|---|
| Nominal Capacity (kWh) | 350.2 | 375.6 | 400.6 |
| Rated Voltage (V) | 576 | 579.6 | 618.2 |
| Rated Charge/Discharge Capacity (A) | 500 / 500 | 400 / 450 | 600 / 600 |
| Battery Brand | Applicable to all brands | Applicable to all brands | Applicable to all brands |
| Battery Model | C Box / H Box | C Box | D Box |
| Thermal Management Method | Liquid-cooled / Liquid-cooled and heated | | Liquid-cooled and heated |
| Overall dimensions (L × W × H) | 2490 × 840 × 2230 mm | 2490 × 840 × 2230 mm | 2490 × 840 × 2070 mm |
| Protection Rating (PACK) | IP67 | IP67 | IP67 |
| Upper Frame System Weight (t) | 3.4 | 3.4 | 3.7 |
| Weight of vehicle-mounted base support system (t) | 0.5 | 0.5 | 0.5 |

## SLP Pro



- Designed based on domestic harsh operating conditions, with structural reinforcements to accommodate poor road conditions in mining areas both domestically and internationally
- The Pack system features an isolated design from the water-cooling unit, ensuring dust-free operation
- Integrated charging and battery-swapping design, compatible with international battery-swapping solutions
- Compatible with batteries from different manufacturers
- Standardized battery pack products require no secondary calibration by vehicle manufacturers
- Universal vehicle mounting base

| Name | SLP 400 Pro | SLP 600 Pro |
|---|---|---|
| Nominal Capacity (kWh) | 400.6 | 600.9 |
| Rated Voltage (V) | 618.2 | 618.2 |
| Rated Charge/Discharge Capacity (A) | 600 / 600 | 600 / 600 |
| Battery Brand | Applicable to all brands | Applicable to all brands |
| Battery Model | F Box / D Box | F Box / D Box |
| Thermal Management Method | Liquid-cooled and heated | Liquid-cooled and heated |
| Communication Protocol | GB/T 27930 | GB/T 27930 |
| Overall dimensions (L × W × H) | 2490 × 840 × 1720 mm | 2490 × 840 × 2230 mm |
| Protection Rating (PACK) | IP67 | IP67 |
| Upper Frame System Weight (t) | 3.6 | 5.2 |
| Weight of vehicle-mounted base support system (t) | 0.5 | 0.5 |

# Battery Swap Series

## CSP (Simple Swap)



- Greater capacity, lighter weight, smaller size, lower center of gravity
- Pack system isolated from water-cooled unit for dust-free operation
- Integrated charging and swapping design compatible with international battery swap solutions
- Battery capacity options range from 282 to 600 kWh, compatible with batteries from various manufacturers
- Standardized modular products eliminate the need for secondary tuning by vehicle manufacturers
- Onboard vehicle-mounted base tray with mechanical manual locking mechanism for simple operation;
- low weight of 290kg vehicle-mounted base tray; reduced cost by replacing four connectors with one

| Name | CSP 400 | CSP 600 |
|---|---|---|
| Nominal Capacity (kWh) | 400.6 | 600.9 |
| Rated Voltage (V) | 618.2 | 618.2 |
| Rated Charge/Discharge Capacity (A) | 600 / 600 | 600 / 600 |
| Battery Brand | CATL | CATL |
| Battery Model | D06 | D06 |
| Thermal Management Method | Liquid-cooled and heated | Liquid-cooled and heated |
| Communication Protocol | GB/T 27930 | GB/T 27930 |
| Overall dimensions (L × W × H) | 2490 × 840 × 1660 mm | 2490 × 840 × 2230 mm |
| Protection Rating (PACK) | IP67 | IP67 |
| Upper Frame System Weight (t) | 3.3 | 4.8 |
| Weight of vehicle-mounted base support system (t) | 0.3 | 0.3 |

## CSP-KY (Simple Battery Swap for Stacked Batteries)



- Higher energy density, smaller size, and lower center of gravity
- Compatible with next-generation stacked batteries from various manufacturers
- Interchangeable with standard battery pack assembly products on simple battery-swapping platforms

| Name | CSP-KY 450 | CSP-KY 600 |
|---|---|---|
| Nominal Capacity (kWh) | 450.1 | 600.1 |
| Rated Voltage (V) | 656.9 | 656.9 |
| Rated Charge/Discharge Capacity (A) | 600-800 / 600-800 | 600-800 / 600-800 |
| Battery Brand | CATL | CATL |
| Battery Model | D01 | D01 |
| Thermal Management Method | Liquid-cooled and heated | Liquid-cooled and heated |
| Communication Protocol | GB/T 27930 | GB/T 27930 |
| Overall dimensions (L × W × H) | 2460 × 850 × 1433 mm | 2460 × 850 × 1690 mm |
| Protection Rating (PACK) | IP67 | IP67 |
| Upper Frame System Weight (t) | 3.3 | 4.3 |
| Weight of vehicle-mounted base support system (t) | 0.3 | 0.3 |

# Charging Edition Series

## Charging Edition Series



- Greater capacity, lighter weight, smaller size, lower center of gravity
- Supports high-current charging and discharging, with capacity options ranging from 400 to 600 kWh, compatible with batteries from various manufacturers
- Standardized battery pack solution, eliminate the need for secondary tuning by vehicle manufacturers
- High-voltage adapters available for compatibility with different battery types

| Name | Charging Edition Series | | | |
|---|---|---|---|---|
| Nominal Capacity (kWh) | 400.6 | 466.0 | 528.1 | 600.9 |
| Rated Voltage (V) | 618.2 | 579.6 | 656.9 | 618.2 |
| Rated Charge/Discharge Capacity (A) | 600 / 600 | 600 / 600 | 600 / 600 | 600 / 600 |
| Battery Brand | CATL | CATL | CATL | CATL |
| Battery Model | D06 | D04 | D05 | D06 |
| Thermal Management Method | Liquid-cooled and heated | | | |
| Communication Protocol | GB/T 27930 | GB/T 27930 | GB/T 27930 | GB/T 27930 |
| Overall dimensions (L × W × H) | 2490 × 840 × 1960 mm | 2490 × 840 × 2390 mm | 2490 × 840 × 2390 mm | 2490 × 840 × 2390 mm |
| Protection Rating (PACK) | IP67 | IP67 | IP67 | IP67 |
| Upper Frame System Weight (t) | 3.6 | 3.9 | 4.4 | 4.8 |

## Charging Edition Series (Stacked Batteries)



- Higher energy density, with no complex structural framework
- Supports high-current charging and discharging, and is compatible with stacked batteries from different manufacturers

| Name | Charging Edition Series (Stacked Batteries) | |
|---|---|---|
| Nominal Capacity (kWh) | 450.1 | 600.1 |
| Rated Voltage (V) | 656.9 | 656.9 |
| Rated Charge/Discharge Capacity (A) | 800 / 800 | 800 / 800 |
| Battery Brand | CATL | CATL |
| Battery Model | D01 | D05 |
| Thermal Management Method | Liquid-cooled and heated | Liquid-cooled and heated |
| Communication Protocol | GB/T 27930 | GB/T 27930 |
| Overall dimensions (L × W × H) | 2500 × 850 × 1195 mm | 2500 × 850 × 1450 mm |
| Protection Rating (PACK) | IP67 | IP67 |
| Upper Frame System Weight (t) | 3.2 | 4.1 |

# Non-Road Series

## Construction Machinery



- Meets the development needs of mining projects, compatible with diverse scenarios including excavation, loading, and ore transportation
- Battery capacity options range from 400 to 600 kWh, compatible with batteries from various manufacturers
- Standardized vehicle-mounted base tray adapts to multiple vehicle models for excavation, loading, and ore transportation.
- Optional locking mechanisms include pneumatic drive, hydraulic drive, pin-lock, and downward pressure
- Integrated charging and swapping design compatible with international battery swapping solutions
- Compatible with fire suppression systems

| Name | YX 400 | YX 600 |
|---|---|---|
| Nominal Capacity (kWh) | 400.6 | 600.9 |
| Rated Voltage (V) | 618.2 | 618.2 |
| Rated Charging Capacity | Single-port: 300A-600A / Dual-port: 600A-1200A | |
| Battery Brand | CATL | CATL |
| Thermal Management Method | Liquid cooling and heating | Liquid cooling and heating |
| Overall dimensions (L × W × H) | 2460 × 845 × 1720 mm | 2460 × 845 × 2230 mm |
| Protection Rating (PACK) | IP67 | IP67 |
| Upper Frame System Weight (t) | 3.6 | 5.2 |
| Weight of vehicle-mounted base support system (t) | 0.5 | 0.5 |

## Mining Truck



- High capacity with support for high-current charging and discharging
- Pack system features isolated design from water-cooled units, ensuring dust-free operation
- Integrated charging and swapping design compatible with national standard battery swap solutions
- Capacity options ranging from 426 to 1200 kWh, compatible with batteries from various manufacturers
- Standardized modular products requiring no secondary tuning by vehicle manufacturers

| Name | MTP 426 | MTP 568 | MTP CTB 800 / MTP Q 800 / MTP 800 | MTP 1000 / MTP Q 1000 |
|---|---|---|---|---|
| Nominal Capacity (kWh) | 426.6 | 568.8 | 801.2 | 1001.5 |
| Rated Voltage (V) | 618.2 | 618.2 | 618.2 | 772.8 / 618.2 |
| Rated Charge/ Discharge Capacity (A) | 650 / 650 | 800 / 920 | 800-1000 / 1000 | 1000-1200 / 1000-1200 |
| Battery Brand | QIYUAN | QIYUAN | QIYUAN / CATL | QIYUAN |
| Battery Model | CTB Box | CTB Box | CTB Box / Q Box / D02 Box | D02 Box / Q Box |
| Thermal Management Method | Liquid-cooled and heated | Liquid-cooled and heated | Liquid-cooled and heated | Liquid-cooled and heated |
| Communication Protocol | GB/T 27930 | GB/T 27930 | GB/T 27930 | GB/T 27930 |
| Overall dimensions (L × W × H) | 3500 × 1250 × 1820 mm | 3500 × 1250 × 1820 mm | 3500 × 1250 × 2080 mm<br>4300 × 1280 × 1520 mm<br>4300 × 1400 × 1520 mm | 4300 × 1400 × 1835 mm |
| Protection Rating (PACK) | IP67 | IP67 | IP67 | IP67 |
| Upper Frame System Weight (t) | 5.0 | 6.0 | 7.0-7.8 | 9.3 |
| Weight of vehicle-mounted base support system (t) | 1.2 | 1.2 | 1.2-1.3 | 1.3 |

# Non-Road Series

## Saddle-Type Battery Assembly



- Low profile and compact size, does not obstruct rear visibility
- Integrated charging and swapping design, compatible with batteries from different manufacturers
- Standardized modular product, no secondary calibration by vehicle manufacturers
- Vehicle-mounted vehicle-mounted base tray with contouring subframe design, no modifications to vehicle frame structure needed

| Name | Saddle-Type Tilt-Head Battery Assembly |
|---|---|
| Nominal Capacity (kWh) | 281.9 |
| Rated Voltage (V) | 618.2 |
| Rated Charge/Discharge Capacity (A) | 250 / 400 |
| Battery Brand | CATL |
| Battery Model | C Box |
| Thermal Management Method | Liquid-cooled and heated |
| Communication Protocol | GB/T 27930 |
| Overall dimensions (L × W × H) | 2500 × 1200 × 1500 mm |
| Protection Rating (PACK) | IP67 |
| Upper Frame System Weight (t) | 2.5 |
| Weight of vehicle-mounted base support system (t) | 0.3 |

## AIV



- Adopting a suspended battery swap system with low height and compact size, specifically designed for port AIV battery swapping
- Integrated charging and swapping design compatible with batteries from different manufacturers
- Standardized modular products requiring no secondary calibration by vehicle manufacturers

| Name | AIV-282 | AIV-352 |
|---|---|---|
| Nominal Capacity (kWh) | 281.9 | 352.1 |
| Rated Voltage (V) | 618.2 | 656.9 |
| Rated Charge/Discharge Capacity (A) | 400 | 450 |
| Battery Brand | CATL | CATL |
| Battery Model | C Box | D05 Box |
| Thermal Management Method | Liquid-cooled and heated | Liquid-cooled and heated |
| Communication Protocol | GB/T 27930-2015 | GB/T 27930-2015 |
| Overall dimensions (L × W × H) | 2580 × 2632 × 1260 mm | 2580 × 2632 × 1260 mm |
| Protection Rating (PACK) | IP67 | IP67 |
| Upper Frame System Weight (t) | 3.0 | 3.5 |
| Weight of vehicle-mounted base support system (t) | / | / |

# Charging Equipment



## EPDD High-Efficiency Ultra-Fast Charging Series

### Ultra-Efficient Power Conversion

- Medium-Voltage Direct-Drop Technology – converts AC 0.6 to 35 kV to DC 1500 V in a single stage
- Efficiency gain – overall system efficiency improved by ≥4.5%
- Module performance – 98.5% at 50% load, 96.3% at 10% light load
- Substantial energy loss reduction, supporting low-carbon ultra-fast charging

### Cost and Footprint Optimization

- High system integration reduces equipment footprint by approximately 30%
- Independent air duct design lowers long-term maintenance costs

### Designed for Harsh Environments

- High Protection: Entire unit IP54, power cabinet IP55
- Reliable operation in high humidity, high salt spray, and high dust environments

### Flexible Deployment

- Compatible with multiple charging standards (GB, European standards, MCS)
- Supports single- or dual-port configurations and fast / ultra-fast charging combinations



## All-in-One Series

Enneagon's DC all-in-one charging systems integrate power conversion, control, metering, and protection into a compact enclosure, designed for co mmercial fleets, logistics hubs, and public fast-charging applications.

### High Efficiency

- Efficiency ≥ 95%, significantly reducing customer operating costs; Efficiency optimization algorithm, maximizing charging module efficiency

### 3C Certification Compliance

- Complies with standards including GB/T 184871-2023, GB 39752-2024, and GB 44263-2024, implementing CCC standard safety protection

### Environmental Adaptability

- Protection rating IP55, suitable for harsh environments including extreme cold, high salt fog, and high dust levels

### Rapid Charging Capability

- Supports single-port sequential charging and dual-port simultaneous charging, compatible with mainstream high-current charging protocols




## Split-Type Unit Series

### Safety

- Three-Tier Safety Protection System

### High Reliability

- Electrical component compartment and module compartment are separated, protecting electrical components from harsh external environments
- Fully encapsulated modules reduce the equipment failure rate by 5% and extend equipment lifespan
- Ultrasonic welding + soldering technology reduces charging port heat generation and equipment failure rate
- All sheet metal materials upgraded from cold-rolled steel to galvanized steel, enhancing corrosion resistance by 30%

# EPDD High-Efficiency Ultra-Fast Charging Series



| Name | EPDD 600 kW High-Efficiency Ultra-Fast Charging System | EPDD 1200 kW High-Efficiency Ultra-Fast Charging System |
|---|---|---|
| AC Input Voltage | 10 kVac | 10 kVac |
| AC Input Frequency | 50Hz | 50Hz |
| High-voltage Switchgear | 630 A (including incoming switchgear, metering switchgear, outgoing switchgear) | |
| Transformer Capacity | 630 kVA | 1250 kVA |
| Power Factor（PF） | ≥ 0.99 | ≥ 0.99 |
| DC Output Voltage Range | 200-1000 Vdc | 200-1000 Vdc |
| Constant Power Range of Output Voltage | 300-1000 Vdc | 500-1000 Vdc |
| Number of DC Output Interfaces | 8 Channels | 8 Channels |
| Single-Channel Rated Output Power | 75 kW | 150 kW |
| Maximum Single-Channel Output Power | 75 kW | 180 kW |
| Maximum Single-Channel Output Current | 150 A | 300 A |
| Working Temperature | -30℃ to 65℃ （55℃ Derating） | -30℃ to 65℃ （55℃ Derating） |
| Storage Temperature | -40℃ to 70℃ | -40℃ to 70℃ |
| Working Humidity | 5% to 95% | 5% to 95% |
| Measurement Accuracy | Class 1.0 | Class 1.0 |
| Power Distribution Method | External switchgear cabinet available, Switching granularity: 75 kW | External switchgear cabinet available, Switching granularity: 150 kW |
| Cooling Method | Independent Air Duct System | Independent Air Duct System |
| Protection Rating | Transformer section: IP54<br>Power cabinet section: IP55 | Transformer section: IP54<br>Power cabinet section: IP55 |
| Structural Dimensions (Width × Depth × Height) | 3250 mm × 2900 mm × 2650 mm | 3250 mm × 2900 mm × 2650 mm |

# EPDD High-Efficiency Ultra-Fast Charging Series



| Name | EPDD 1800 kW High-Efficiency Ultra-Fast Charging System | EPDD 2400 kW High-Efficiency Ultra-Fast Charging System | EPDD 3000 kW High-Efficiency Ultra-Fast Charging System |
|---|---|---|---|
| AC Input Voltage | 10 kVac | 10 kVac | 10 kVac |
| AC Input Frequency | 50Hz | 50Hz | 50Hz |
| High-voltage Switchgear | 630 A ( including incoming switchgear, metering switchgear, outgoing switchgear ) | | |
| Transformer Capacity | 2000 kVA | 2500 kVA | 3100 kVA |
| Power Factor（PF） | ≥ 0.99 | ≥ 0.99 | ≥ 0.99 |
| DC Output Voltage Range | 200-1000 Vdc | 200-1000 Vdc | 200-1000 Vdc |
| Constant Power Range of Output Voltage | 500-1000 Vdc | 500-1000 Vdc | 500-1000 Vdc |
| Number of DC Output Interfaces | 12 Channels | 16 Channels | 20 Channels |
| Single-Channel Rated Output Power | 150 kW | 150 kW | 150 kW |
| Maximum Single-Channel Output Power | 180 kW | 180 kW | 180 kW |
| Maximum Single-Channel Output Current | 300 A | 300 A | 300 A |
| Working Temperature | -30℃ to 65℃ （55℃ Derating) | -30℃ to 65℃ （55℃ Derating) | -30℃ to 65℃ （55℃ Derating) |
| Storage Temperature | -40℃ to 70℃ | -40℃ to 70℃ | -40℃ to 70℃ |
| Working Humidity | 5% to 95% | 5% to 95% | 5% to 95% |
| Measurement Accuracy | Class 1.0 | Class 1.0 | Class 1.0 |
| Power Distribution Method | External switchgear cabinet available, Switching granularity: 150 kW | | |
| Cooling Method | Independent Air Duct System | Independent Air Duct System | Independent Air Duct System |
| Protection Rating | Transformer section: IP54<br>Power cabinet section: IP55 | Transformer section: IP54<br>Power cabinet section: IP55 | Transformer section: IP54<br>Power cabinet section: IP55 |
| Structural Dimensions (Width × Depth × Height) | 3900 mm × 2900 mm × 2650 mm | 3900 mm × 2900 mm × 2650 mm | 3900 mm × 2900 mm × 2650 mm |

# DC All-in-One Unit

## 240 / 320 / 400 / 500 kW Charging Station



| | | |
|---|---|---|
| Power | 240 / 320 / 400 kW | 500 kW |
| Dimensions (Width × Depth × Height) | 750 mm × 800 mm × 1700 mm | 750 mm × 800 mm × 1700 mm |
| Output Current | 240 / 320kW single-port maximum output current: 250 A<br>400 kW single-port maximum output current: 300 A | single-port maximum output current: 400 A |
| Output Voltage | 200-1000 Vdc | 200-1000 Vdc |
| Number of ports | 2 / 2 + 2 | 2 / 2 + 2 |
| Cooling method | Intelligent Air-Cooled | Intelligent Air-Cooled |
| Protection Rating | IP55 | IP55 |
| Peak Efficiency | ≥ 95% | ≥ 95% |
| Noise | ≤ 65dB | ≤ 65dB |
| Basic Configuration | Card Reader, Ethernet + 4G, 12V & 24V Switching Power Supply, Low-Temperature Display | |

*This product has passed the 3C (China Compulsory Certification) mandatory certification.

## DC/DC Charging Station



| | | |
|---|---|---|
| Power | 320 kW | 400 kW |
| Dimensions (Width × Depth × Height) | 750 mm × 800 mm × 1700 mm | |
| DC Input Voltage Range | 250 Vdc-825 Vdc | |
| DC Output Voltage Range | 200 Vdc-1000 Vdc | |
| Maximum output current per port | 250 A | 300 A |
| Protection Rating | IP55 | |
| Number of ports | 2 or 4 (DC input can be connected to a DC bus or powered via a charging port) | |
| Cooling Method | Air-Cooled | |
| Basic Configuration | Built-in UPS (optional), 7-inch touchscreen, card reader, VIN activation, local activation, QR code activation, 4G+ Ethernet | |

# DC All-in-One Unit

## PCS Bidirectional Charger



| | |
|---|---|
| Power | 300 kW |
| Dimensions (Width × Depth × Height) | 1150 mm × 1450 mm × 2100 mm |
| Output Current | Single-port maximum output current: 250 A |
| Output Voltage | 550-950 Vdc |
| Number of ports | 2 / 2 + 2 |
| Cooling method | Intelligent Air-Cooled |
| Protection Rating | IP55 |
| Peak Efficiency | ≥ 95% |
| Noise | ≤ 65dB |
| Basic Configuration | Card reader, Ethernet + 4G, AC contactor, 12 V & 24 V switching power supply, low-temperature display |

## Megawatt Charging System



| | |
|---|---|
| Power | 1840 kW |
| Dimensions (Width × Depth × Height) | 3000 mm × 2500 mm × 3100 mm |
| Output Current | Single-port 1500 A / Dual-ports 1800 A |
| Output Voltage | 200-1000Vdc |
| Number of ports | 2 |
| Cooling method | Intelligent Air-Cooled |
| Protection Rating | IP54 |
| Peak Efficiency | ≥ 95.5% |
| Noise | ≤ 75dB |
| Basic Configuration | Touchscreen, card reader, Ethernet + 4G, DC metering (Class I), OTA, etc. |

# DC All-in-One Unit

## 640 / 800 kW High-Power All-in-One Charger for Mining Trucks



| | | |
|---|---|---|
| Power | 640 kW | 800 kW |
| Dimensions (Width × Depth × Height) | 750 × 1065 × 1800 mm | 750 × 1065 × 1800 mm |
| Maximum output current per port | 250 A | 300 A |
| Four-port parallel charging current | 1000 A | 1200 A |
| Output Voltage Range | 300-1000 V | 600-1000 V |
| Protection Rating | IP55 | |
| Number of ports | 4 / 4 + 4 | |
| Cooling Method | Air-Cooled | |
| Basic Configuration | 7-inch touchscreen, card swipe, VIN start, local start, QR code start, 4G+ Ethernet | |

*This product has passed the 3C (China Compulsory Certification) mandatory certification.

# DC Split System

## 720-1120kW Flexible DC Charging Stack



| | |
|---|---|
| Power | 720 kW / 840 kW / 960 kW / 1120 kW |
| Dimensions (Width × Depth × Height) | 2400 × 900 × 2400 mm |
| Output Current | Max 300 A per fast-charging port; max 600 A per ultra-fast-charging port |
| Output Voltage Range | 200-1000Vdc |
| Number of ports | 12 |
| Cooling method | Intelligent Air-Cooled |
| Protection Rating | IP55 |
| Peak Efficiency | ≥ 95% |
| Noise | ≤ 80dB |
| Basic Configuration | 40kW granularity, flexible full-matrix switching |

*This product has passed the 3C (China Compulsory Certification) mandatory certification.

## 800-1200 kW / 1300-1600kW Flexible DC Charging Stack



| | |
|---|---|
| Power | 800-1200 kW / 1300-1600 kW |
| Dimensions (Width × Depth × Height) | 2500 × 1000 × 1700 mm / 2500 × 1000 × 1900 mm |
| Output Current | The fast-charging port has a maximum output of 400 A per channel, while the ultra-fast-charging port has a maximum output of 800 A per channel. |
| Output Voltage | 200-1000 Vdc |
| Number of ports | 800 kW (up to 16 channels) / 1000 kW (up to 20 channels) / 1200 kW and above (up to 24 channels) |
| Cooling method | Intelligent Air-Cooled |
| Protection Rating | IP55 |
| Peak Efficiency | ≥ 95% |
| Noise | ≤ 65dB |
| Basic Configuration | 50 kW granularity, flexible full-matrix switching |

*This product has passed the 3C (China Compulsory Certification) mandatory certification.

# DC Split System

## Megawatt-class Flexible DC Charging Stack



| | | |
|---|---|---|
| Power | 2000 kW | 2400 kW |
| Dimensions (Width × Depth × Height) | 3000 × 1000 × 2000 mm | |
| Output Current | The fast-charging port delivers a maximum output of 400 A per channel, while the ultra-fast charging port provides up to 800 A per channel. | |
| Output Voltage | 200 Vdc-1000 Vdc | |
| Number of ports | 12-24 | |
| Cooling method | Intelligent Air-Cooled | |
| Protection Rating | IP55 | |
| Peak Efficiency | ≥ 95% | |
| Noise | ≤ 65dB | |
| Basic Configuration | 50 kW granularity, flexible full-matrix switching | |

*This product has passed the 3C (China Compulsory Certification) mandatory certification.

# DC Split System






| Name | Air-Cooled Single/ Dual-port Terminal | Liquid-Cooled Single/Dual-port Terminal | Basic Single/Dual-port Terminal | Basic Liquid-Cooled Single-port Terminal |
|---|---|---|---|---|
| Dimensions (W x D x H) | 360 × 285 × 1450 mm | 550 × 553 × 1750 mm | 250 × 250 × 1340 mm | 300 × 350 × 1600 mm |
| Maximum Output Current per Port | 250 / 300 / 400 A | 600 / 800 A | 250 / 300 A | 600 A |
| Output Voltage | 200-1000 V | 200-1000 V | 200-1000 V | 200-1000 V |
| Number of Ports | 2 | 2 | 1-2 | 1 |
| Cooling Method | Air-cooled | Liquid-cooled | Air-cooled | Liquid-cooled |
| Protection Rating | IP55 | IP55 | IP55 | IP55 |
| Basic Configuration | Supports dual-port simultaneous charging, sequential charging, and parallel charging.<br>Equipped with a 7-inch color touchscreen, RFID card, VIN activation, local start, QR code scan start, 4G + Ethernet, and more. | | | |

## Single-port MCS Terminal



| Name | Single-port MCS Terminal | |
|---|---|---|
| Dimensions (Width × Depth × Height) | 1100 × 450 × 1800 mm | 1150 × 1115 × 1800 mm |
| Maximum output current per port | 1500 A | 3000 A |
| Output Voltage | 200-1500 V | |
| Number of Ports | 1 | |
| Cooling method | Liquid-Cooled | |
| Protection Rating | IP55 | |
| Basic Configuration | 7-inch touchscreen, card swiping, local startup, QR code startup,<br>4G + Ethernet, OCPP 1.6 / 2.0, etc. | |

# Battery Swapping Equipment



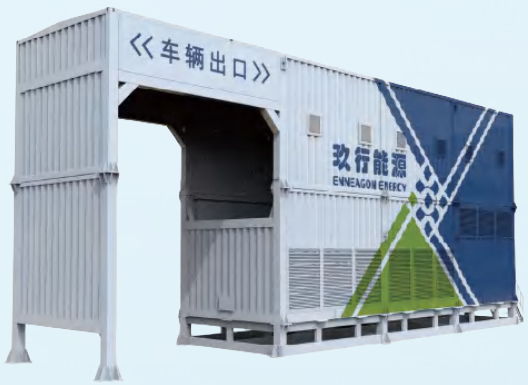

FX Series




950 Series

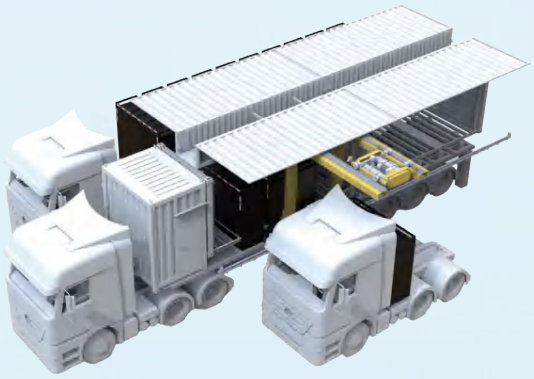
## Heavy Truck Series

- Fully compatible with battery pack assemblies under 600kWh
- Supports separate construction for charging and swapping stations, with minimal civil engineering requirements
- Flexible and versatile configurations for strong adaptability to various scenarios
- Mobile design enables rapid deployment, relocation, and site transfer
- Multiple charging technologies available (chargers, charging stacks, PCS)
- Enclosed design with waterproof, dustproof, humidity-controlled, and temperature-controlled features for efficient thermal management
- LiDAR + LED guidance and laser positioning guidance
- Mobile HMI for convenient maintenance and commissioning operations
- Equipped with automatic fire alarm system featuring one-touch fire suppression function
- Main structure comprises only the base module + robot + charging station




## Mining Truck Series

- Separate charging and swapping infrastructure with minimal civil engineering requirements and no foundation pits
- Multiple charging technologies available (chargers, charging stacks, PCS)
- Robot rated lifting capacity: 10 tons
- Fully compatible with mining truck battery pack assemblies under 1000kWh
- Containerized design, skid-mounted configuration
- Enclosed design with waterproof, dustproof, humidity-controlled, temperature-controlled, and efficient thermal management
- Flexible combinations for strong adaptability to diverse scenarios
- Mobile design enables rapid deployment, relocation, and site transfer
- Exceptional environmental adaptability and reliability, with outstanding resistance to harsh conditions (high dust, strong vibration, extreme temperature variations)



## Mobile Series

- Supports microgrid integration as energy storage and consumption points, enabling both charging and discharging
- Parallel layout facilitates station access and simplifies parking
- Customizable design ensures full compatibility with all battery pack assembly models
- Mobile architecture enables rapid deployment, relocation, and site transfer
- Utilizes proven battery-swapping robots supporting mixed-vehicle swapping
- Pairing with dedicated battery delivery vehicles significantly boosts station capacity for high-demand applications such as long-haul routes
- Flexible configurations deliver strong adaptability across diverse scenarios

# FX Series

## FX-Mini Battery Swap Station

- Compact footprint with minimal site requirements, no foundation needed
- Rapid deployment enables swift operational launch and revenue generation, with quick relocation
- Phased investment structure offers low entry costs and rapid return on investment
- Flexible deployment and diverse configurations meet real-world customer scenarios
- Rapid battery swapping with low power demand, high compatibility, and exceptional reliability




| | |
|---|---|
| Battery Swap Time | ≤ 4.5min |
| Standard Battery | 282 / 350 / 400 / 600 kWh |
| Number of Charging Bays | 6 bays (5 storage bays + 1 transfer bay) |
| Service Capability | 120 vehicle swaps per day* |
| Charging System | High-Efficiency Ultra-Fast Charging System / PCS / Flexible Stack / Chargers |
| Power Supply Requirement | 1600 kVA (Depending on the charging configuration) |
| Ambient Temperature | -20°C to 55°C (Extreme cold: -40°C to 55°C) |
| Vehicle Guidance | LiDAR Guidance System |
| Parking Area | Front-to-back: ±200 mm,Left-to-right: ±200 mm |
| Wind Resistance Rating | ≤ Level 12 (Level 14, requires pre-embedded foundation) (not in service) |
| Seismic Resistance Grade | Seismic design intensity ≤ 7 degrees, ≤ 0.15g |
| Surveillance System | Distribution Monitoring, Charging and Swapping Monitoring, Security Monitoring, Metering and Billing, Settlement System |
| Standard Edition Dimensions (L × W × H) | 11.0 × 4.2 × 6.2 m |

* Based on a charging time of 60 minutes

### Standard Solution

- Intelligent Battery Swapping Robot 1 set
- Intelligent Battery Swapping Lifting Device 1 set
- Flexible Charging Stack 1 set
- Container Body 1 set
- Battery Base Tray 4/5 sets
- One-Touch Start System 1 set
- Laser Guidance System 1 set
- Video Surveillance System 1 set
- Station Control System 1 set
- Lighting System 1 set
- Fire Protection System 1 set

### Optional Configuration

- Extended Port Line
- High-Power UPS
- Gas Fire Suppression System
- Fire Isolation System
- Photovoltaic System
- S2G System
- EPDD High-Efficiency Ultra-Fast Charging System
- PCS Bidirectional Charger
- EMS Energy Management System
- Autonomous Operations

# FX Series

## FX-ProMax Battery Swap Station

- Skid-mounted design enables rapid deployment within 1 day and swift relocation within 4 hours
- Containerized integrated design delivers high-reliability intelligent battery-swapping robots
- No-pit, no-embedded-foundation construction ensures efficient assembly
- Flexible deployment with diverse configurations meets actual customer scenario requirements
- Supports dual-channel solutions



| | | |
|---|---|---|
| Battery Swap Time | ≤ 4.5min | |
| Standard Battery | 282 / 350 / 400 / 600 kWh | |
| Number of Charging Bays | 7 bays + 1 transfer bay | basic 8 bays |
| Service Capability | 168 vehicle swaps per day* | 216 vehicle swaps per day* |
| Charging Cabinet Power Rating | 8 /10 × 320 / 400 kW (Power rating can be adjusted based on actual requirements) | |
| Charging Current | 600 A | |
| Distribution Capacity | 2000-3150 kVA (depending on charging configuration) | |
| Operating Temperature Range | -20°C to 55°C (Arctic Edition: -40°C to 55°C) | |
| Operating Humidity Range | 5% to 95%RH | |
| Operating Altitude | ≤ 2000 m (High-altitude version ≤ 4000m) | |
| Wind Resistance Rating | ≤ Level 12 (Level 14, requires pre-embedded foundation) (not in service) | |
| Seismic Resistance Grade | Seismic design intensity ≤ 7 degrees, ≤ 0.15g | |
| Vehicle Guidance | Physical Guidance Strip + LiDAR + LED + Voice Prompts | |
| Standard Edition Dimensions (L × W × H) | 17.0 × 6.1 × 5.3 m (Includes stairs) | |

* Based on a charging time of 60 minutes

### Standard Solution

- Shell System 1 set
- Intelligent Battery Swapping Robot 1 set
- Intelligent Battery Swapping Lifting Device 1 set
- Inspection and Activation System 1 set
- Vehicle Positioning System 1 set
- Lighting System 1 set
- Battery Pack Assembly Base Tray (as required)
- Operator Cabin 1 set
- Station Control System 1 set
- Video Surveillance System 1 set
- Charging System (as required)
- Fire Protection System 1 set

### Optional Configuration

- Independent Monitoring Room
- Gas Fire Suppression System
- Emergency Firefighting System
- Fire Isolation System
- Photovoltaic System
- S2G System
- EPDD High-Efficiency Ultra-Fast Charging System
- PCS Bidirectional Charger
- EMS Energy Management System
- Autonomous Operations

# Parallel Heavy Truck Series

- Fully compatible with battery packs under 600kWh
- Separate charging and swapping, quick foundation leveling, no-pit design
- Parallel station-vehicle layout for easy approach and effortless parking
- Customizable to 4 / 6 / 10 / 12 workstations



One-way



Two-way

| Battery Swap Model | One-way | Two-way |
|---|---|---|
| Battery Swap Time | ≤ 5.5min | |
| Standard Battery | 282 / 350 / 400 / 600 kWh | |
| Number of Charging Bays | 7 bays + 1 transfer bay | |
| Service Capability | 168 vehicle swaps per day* | |
| Charging Cabinet Power Rating | 8 × 320 / 400kW | |
| Charging Current | 600 A | |
| Distribution Capacity | 2000 ~ 2500 kVA | |
| Operating Temperature Range | -20°C to 55°C (Arctic Edition: -40°C to 55°C) | |
| Operating Humidity Range | 5% ~ 95%RH | |
| Operating Altitude | ≤ 2000 m (High-altitude version ≤ 4000 m) | |
| Wind Resistance Rating | ≤ Level 12 (Level 14, requires pre-embedded foundation) (not in service) | |
| Seismic Resistance Grade | Seismic design intensity ≤ 7 degrees, ≤ 0.15g | |
| Vehicle Guidance | Physical Guidance Strip + LiDAR + LED + Voice Prompts | |
| Standard Edition Dimensions (L × W × H) | 13.5 × 4.0 × 6.2 m | 13.5 × 8.2 × 6.2 m |

* Based on a charging time of 60 minutes

## Standard Solution

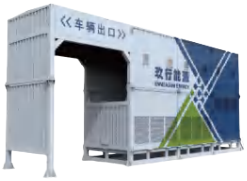
- Battery Swap Station System 1 set
- Video Surveillance System 1 set
- Station Control System 1 set
- Lighting System 1 set
- Fire Protection System 1 set
- Logo 1 set

## Optional Configuration

- Independent Monitoring Room
- Gas Fire Suppression System
- Emergency Firefighting System
- Fire Isolation System
- Photovoltaic System
- S2G System
- EPDD High-Efficiency Ultra-Fast Charging System
- PCS Bidirectional Charger
- EMS Energy Management System
- Autonomous Operations

# Mining Truck Series

- Fully compatible with mining truck battery pack assemblies under 1000kWh
- Utilizes proven overhead crane robotic solutions,reducing overall station costs
- Separate charging and swapping infrastructure with minimal civil engineering requirements and no foundation pits
- Enclosed design featuring waterproofing, dustproofing, humidity control, temperature regulation, and efficient thermal management



Standard



Twin

| Battery Swap Model | Standard | Twin |
|---|---|---|
| Battery Swap Time | ≤ 6min | ≤ 4min |
| Standard Battery | 528 / 770 / 800 / 1000 kWh | |
| Number of Charging Bays | 5 bays + 1 transfer bay | 10 bays + 2 transfer bay |
| Service Capability | 80 vehicle swaps per day | 160 vehicle swaps per day |
| Charging Cabinet Power Rating | 6 × 640 kW | 12 × 640 kW |
| Charging Current | 1000 A | |
| Distribution Capacity | 3150 kVA | 2 × 3150 kVA |
| Operating Temperature Range | -40°C to 55°C | |
| Operating Humidity Range | 5% ~ 95%RH | |
| Operating Altitude | ≤ 2000 m (High-altitude version ≤ 4000 m) | |
| Wind Resistance Rating | ≤ Level 12 (Level 14, requires pre-embedded foundation) (not in service) | |
| Seismic Resistance Grade | Seismic design intensity ≤ 7 degrees, ≤ 0.15g | |
| Vehicle Guidance | Physical Guidance Strip + LiDAR + LED + Voice Prompts | |
| Standard Edition Dimensions (L × W × H) | 20.5 × 4.2 × 7.7 m | 32.5 × 4.2 × 7.7 m |

## Standard Solution

- Battery Swap Station System 1 set
- Video Surveillance System 1 set
- Station Control System 1 set
- Lighting System 1 set
- Fire Protection System 1 set
- Logo 1 set

## Optional Configuration

- Independent Monitoring Room
- Gas Fire Suppression System
- Emergency Firefighting System
- Fire Isolation System
- Photovoltaic System
- S2G System
- EPDD High-Efficiency Ultra-Fast Charging System
- PCS Bidirectional Charger
- EMS Energy Management System
- Autonomous Operations

# Mining Truck Series

- Fully compatible with mining truck battery pack assemblies under 1000kWh
- Supports autonomous mining truck battery swapping with canopy coverage
- Station and vehicle arranged parallel for easy entry and effortless parking
- Separate charging and swapping infrastructure with minimal civil engineering requirements and no foundation pits
- Scalable to 8 / 10 / 11 workstations



**Parallel**

| | |
|---|---|
| Battery Swap Model | Side-Reaching Overhead Crane |
| Battery Swap Time | ≤ 6min |
| Standard Battery | 528 / 770 / 800 / 1000 kWh |
| Number of Charging Bays | 5 bays + 1 transfer bay |
| Service Capability | 80 vehicle swaps (based on a charging time of 90 minutes) |
| Charging Cabinet Power Rating | 6 × 640 kW |
| Charging Current | 1000 A |
| Distribution Capacity | 3150 kVA |
| Operating Temperature Range | -40°C to 55°C |
| Operating Humidity Range | 5% ~ 95%RH |
| Operating Altitude | ≤ 2000 m (High-altitude version ≤ 4000 m) |
| Wind Resistance Rating | Level 12 (Not in operation) |
| Seismic Resistance Grade | Seismic design intensity ≤ 7 degrees, ≤ 0.15g |
| Vehicle Guidance | Physical guidance strip + LiDAR + LED + voice prompts |
| Standard Edition Dimensions (L × W × H) | 18.5 × 10.7 (excluding lanes) × 7.1 (dimensions may vary for custom products) m |

## Standard Solution

- Battery Swap Station System 1 set
- Video Surveillance System 1 set
- Station Control System 1 set
- Lighting System 1 set
- Fire Protection System 1 set
- Logo 1 set

## Optional Configuration

- External Port Cable
- High-Capacity UPS
- Independent Monitoring Room
- Emergency Firefighting System
- Fire Isolation System
- Photovoltaic System
- S2G System
- EPDD High-Efficiency Ultra-Fast Charging System
- PCS Bidirectional Charger
- EMS Energy Management System
- Autonomous Operations

# Mobile Series

- Versatile configurations allow flexible pairing of battery delivery vehicles with swap stations
- Trailers and tractor units operate independently, eliminating the need for dedicated vehicles
- Addresses charging challenges with expanded options and greater location flexibility
- Intelligent dispatch and efficient swapping deliver substantial energy storage capacity
- High docking efficiency with modular gantry robots for streamlined handling and installation
- Customizable 5 / 6 / 10-bay configurations support mining truck battery swapping operations



Gantry-type

| | |
|---|---|
| Battery Swap Model | Overhead Charging and Swapping Station |
| Battery Swap Time | ≤ 6min |
| Standard Battery | 282 / 284 /350 / 400 / 600 kWh |
| Number of Charging Bays | 7 bays + 1 transfer bay |
| Service Capability | 240 vehicle swaps per day |
| Charging Cabinet Power Rating | / |
| Charging Current | / |
| Distribution Capacity | / |
| Operating Temperature Range | -20℃ to 55℃ (Extreme cold: -40℃ ) |
| Operating Humidity Range | 5% ~ 95%RH |
| Operating Altitude | ≤ 2000 m (High-altitude version ≤ 4000 m) |
| Wind Resistance Rating | Level 12 |
| Seismic Resistance Grade | Seismic design intensity ≤ 7 degrees, ≤ 0.15g |
| Vehicle Guidance | / |
| Standard Edition Dimensions (L × W × H) | 18.5 × 14.0 × 8.0 m |

## Standard Solution

- Battery Swap Station System 1 set
- Video Surveillance System 1 set
- Station Control System 1 set
- Lighting System 1 set
- Fire Protection System 1 set
- Rain Shelter
- Logo 1 set

## Optional Configuration

- External Port Cable
- High-Capacity UPS

# Mobile Series

- Separate construction for charging and swapping stations with minimal civil engineering requirements and no foundation pits
- Supports microgrid integration as an energy storage and consumption point, enabling both charging and discharging
- Dedicated battery delivery vehicles significantly enhance station service capacity
- Supports rapid expansion with up to 14 workstations
- Customizable design ensures full compatibility with all battery pack assembly models



## Parallel Configuration

| | |
|---|---|
| Battery Swap Model | Side-Reaching Overhead Crane |
| Battery Swap Time | ≤ 6min |
| Standard Battery | 282 / 284 / 350 / 400 / 600 kWh |
| Number of Charging Bays | 7 bays + 1 transfer bay |
| Service Capability | 240 vehicle swaps per day |
| Charging Cabinet Power Rating | / |
| Charging Current | / |
| Distribution Capacity | / |
| Operating Temperature Range | -20℃ to 55℃ (Extreme cold: -40℃ ) |
| Operating Humidity Range | 5% ~ 95%RH |
| Operating Altitude | ≤ 2000 m (High-altitude version ≤ 4000 m) |
| Wind Resistance Rating | Level 12 |
| Seismic Resistance Grade | Seismic design intensity ≤ 7 degrees, ≤ 0.15g |
| Vehicle Guidance | / |
| Standard Edition Dimensions (L × W × H) | Customizable |

## Standard Solution

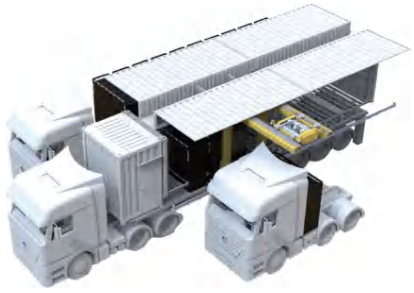
- Battery Swap Station System 1 set
- Video Surveillance System 1 set
- Station Control System 1 set
- Lighting System 1 set
- Fire Protection System 1 set
- Logo 1 set

## Optional Configuration

- External Port Cable
- High-Capacity UPS

# Mobile Series

- Versatile configurations allow battery delivery vehicles and swappable battery vehicles to be paired as needed
- Trailers and tractor units can operate independently, eliminating the need for dedicated trailers or tractor units
- Addresses charging challenges with more charging options and greater location flexibility
- Intelligent dispatch and efficient battery swapping with large energy storage capacity
- Exceptionally high docking efficiency—simply level the landing legs, deploy the side doors, and begin operations



Mobile

| | |
|---|---|
| Battery Swap Model | Side-Reaching Overhead Crane |
| Battery Swap Time | ≤ 6min |
| Standard Battery | 282 / 284 / 350 / 400 / 600 kWh |
| Number of Charging Bays | / |
| Service Capability | 240 vehicle swaps per day |
| Charging Cabinet Power Rating | / |
| Charging Current | / |
| Distribution Capacity | / |
| Operating Temperature Range | -20°C to 55°C (Extreme cold: -40°C ) |
| Operating Humidity Range | 5% ~ 95%RH |
| Operating Altitude | ≤ 2000 m (High-altitude version ≤ 4000 m) |
| Wind Resistance Rating | Level 12 |
| Seismic Resistance Grade | Seismic design intensity ≤ 7 degrees, ≤ 0.15g |
| Vehicle Guidance | / |
| Standard Edition Dimensions (L × W × H) | Customizable |

## Standard Solution

- Battery Swap Station System 1 set
- Video Surveillance System 1 set
- Station Control System 1 set
- Lighting System 1 set
- Fire Protection System 1 set
- Logo 1 set

## Optional Configuration

- External Port Cable
- High-Capacity UPS

# Mobile Series

- Full Compatibility: Compatible with battery-swapping equipment from multiple brands and types, as well as mainstream power batteries; suitable for diverse scenarios such as power-constrained environments, temporary operations, and emergency rescue missions
- Versatile Applications: Modular and mobile design enables flexible compatibility and rapid deployment; outstanding resilience in harsh operating conditions (outdoors, high dust levels, and intense vibrations)
- High-Efficiency Protection: Full monitoring of the battery-swapping process, including video surveillance, as well as waterproof and dustproof features; a three-tier protection system— " battery pack assembly–swapping station–cloud " —ensures battery safety
- Cost Reduction and Efficiency Improvement: Digital management enables real-time control over the battery-swapping process for efficient operations; integration of wind, solar, storage, charging, swapping, and transmission facilitates the consumption of green electricity



## Straight-Boom Crane Mobile Battery-Swap Vehicle

| Project | Specifications |
|---|---|
| Battery Swapping Model | Top-Mounted |
| Rated Load Capacity | 5T |
| Maximum Lifting Moment | 300 kN·m |
| Maximum Working Height | 6600 mm |
| Grip Height | 1760 mm-5360 mm |
| Operating Radius | 2650 mm-5200 mm |
| Compatible Battery Types | 400 kWh |
| Compatible Vehicle Models | Excavators, Loaders |
| Battery Swap Time | ≤ 10–12 min (depending on operator actions) |
| Number of Charging Bays | 3 bays (optional charging capability) |
| Operating Temperature | Standard version: -20℃ to 55℃ \| High-altitude version: -40℃ to 55℃ |
| Equipment Weight | Approximately 20 T including battery |
| Operating Altitude | ≤ 2000 m (High-altitude version ≤ 4000 m) |
| Applicable Scenarios | Railways, Highways, Water Resources and Hydropower |

## Standard Solution

- Auxiliary Power Cabinet
- EMS System

## Optional Configuration

- PCS Power Cabinet
- DC-DC Power Cabinet

# Mobile Series

- Adopting an electrified design philosophy, it is zero-carbon, environmentally friendly, pollution-free, compliant with dual carbon policies, and low-noise
- Equipped with an intelligent energy management system, it enables remote monitoring, charge/discharge data management, and real-time system security assurance
- Highly mobile and responsive, rapidly deployable to any power-demanding scenario without fixed infrastructure, serving as backup power for critical facilities
- Suitable for diverse scenarios including microgrids, green power consumption, green construction sites, and trunk logistics
- Peak shaving and valley filling through off-peak charging and peak discharge reduces electricity costs, replacing traditional diesel generators with eco-friendly solutions



Mobile Battery Delivery Vehicle

| Project | Battery Delivery Vehicle | |
|---|---|---|
| | Specifications | Note |
| Equipment Model | EMPS-770-E400 | |
| Number of Workstations | 2 / 4 / 6 / 8 | Optional |
| vehicle-mounted base tray | Compatible with Enneagon battery pack upper frame | Customizable |
| Equipment Installation Dimensions (L × W × H) | 13000 × 2500 × 1500 mm | 8-Station Dimensions |
| Equipment Weight | Approximately 40 T including battery | 8-Station Weight |
| Operating Altitude | ≤ 2000 m | Derating required above 2,000 m |
| Relative Humidity | 5% ~ 95% | |
| Operating ambient Temperature | -30℃ to 50℃ | Extreme-Cold Version |
| Wind Resistance Rating | Non-working ≤ Level 12, Working ≤ Level 8 | |
| Lightning Protection Performance | Equipped with a vehicle grounding network, multiple grounding points via grounding rods, and surge protectors | |
| Insulation Properties | Communication/V2G Power Cabinet: 220/380 VAC, insulation resistance ≥0.5MΩ<br>DC-DC Power Cabinet: 1000 VDC, insulation resistance ≥10MΩ | |
| Protection Rating | V2G Power Cabinet/DC-DC Power Cabinet/Co mmunication Power Cabinet: IP54<br>Battery Pack Assembly (After Connection): IP67 | |
| Seismic Resistance | Seismic Design Intensity: Grade 7, 0.15g | |
| Noise Resistance | Overall noise level is less than 75dB | |
| Design Life | 5 years | |
| Energy Storage Battery (Optional) | 282 kWh / 350 kWh / 400 kWh / 600 kWh | |

## Standard Solution

- Auxiliary Power Cabinet
- EMS System

## Optional Configuration

- PCS Power Cabinet
- DC-DC Power Cabinet

# Mobile Series

- Equipped with commercial vehicle chassis in various specifications to suit different scenarios, offering exceptional road adaptability and enabling rapid deployment
- Features high-performance lithium iron phosphate (LFP) energy storage batteries with high energy density and long cycle life, supporting high-power charging and discharging
- Integrated IoT technology enables real-time remote monitoring and intelligent scheduling of battery status, power output, and geographic location
- With zero emissions and low noise during operation, it serves as a perfect replacement for traditional diesel/gas generator sets and complies with environmental standards
- Equipped with a seven-layer safety protection system—including physical isolation, an intelligent BMS, and an automatic fire suppression system—it ensures flawless operation



Mobile Power Supply Vehicle

| | Xiaojiu Mobile Power Supply Vehicle | |
|---|---|---|
| Project | Specifications | Note |
| Equipment Model | JXMPS-MDC1000-O500 | |
| Battery Capacity | 1001 kWh | |
| Power | 500-900 kW | |
| Equipment Installation Dimensions (L × W × H) | 5800 × 2500 × 2600 mm | Cabinet Dimensions |
| Equipment Weight | Approximately 13 T including battery | |
| Operating Altitude | ≤ 2000 m | Exceeds standard operational capacity |
| Relative Humidity | 5% ~ 95% | |
| Operating Ambient Temperature | -30℃ to 50℃ | Customizable |
| Self-retracting Outriggers | Electric-Hydraulic Outriggers | Optional |
| Corrosion Resistance Rating | C3 | |
| Insulation Properties | Communication/V2G Power Cabinet: 220/380 VAC, insulation resistance ≥ 0.5MΩ<br>DC-DC Power Cabinet: 1000 VDC, insulation resistance ≥ 10MΩ | |
| Protection Rating | Discharge compartment: IP54;<br>battery pack assembly (after connection): IP67 | |
| Reference Standards | GB/T 36545-2023 Technical Specifications for Mobile Electrochemical Energy Storage Systems | |
| Noise Resistance | Overall noise level is less than 75dB | |
| Vehicle Dimensions (L × W × H) | 8150 × 2550 × 3585 mm | |
| Energy Storage Battery (Optional) | 1000 kWh / 2000 kWh / 3000 kWh | |

## Standard Solution

- Auxiliary Power Cabinet
- EMS System

## Optional Configuration

- PCS Power Cabinet
- DC-DC Power Cabinet

# Modular Mobile Power Bank

- Flexible configurations tailored to different scenarios; a modular design that offers exceptional adaptability and enables rapid deployment
- Equipped with high-performance lithium iron phosphate (LFP) power batteries, featuring high energy density, strong road adaptability, and support for high-power charging and discharging
- Integrated IoT technology enables real-time remote monitoring and intelligent scheduling of battery status, power output, and geographic location
- With zero emissions and low noise during operation, it serves as a perfect replacement for traditional diesel/gas generator sets and complies with environmental standards
- Its robust structural design allows it to withstand harsh road conditions found on construction sites, in mining areas, and other challenging environments



## Mobile Emergency Power Supply

| Project | Specifications | Note |
|---|---|---|
| Battery Compartment | 1000 kWh | 1000 kWh-4000 kWh |
| Voltage | 772 V | |
| Current | 1200 A | |
| Equipment Installation Dimensions (L × W × H) | 2490 × 1688 × 2410 mm | Unit Dimensions |
| Equipment Weight | 8.5T / 1000 kWh | |
| PCS Discharge Chamber (L × W × H) | 2490 × 1054 × 2410 mm | |
| Rated Power | 300 kW / 500 kW / 600 kW | 300 kW-4000 kW |
| DC Voltage Measurement | 550 V-950 V | According demand |
| AC Voltage Measurement | 380 V Three-phase three-wire (Three-phase four-wire) | |
| DC-DC Discharge Chamber (L × W × H) | 2490 × 850 × 2410 mm | |
| Rated Power | 400 kW / 480 kW | |
| DC Input | 300 V-950 V | 2 circuits / 4 circuits |
| DC Output | 300-950 V | 2 circuits / 4 circuits |
| Removable Outriggers | Electric-Hydraulic Outriggers | Optional Configuration |

## Standard Solution

- Auxiliary Power Cabinet
- EMS System

## Optional Configuration

- PCS Power Cabinet
- DC-DC Power Cabinet

# Customized Solutions

## Withstands All Kinds of Extreme Conditions




- Operating Temperature: -40℃ to 55℃
- Servo motor incorporates built-in automatic heating function; motor and gearbox utilize low-temperature grease
- Charging system features integrated PTC thermostat and heater for automatic temperature regulation
- Sensors and cables selected in low-temperature variants
- Main steel structure constructed from cold-resistant materials such as Q235C / Q355C or higher




- Install dust-removal ducts with air curtains or external fresh-air systems at duct entrances and exits to keep vehicle-borne dust out
- Install air curtains at battery compartment entrances and exits to keep lane and battery surface dust out of the compartment

# Customized Solutions




- For equipment operating within 10 km of a coastline, or in saline-alkali environments
- Main body of battery swap station undergoes rust removal treatment; steel plate surfaces and welds achieve Sa2.5 grade rust removal, meeting C4-M corrosion resistance requirements with paint thickness ≥ 240μm
- Swap station bolts utilize Dacromet (zinc-chromate coating), zinc-aluminum coating, or stainless steel
- Exposed friction components of the charging station: high-carbon steel, alloy steel (requiring heat treatment), or other corrosion-resistant materials
- Charger housing constructed from galvanized steel plate with simultaneous powder coating application
- Charger main control PCB treated with triple-proof protection
- Charger copper plates treated with tin plating
- Charger modules fully encapsulated with potting compound

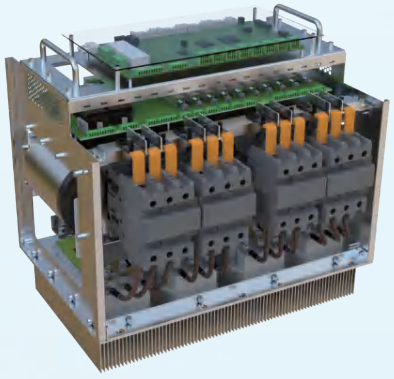



- Operating Altitude: 2000-4000 m
- Operating Temperature: -40℃ to 55℃
- Motor power and charging capacity increased to account for derating
- High-altitude version charging control board selected
- Servo motor incorporates built-in automatic heating function; motor and gearbox utilize low-temperature grease
- Charging system integrates PTC thermostat and heater for automatic cabinet temperature regulation
- Sensors and cables selected in low-temperature variants
- Main steel structure constructed with cold-resistant materials such as Q235C / Q355C or higher

# Power Electronics & Control



## Power Conversion System



## High-Voltage Direct-Drop Module

### High Efficiency and Energy Savings

- Advanced power electronics and control algorithms deliver up to 98% conversion efficiency
- Modular IGBT architecture ensures high efficiency, stability, and maintainability
- Robust thermal management enables stable operation from -20°C to 40°C

### Ultra-High Efficiency Architecture

- Three-level topology with high-voltage direct-drop control
- Module efficiency up to 98.5%, system efficiency up to 97%
- Intelligent thermal control enables adaptive fan speed, reducing energy consumption and noise

### Flexible Configuration

- Modular design supports flexible system configuration and capacity expansion
- Parallel operation enables both grid-connected and off-grid applications

### Wide Application Range

- DC output range from 200 to 1000 VDC
- Supports multi-module parallel expansion
- Grid-side current THD ≤ 3%, ensuring grid-friendly operation

### Application Versatility

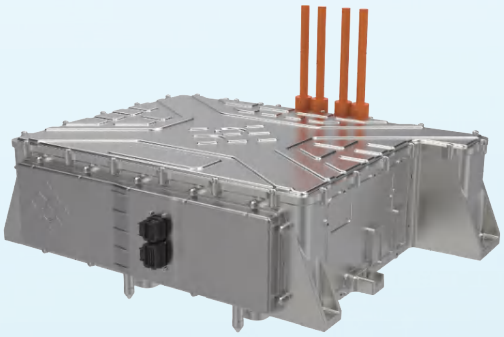
- Supports constant power, constant current, and constant voltage control modes
- Enables off-grid discharge and grid-connected charge/discharge operation
- Supports reactive power compensation for improved power quality
- Multiple co mmunication protocols (CAN / RS485) for seamless system integration

### Industrial-Grade Reliability

- Independent air duct and heat exchanger design achieves IP65 protection
- Reduced conversion stages improve system reliability and simplify control
- Designed for low maintenance cost and long service life in harsh environments

### Safety and Reliability

- Protection rating up to IP65, corrosion resistance up to C5
- Soft-start functionality ensures smooth power ramp-up
- Fast dynamic response improves overall power system stability



## High-Voltage Box



## High-Voltage Controller

### High Integration and Modular Design

- Integrates multiple control and protection modules into a compact unit
- Modular architecture simplifies installation, commissioning, and maintenance

### High Performance Control

- Real-time data acquisition and analysis support safe, efficient system operation
- Enhances system safety, performance optimization, and maintenance efficiency

### High Performance and Intelligence

- Distributes and manages high-voltage power safely across the system
- Real-time CAN co mmunication enables intelligent monitoring and control

### High Reliability Design

- Electrical isolation protects control circuits from high-voltage interference
- Strong anti-interference capability ensures measurement accuracy

### Customization and Compatibility

- Flexible mechanical and electrical design supports customization
- Rated for operating conditions exceeding 750 V and 400 A

### Simplified System Integration

- Multi-sensor data aggregation reduces wiring complexity
- Comprehensive diagnostics enable rapid fault localization and analysis

### Safety Assurance

- Protection rating of high-voltage enclosures: ≥ IP67; protection rating of high-voltage cabinets: ≥ IP65
- Equipped with multiple protection functions, including overload, short-circuit, overcurrent, overvoltage, and overtemperature protection, enabling real-time monitoring of the high-voltage system’s operating status

# Energy Storage Converter

## Three-Level High-Protection PCS Module

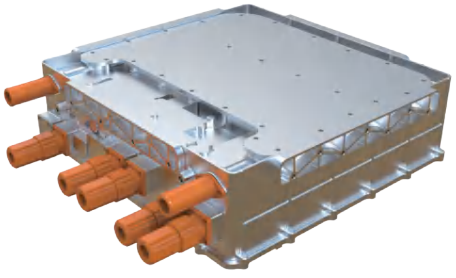
- Supports bidirectional charging and discharging via standard transformers
- Capable of grid formation, supporting active voltage source support, primary frequency regulation, inertia response, and black start
- Enables off-grid three-phase four-wire operation, supporting parallel operation of multiple off-grid PCS units



| | Name | Parameters |
|---|---|---|
| Basic Parameters | Rated Power | 150 kW |
| | Thermal Management Method | Air-cooled, Independent air duct |
| | Protection Rating | IP65 |
| | Corrosion Resistance Rating | C5 |
| | Power Factor | > 0.99 |
| | Efficiency | ≥ 98.4% |
| | DC Voltage | 550-1000 V |

## Two-Level Liquid-Cooled PCS Module

- Features a two-level topology for proven reliability and relatively simple control, enabling easy implementation of high efficiency
- Employs advanced space vector modulation and predictive control algorithms to reduce harmonic content and enhance charging/discharging efficiency
- Incorporates an efficient liquid cooling system design to improve heat dissipation performance

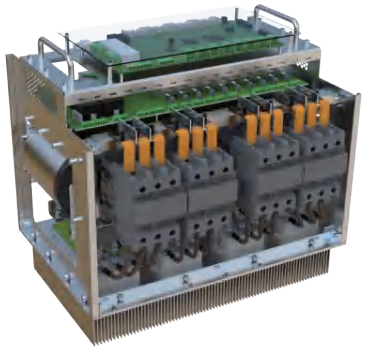


| | Name | Parameters |
|---|---|---|
| Basic Parameters | Rated Power | 150 kW |
| | Thermal Management Method | Water-cooled |
| | Protection Rating | IP67 |
| | Corrosion Resistance Rating | C5 |
| | Power Factor | > 0.99 |
| | Efficiency | ≥ 98% |
| | DC Voltage | 560-700 V |

# High-Voltage Direct-Drop High-Power Charging Module

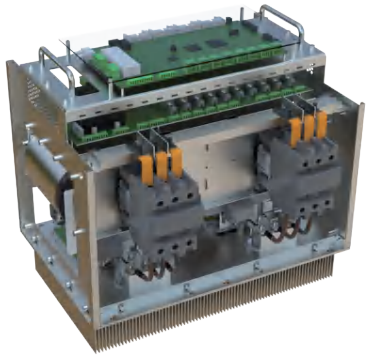
- Utilizing high-voltage step-down technology, the module achieves an efficiency of up to 98.5%
- Wide voltage output range acco mmodates diverse charging scenarios
- Generates no high-order harmonics in grid-side current, ensuring grid-friendly operation

## 1000V Module



| | Name | Parameters |
|---|---|---|
| Basic Parameters | Rated Power | 150 kW（75kW × 2） |
| | Thermal Management Method | Air-cooled, Independent air duct |
| | BMS Co mmunication Interface | CAN / RS485 |
| | Operating Temperature | -35℃ to 60℃ |
| | Grid-Side Current THD | ≤ 3% |
| | Efficiency | 98.5% |
| | Output Current Range | 0-300 A |
| | DC Voltage | 200-1000 V |

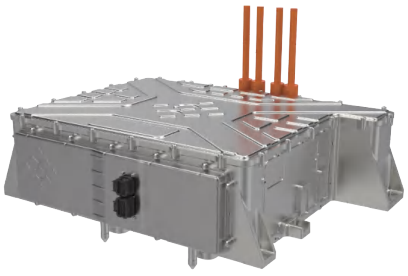
## 750V Module



| | Name | Parameters |
|---|---|---|
| Basic Parameters | Rated Power | 150 kW（75 kW × 2） |
| | Thermal Management Method | Air-cooled, Independent air duct |
| | BMS Co mmunication Interface | CAN / RS485 |
| | Working Temperature Range | -35℃ to 60℃ |
| | Grid-Side Current THD | ≤ 3% |
| | Efficiency | 98.5% |
| | Output Current Range | 0-300 A |
| | DC Voltage | 200-750 V |

# High-Voltage Box (Battery Swapping)

- Compatible with a wide range of co mmercial vehicles, heavy-duty trucks, mining trucks, and construction machinery across multiple sectors
- Features scalable design with dual charging and dual discharging capabilities, supporting integrated charging/discharging solutions
- Platform-based development enables compatibility with multi-path input configurations



## BCU-4

| | Name | Parameters |
|---|---|---|
| Basic Parameters | Dimensions (L × W × H) | 684 × 616 × 225 mm |
| | Single-port Charging Current | 250 A |
| | Dual-port Charging Current | 500 A |
| | Discharge Current | 500 A |
| | Protection Rating | ≥ IP67 |
| | DC Voltage | 750 V |
| | Number of Branches | 4 |



## BCU-400

| | Name | Parameters |
|---|---|---|
| Basic Parameters | Dimensions (L × W × H) | 684 × 616 × 225 mm |
| | Single-port Charging Current | 350 A |
| | Dual-port Charging Current | 700 A |
| | Discharge Current | 600 A |
| | Protection Rating | ≥ IP67 |
| | DC Voltage | 1000 V |
| | Number of Branches | 2 |



## BCU-600

| | Name | Parameters |
|---|---|---|
| Basic Parameters | Dimensions (L × W × H) | 684 × 616 × 225 mm |
| | Single-port Charging Current | 350 A |
| | Dual-port Charging Current | 700 A |
| | Discharge Current | 600 A |
| | Protection Rating | ≥ IP67 |
| | DC Voltage | 1000 V |
| | Number of Branches | 3 |

# High-Voltage Box (Charging)



## BCU-1

| | Name | Parameters |
|---|---|---|
| Basic Parameters | Dimensions (L × W × H) | 651 × 358 × 160 mm |
| | Single-port Charging Current | 250 A |
| | Dual-port Charging Current | 500 A |
| | Discharge Current | 500 A |
| | Protection Rating | ≥ IP67 |
| | DC Voltage | 750 V |
| | Number of Branches | 2 |



## BCU-500

| | Name | Parameters |
|---|---|---|
| Basic Parameters | Dimensions (L × W × H) | 878 × 551 × 229 mm |
| | Single-port Charging Current | 350 A |
| | Dual-port Charging Current | 700 A |
| | Discharge Current | 600 A |
| | Protection Rating | ≥ IP67 |
| | DC Voltage | 1000 V |
| | Number of Branches | 3 |



## PDU-Non-standard

| | Name | Parameters |
|---|---|---|
| Basic Parameters | Dimensions (L × W × H) | 1370 × 1370 × 127 mm |
| | Single-port Charging Current | 1500 A |
| | Dual-port Charging Current | 1800 A |
| | Discharge Current | 1800 A |
| | Protection Rating | ≥ IP65 |
| | Rated Voltage | 869.4 V (675-985.5 V) |
| | Number of Branches | 6 |

# High-Voltage Controller



## HVM3.6

| | |
|---|---|
| Main Control Chip Parameters<br>APM32A407Z | 168MHz |
| | Flash 1024KB |
| | SRAM 192 + 4KB |
| | AEC-0100 Grade1 / Grade2 |

| | |
|---|---|
| Motherboard Hardware Resources | 11-channel voltage-type analog input voltage range: 0-24V |
| | 3-channel digital input with wake-up function, high-level active |
| | 2-channel PWM input polarity is configurable |
| | 1-wire DC fast charging signal (A+) |
| | 2-channel CAN (supports CANFD) |
| | 11-channel high-voltage acquisition:<br>6 positive channels, 5 negative channels |
| | 1-channel 5V output power supply, maximum current 500mA |
| | 11-channel low-side driver, continuous 1.5A, 5A @ 200ms |
| | 3-channel SHUNT current sensing, 100μΩ, maximum 350A,<br>full-scale accuracy 0.2% |
| | 1-phase electricity metering, accuracy 0.5% |
| | 1-channel high-voltage interlock monitoring supports<br>both voltage level and PWM control |

# High-Voltage Controller



## HVM4

| | |
|---|---|
| Main Control Chip Parameters<br>APM32A407Z | 168MHz |
| | Flash 1024KB |
| | SRAM 192 + 4KB |
| | AEC-0100 Grade1 / Grade2 |

| | |
|---|---|
| Motherboard Hardware Resources | 22 analog inputs: 18 voltage inputs, 2 current inputs, 2 resistance inputs |
| | 16 digital inputs with configurable polarity,<br>3 of which support wake-up functionality |
| | 4-channel PWM input, polarity configurable |
| | 2-channel fast charging confirmation signal |
| | 2-channel RS485, supporting Modbus protocol |
| | 2-channel CAN interface, supporting CANFD |
| | 21 high-voltage channels for data acquisition,<br>11 positive terminals, 10 negative terminals |
| | 20-channel low-side driver, continuous 2A, 5A @ 300ms |
| | 3-channel high-side driver, continuous 1.5A, 3A @ 300ms |
| | 4-channel PWM output with drive capability, 1 A |
| | Standalone 5V / 1A, 12V / 1A Power Supply |

# Cloud Platform




## Recharge Cloud

**Flexible charging or swapping for worry-free energy replenishment in any scenario**

- Offering both charging and battery swapping modes, it flexibly adapts to different scenarios, ensuring fast energy replenishment anytime, anywhere for worry-free operation

**Intelligent Operations System**

- Multi-dimensional precision pricing and billing, diverse operational campaigns, comprehensive analytics covering drivers,vehicles, chargers, and stations

**Efficient & Secure Equipment Management**

- Real-time equipment monitoring, proactive alerts and protection, remote control and OTA updates

**Intelligent Scheduling**

- One-click off-peak charge scheduling, smart algorithms for optimal charging

**Security Compliance Settlement System**

- Supports D+N settlement for merchants, with clear and intuitive statements for easy reconciliation




## Battery Cloud Platform

**Real-time Monitoring**

- Monitor battery operation in real time to prevent loss or idling, ensuring battery safety

**Health Status Analysis**

- Comprehensively evaluate battery condition across four dimensions–health, lifespan, safety, and efficiency–and compare it with similar batteries to provide usage reco mmendations

**Balanced Management**

- Calculate the balance level and relative deviation of batteries within the field to provide data support for battery swapping strategies This ensures both battery age and cumulative discharge volume meet retirement criteria simultaneously, maximizing battery lifespan

**Pricing Strategy**

- Based on a financial leasing model combined with a credit rating mechanism, calculate battery leasing pricing and reco mmend compatible batteries

# Cloud Platform




## Energy Management Cloud Platform

**Energy Monitoring**

• Real-time monitoring of photovoltaic, energy storage, and load-side operational parameters

**Energy Efficiency Analysis**

• Big data-based energy efficiency analysis services

**Energy Efficiency Optimization, Collaborative Dispatch**

• Achieve coordinated optimization of energy costs through vehicle-station-charger integration to enhance efficiency




## Fleet Services

**Full Internet Access**

• By aggregating sites from different brands, fleets can efficiently access energy services across carriers and regions

**Unified Resource Scheduling**

• Integrate dispersed resources, optimize utilization rates, and enhance operator revenue and fleet operational efficiency

**Multi-dimensional Operational Insights**

• Provide multi-dimensional data analysis covering cost reduction, energy consumption, and more to empower fleets with refined operational management

**All-Scenario Management Tool**

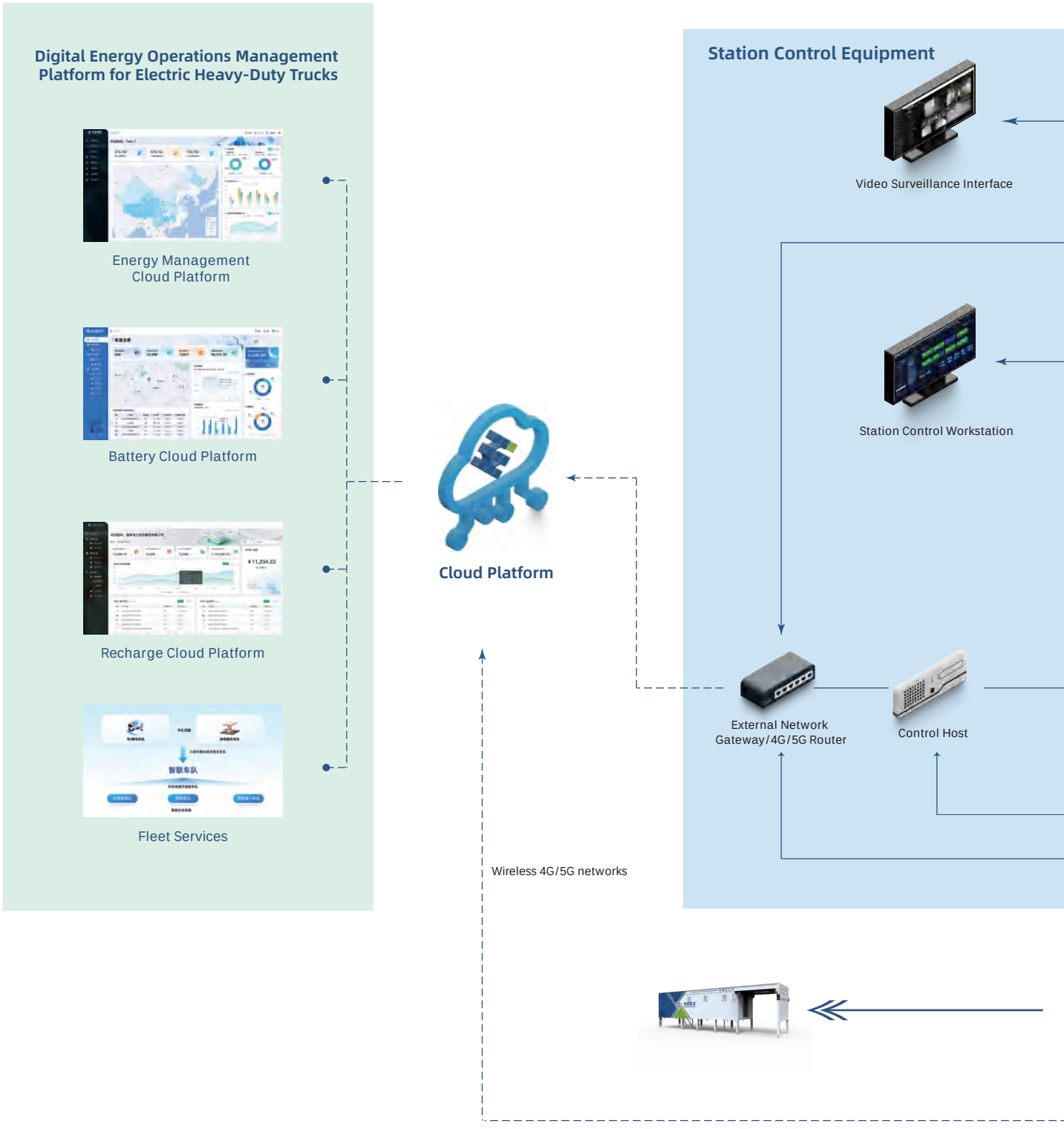
• Deliver core functionalities such as vehicle management, order tracking, and e-card services through mini-programs for convenient one-stop management

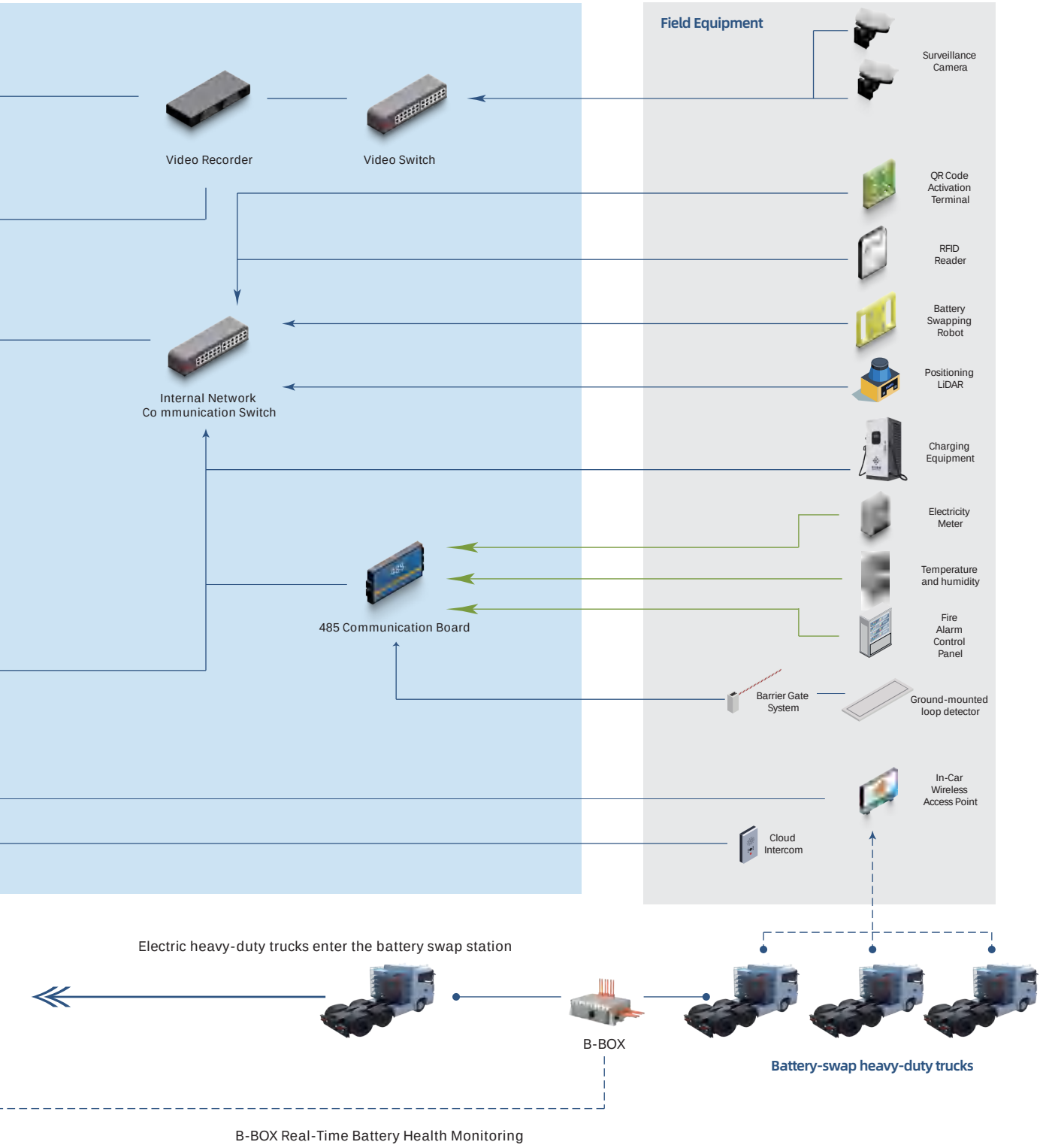
**Dedicated Invoicing**

• Automatically generate clear invoices and streamline billing processes, simplifying financial workflows and reducing administrative burdens

# Intelligent Cloud Platform

## Network Topology Diagram for Electric Heavy-Duty Truck Battery Swap Stations

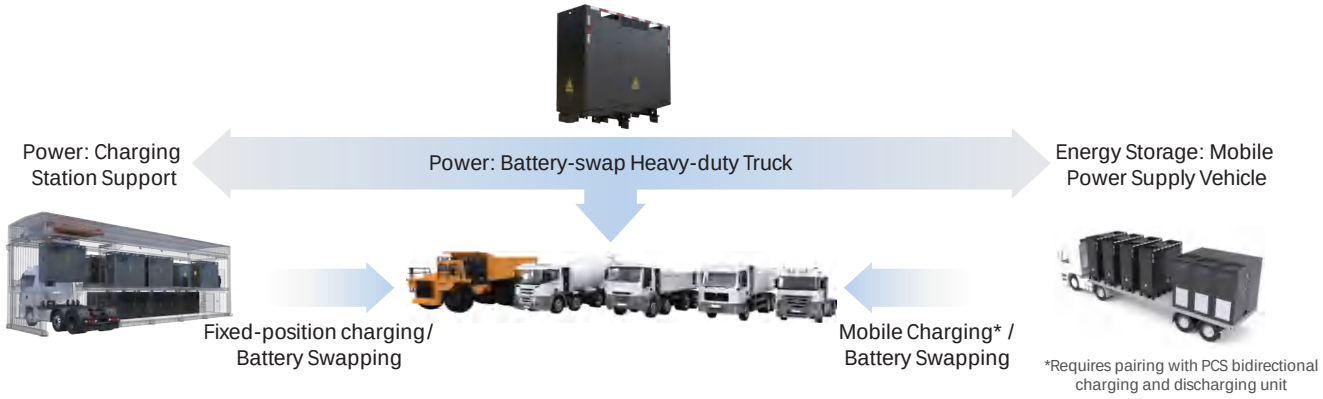



Field Equipment
Surveillance Camera
Video Recorder
Video Switch
QR Code Activation Terminal
RFID Reader
Battery Swapping Robot
Positioning LiDAR
Internal Network Co mmunication Switch
Charging Equipment
Electricity Meter
Temperature and humidity
485 Communication Board
Fire Alarm Control Panel
Barrier Gate System
Ground-mounted loop detector
In-Car Wireless Access Point
Cloud Intercom
Electric heavy-duty trucks enter the battery swap station
B-BOX
Battery-swap heavy-duty trucks
B-BOX Real-Time Battery Health Monitoring

# Solution Advantages

## Integrated Mobility and Energy Storage

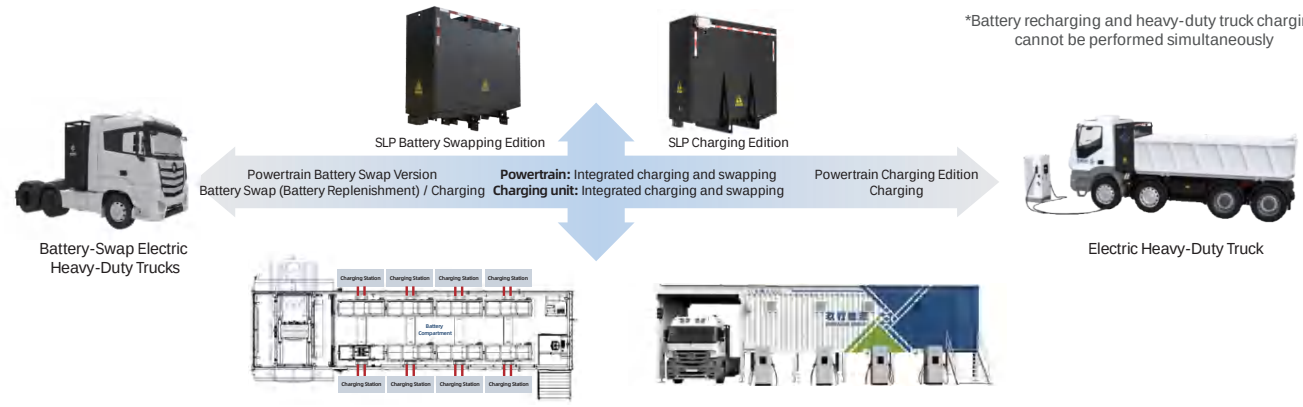
The integrated battery pack assembly system, combining mobility and energy storage, serves as the core carrier for the integration of transportation and energy.




## Charge and Swap Integrated

**Powertrain:** Integrated charging and swapping, shared platform architecture with identical upper frame, differing only in the vehicle-mounted base tray design.

**Charging Unit:** Integrated charging and swapping, 4-port charging station design, dual-purpose for swappable batteries or heavy-duty truck charging.




## Deliverable and Exchangeable

Mobile solution based on integrated power battery systems, overcoming site constraints for flexible and unrestricted energy replenishment.

Power battery pack + fixed battery swap station + mobile power delivery vehicle + mobile battery swap vehicle = a transportable and interchangeable mobile solution.

- Land-based Wind/Solar Power Plant
- Compatible with 10kV Substation

- Power Battery Pack for Energy Storage
- Battery Swap Station Supports 7+1 Power Battery Loading (Expandable Bays)
- Mobile Power Delivery Vehicle as Additional Auxiliary Consumption Method
- Chargeable, Swappable, Deliverable



## Charge-and-Swap Phased Investment

Intelligent Power Distribution for Safe and Efficient Charging.



**Electric Heavy-Duty Truck**

DC All-in-One Unit



**240-500 kW DC Charging Station**

Step Investment



**MCS Megawatt-Class Supercharger**

DC Split-Type Unit



**1200-1600 kW Flexible DC Charging Stack**

Step Investment



**EPDD 1200 kW High-Efficiency Ultra-Fast Charger**

### Phased Investment!

### Charge when convenient, swap when needed–the best of both approaches

*Recommended service routes and heavy-duty truck operating scenarios: Battery capacity 350 kWh, charging frequency 2 times/day, battery swapping frequency 2.5 times/day;

**Charging stations:** 1120 kW flexible stack / 1200 kW EPDD system with 4 terminals;

**Battery swap stations:** 5 + 1 bay MINI stations.

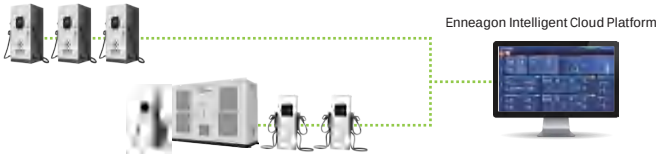


**1**

**Initial Investment**

Small fleet, premium configuration, full-power intelligent distribution

≤ 15 vehicles*

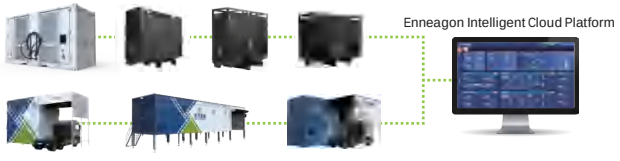



**2**

**Mid-term Investment**

Expanding vehicle scale with battery swapping as the primary method and charging as a secondary option, enabling highly efficient energy supply

15 < ≤ 35 vehicles*

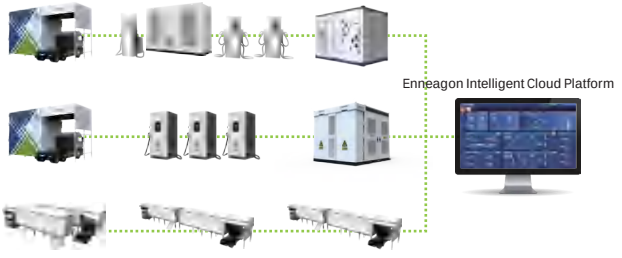



**3**

**Late-stage Investment**

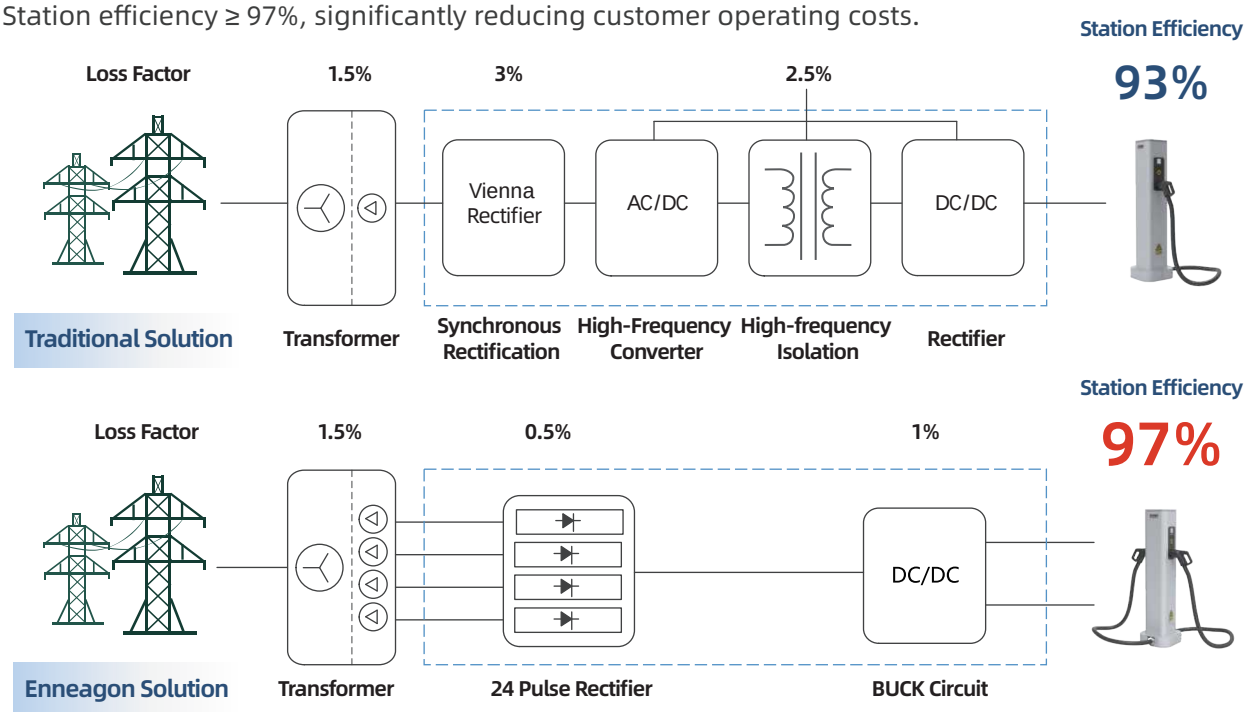
Diverse equipment combinations provide comprehensive support for all energy replenishment needs

> 35 vehicles*



## EPDD High-Efficiency Ultra-Fast Charging System

Station efficiency ≥ 97%, significantly reducing customer operating costs.




## EPDD High-Efficiency Ultra-Fast Charging System

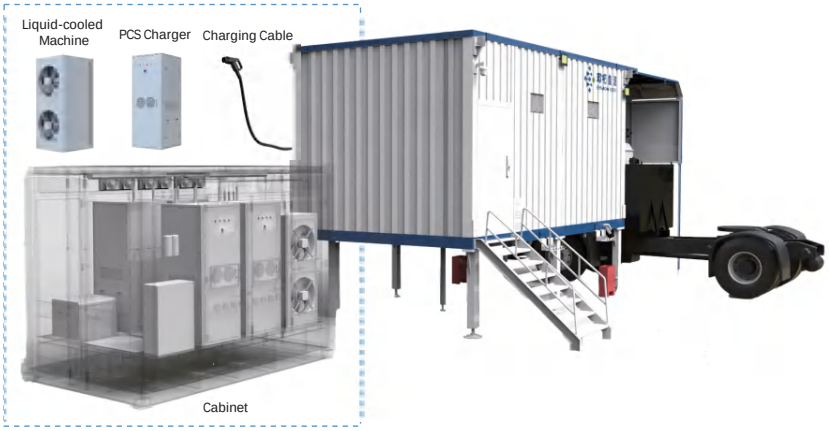
The EPDD system features an IP54 protection rating and independent air duct cooling.
It is designed to meet the demands of high-humidity, high-salt-fog, and high-dust environments (such as coastal areas, mining zones, and industrial districts).

| Product Line Configuration | 600 kW | 1200 kW | 1800 kW | 2400 kW | 3000 kW |
|---|---|---|---|---|---|
| |  | | |  | |
| Number of Hosts & Terminals | 1 Main Unit + 4 Air-Cooled Dual-Port Terminals / 1 Main Unit + 4 Liquid-Cooled Single-Port Terminals (multiple combination options available, such as air-cooled fast charging + liquid-cooled ultra-fast charging) | | 1 Main Unit + 6 / 8 / 10 Fast-Charging Dual-Port Terminals / 1 Main Unit + 6 / 8 / 10 Liquid-Cooled Single-Port Terminals (multiple combination options available, such as air-cooled fast charging + liquid-cooled ultra-fast charging) | | |
| Station Type | Small Station / Starter Station Supports 4–8 parking bays, ideal for initial investment or small to medium-sized sites. | Medium Station / Standard Station Supports 8–12 parking bays, suitable for urban fast-charging stations, logistics parks, etc. | | Large Station / Hub Station Supports 16 / 20 parking bays, suitable for highway service areas, large bus depots, and battery swap station support. | |
| Current | 1200 A | 2400 A | 3600 A | 4800 A | 6000 A |
| Vehicle Type and Charging Speed | • High ultra-fast charging demand (e.g., logistics vehicles, buses, heavy-duty trucks): Recommended configuration: liquid-cooled terminals, supporting 600 kW per port.<br>• Primarily fast-charging demand (e.g., passenger cars, ride-hailing vehicles): Configurable with air-cooled terminals, supporting 300 kW per port. | | | | |
| Daily Service Vehicle Count* SOC 10%-80% | 36 – 60 vehicles @30%–50% utilization rate Liquid-cooled single port, 12 min (passenger vehicles) | 20 – 30 vehicles @30%–50% utilization rate Liquid-cooled single-port*2, 600 kWh battery heavy-duty truck, 23-minute full charge | 30 – 45 vehicles @30%–50% utilization rate Liquid-cooled single-port*3, 600 kWh battery heavy-duty truck, 23-minute full charge | 40 – 60 vehicles @30%–50% utilization rate Liquid-cooled single-port*4, 600 kWh battery heavy-duty truck, 23-minute full charge | 50 – 75 vehicles @30%–50% utilization rate Liquid-cooled single-port*4, 600 kWh battery heavy-duty truck, 23-minute full charge |
| Optional Accessories | Metering Cabinet, Liquid-Cooled Terminal, Air-Cooled Terminal | | | | |

*1. Daily Service Vehicle Capacity Calculation Formula:
(Number of terminals × 24 hours × utilization rate) / Time required to fully charge a single terminal = Daily service vehicle capacity
2. SOC 10%-80%

## PCS Bidirectional Charging and Swapping Station

S2G Demonstration: Highly Integrated and Efficiently Coordinated, Bidirectional Charging Enhances Station Efficiency.




- Bidirectional charging technology for battery energy storage applications
- Grid-forming capability supporting voltage source active support, primary frequency regulation, inertia response, and black start
- Independent air duct cooling design with waterproof, dustproof, humidity control, and temperature regulation
- Fully compatible with various battery pack assemblies including 282 / 600 LHP / CVP
- High efficiency and energy savings, boosting overall station efficiency by 3%-4%

## Energy Management System (EMS) for Photovoltaic Storage, Charging, and Swapping

Based on charging and swapping stations, flexibly integrate photovoltaic and energy storage equipment to build microgrids, enabling flexible dispatch of controllable resources.
Real-time monitoring and data analysis, intelligent scheduling and optimization, cloud-edge collaboration and grid interaction, and adaptation to battery swap station access requirements.

- Peak shaving and valley filling to capture economic benefits through peak-off-peak electricity price differentials
- Integration of renewable energy to enhance corporate environmental performance metrics
- Grid interaction to participate in electricity market transactions
- Off-grid operation to ensure site i mmunity from grid failure disruptions

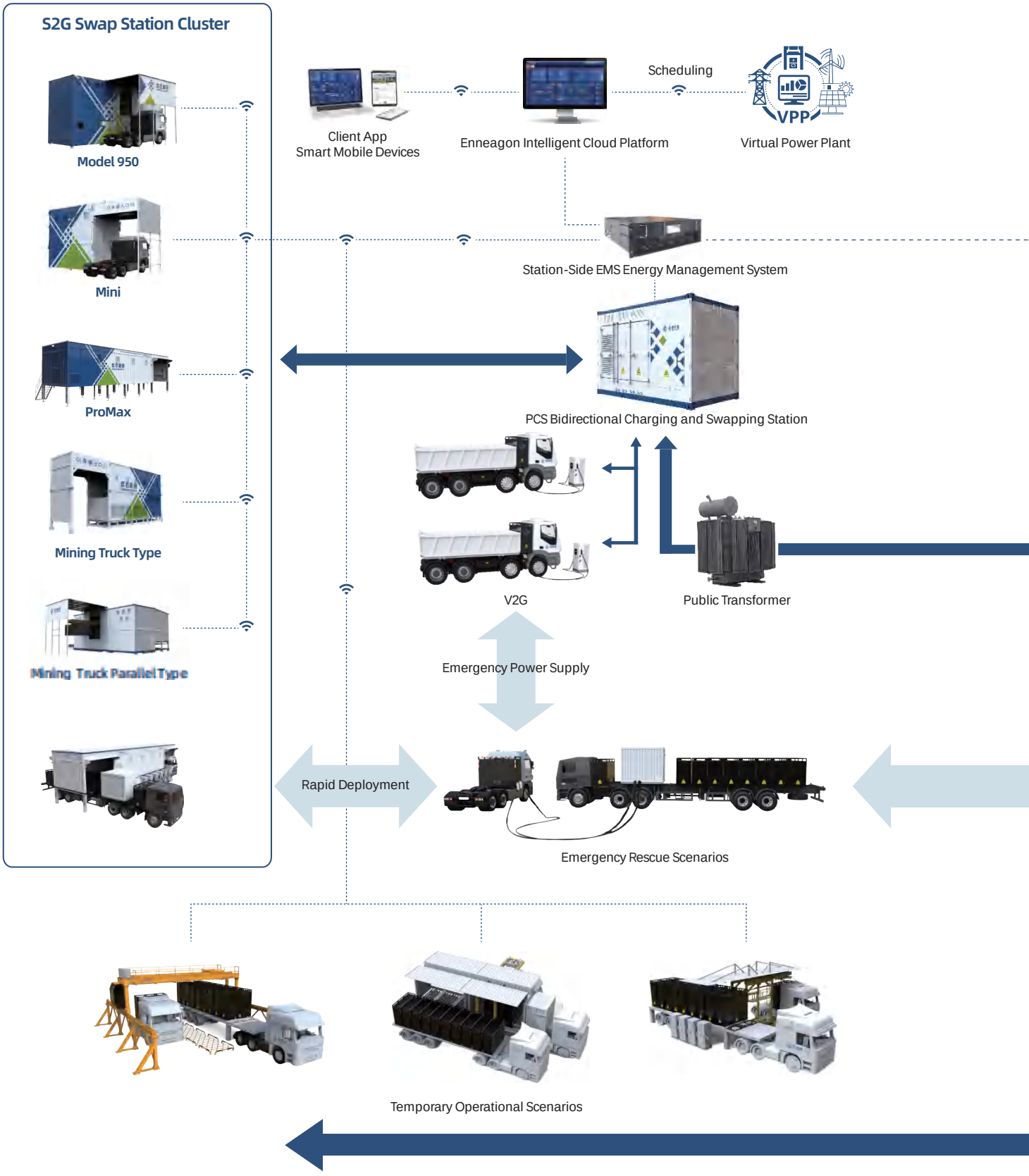


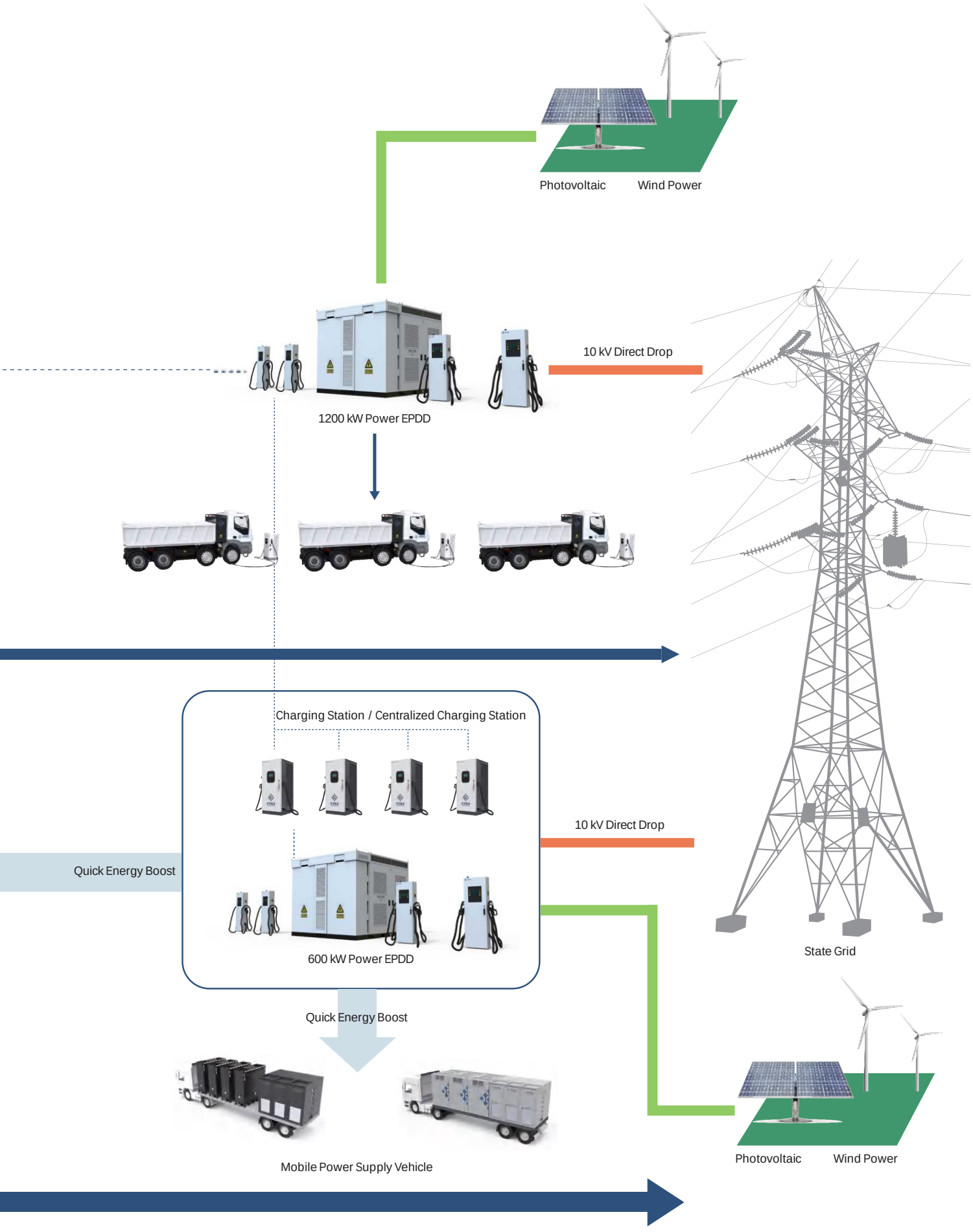
## Wind / Solar / Storage / Charging / Swapping / Distribution Integrated Solution

Centered on PCS / EMS, multiple software and hardware products facilitate grid formation / connection, enabling microgrids / virtual power plants to optimize energy utilization and achieve flexible dispatch.

Source-Load-Storage + PCS + V2G/S2G +Wind/Solar/Storage/Charging/Swapping + EMS =Microgrid / Virtual Power Plant

* Use 4 / 5G networks




Photovoltaic
Wind Power
10 kV Direct Drop
1200 kW Power EPDD
State Grid
Charging Station / Centralized Charging Station
10 kV Direct Drop
Quick Energy Boost
600 kW Power EPDD
Quick Energy Boost
Photovoltaic
Wind Power
Mobile Power Supply Vehicle

## Green Mining Solutions

- **Mobile Recharging:** Utilizes mobile power units such as power supply vehicles and power delivery vehicles for flexible energy replenishment without reliance on fixed power lines.
- **Battery Swap Model:** Provides rapid battery swap services for mining trucks and heavy-duty trucks, significantly reducing recharge time and enhancing vehicle uptime.
- **Tiered Energy Utilization:** Supplies surplus system power to living quarters, improving overall energy efficiency.
- **Specialized Design:** Tailored to the distinct requirements of mining trucks and heavy-duty trucks, utilizing batteries and power delivery vehicles of varying specifications for high levels of specialization.


Wind Power Generation







Fully charged power supply vehicles can directly provide charging services for mining site construction machinery and equipment.

The power delivery vehicle supplies fully charged batteries to the mining truck battery swap station for charging and swapping purposes, while feeding surplus electricity to the residential area.

The delivery truck supplies fully charged batteries to the heavy-duty truck battery swap station for charging and swapping purposes. Surplus electricity generated is then supplied to the residential area.

**Notes:**

- **Vehicle Configuration Differences:** Mobile charging vehicles supplying power to mining truck battery swap stations and heavy-duty truck battery swap stations are two distinct specialized vehicles due to differing battery specifications.
- **Mining Site Power Vehicle Configuration:** Power vehicles charging mining site equipment come standard with 4 mining truck batteries arranged vertically.
- **Battery Quantity Difference:** The heavy-duty truck battery mobile charging vehicle has a standard cargo capacity of 8 batteries, while the mining truck battery mobile charging vehicle carries 4 batteries.

### Comprehensive Green Mining Solution Components:

- **Mobile Distribution Networks:** Reimagining traditional grid models with mobile networking and power distribution under the new energy system architecture.
- **Charging:** The grid charges batteries at swap stations via chargers.
- **Energy Distribution:** Mobile power delivery vehicles operate in a loop between power plants and swap stations, delivering fully charged batteries while retrieving depleted ones to form an efficient energy replenishment cycle.
- **Equipment Recharging:**
  - Power supply vehicles directly recharge mining equipment.
  - Mining trucks swap batteries or recharge at parallel battery swap stations or chargers.
  - Dump trucks (heavy-duty trucks) swap batteries at dedicated heavy-duty truck swap stations.
- **Energy Reuse:** Transferring surplus electricity to residential areas for daily power consumption.

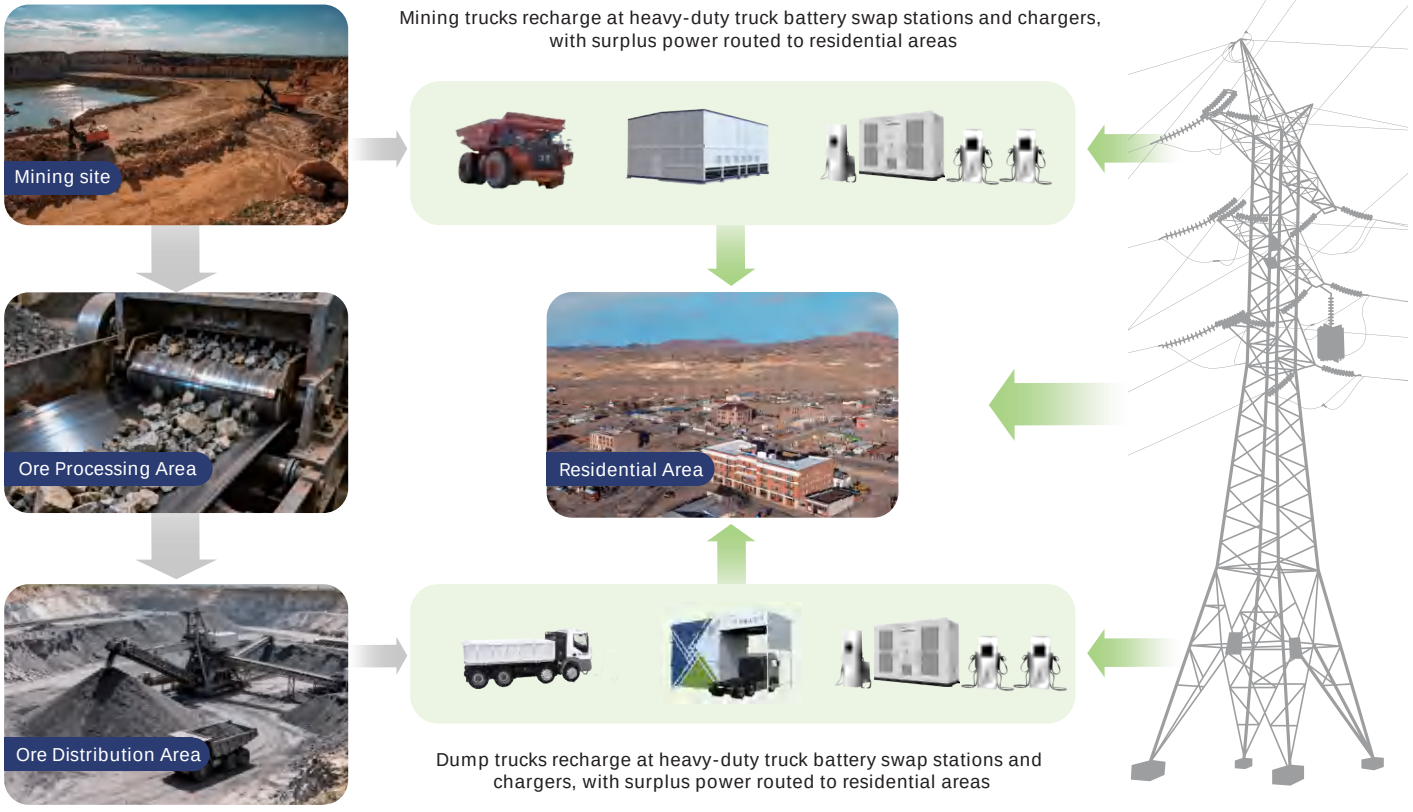
**For mining operators, this translates to lower transportation costs per ton of ore, more stable and reliable production processes, and a greener mining image that better aligns with environmental policies.**

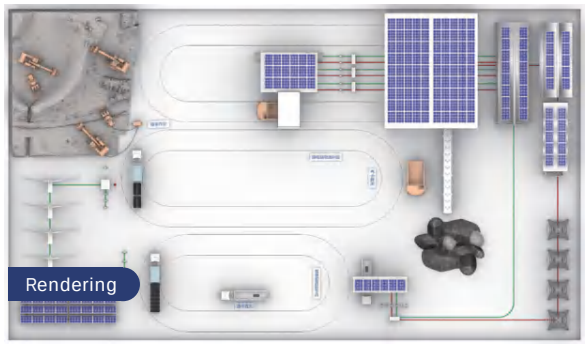


**Mobile Power Vehicle:** Equipped with 4 mining-grade batteries arranged vertically



**Mobile Power Supply Vehicle:** Those serving mining truck battery swap stations are equipped with 4 mining truck batteries; those serving heavy-duty truck battery swap stations are equipped with 8 heavy-duty truck batteries




## Program Benefits:

- **Enhanced Operational Efficiency:** Rapid battery swapping minimizes equipment downtime, ensuring uninterrupted production and boosting overall operational efficiency.
- **Reduced Energy Costs:** Leveraging off-peak grid electricity and repurposing surplus power lowers overall electricity expenses.
- **Environmental Sustainability:** Full electrification replaces traditional fuel-based solutions, reducing carbon emissions and noise pollution.



**Mini2.0 Battery Swap Station:** Battery “Hybrid Swap Mode” fully compatible with 282–600kWh batteries—works seamlessly with all models, new or old, and all battery sizes



**Mining Truck Parallel Station:** Fully compatible with mining truck battery pack assemblies under 1000kWh, supporting unmanned mining truck battery swapping operations with a canopy



**High-Power Charging Stack (Optional V2G Functionality):**
Complementing battery swap stations, supporting power smoothing upgrades, and enabling integrated upgrades for solar, storage, charging, and swapping systems



**Energy Management Cloud:**

- Real-time monitoring of PV, energy storage, and load-side operational parameters
- Big data-driven energy efficiency analysis services
- Achieving coordinated optimization of energy consumption costs through vehicle-to-station / charger linkage

## Diesel-to-Electric Conversion for Mining Trucks

In mining operations, high fuel costs, stringent environmental regulations, and equipment maintenance pressures have long been core challenges hindering corporate development.
Mining trucks and other construction machinery are emerging as key pathways for industry transformation, upgrading, cost reduction, and efficiency gains.
This represents not merely a technological upgrade, but a revolution in operational models.

## Significant Benefits After Converting from Oil to Electricity



### Significant improvement in economic efficiency

**Energy costs plu mmet:** With electricity prices lower and more stable than fuel costs, electric mining trucks can reduce energy expenses by 50% to 70% compared to diesel-powered vehicles.
**Maintenance costs slashed:** The electric system features a simple structure that eliminates the need for oil changes, filter replacements, and other maintenance tasks, reducing upkeep expenses by over 30%.
**Long service life and high reliability:** Motors and electronic control systems feature extended lifespans and low failure rates, significantly improving equipment uptime.



### Outstanding environmental and social value

**Zero emissions and low noise:** Pure electric drive achieves zero tailpipe emissions during operation and significantly reduces noise levels, improving the mining area environment.
**Aligned with policy direction:** Responding to the national "dual carbon" strategy, benefiting from new energy policy support, and enhancing the company's green image.



### Comprehensive Optimization of Operational Efficiency

**More responsive power delivery:** Instantaneous torque burst from the motor enables faster acceleration on steep inclines and quicker starts, reducing cycle times.
**Energy Recovery for Extended Range:** During braking on downhill slopes, the energy recovery system converts kinetic energy into electrical energy, boosting range by 15%–20%.
**Smart management for greater peace of mind:** Electric platforms are inherently compatible with intelligent dispatch and remote monitoring, laying the foundation for future autonomous driving.

## Core Supporting Products of Enneagon Energy

### 1. High-voltage power distribution system

- **High integration and modular design**
  By ingeniously integrating multiple control modules into a single unit, the system's complexity is significantly reduced. The modular design allows for flexible combination and assembly according to requirements, facilitating on-site installation, commissioning, and maintenance.
- **Multi-path Flexible Configuration**
  Supports 2- or 3-branch battery parallel input, easily acco mmodating varying power demands with strong scalability.
- **Resilience in Extreme Conditions**
  With an IP67 protection rating, it withstands mining site dust, humidity, and extreme temperatures, ensuring stable system operation around the clock.
- **Intelligent Protection with Precision Control**
  Featuring integrated protection against overvoltage, overcurrent, overtemperature, and short circuits, combined with intelligent CAN co mmunication management for enhanced safety and efficiency.
- **Supports ultra-fast charging**
  Supports single-port charging at 350A and dual-port charging at 700A, reducing recharge time and ensuring continuous operation.
- **Highly compatible platform-based design**
  The design features flexible and adaptable structures that can be customized to meet diverse customer requirements, ensuring seamless compatibility with various vehicle models or equipment.
  It can withstand operating conditions including voltages exceeding 750V and currents up to 400A, fulfilling the demands of multiple application scenarios.

### BCU-600 >>



### Compatible Vehicle Models >>



Electric Mixer Truck



Electric Wide-Body Mining Truck

## 2. Power Battery System

#### Product Features

- High capacity with support for high-current charging and discharging
- Pack system features a design isolated from water-cooled units, eliminating dust concerns
- Integrated charging and swapping design compatible with mining truck battery swap solutions
- Capacity options ranging from 426 to 800 kWh, compatible with batteries from various manufacturers
- Standardized modular products requiring no secondary calibration by vehicle manufacturers

#### Application Areas

- Battery swapping for mining trucks, etc.

#### Standard Configuration

- 2 Connectors:  Charging and discharging via the same port
- National Standard Charging Dock

#### Optional Configuration

- High-Cold Version
- High-Altitude Version
- High-Salt-Fog Version



Backpack-Type Mining Battery Packs

## Integrated PV Storage Charging Swapping Solution

• Real-time monitoring and data analytics, supporting diverse device and protocol integration with flexible configuration.
• Intelligent scheduling and optimization, powered by AI algorithms.
• Cloud-Edge Collaboration and Grid Integration: Cloud-Network-Edge-Device Architecture for IoT Interconnection.

## Core Revenue

### 【Enneagon EMS Energy Management System Features】

The EMS Energy Management System is based on an embedded hardware data processing platform. By expanding terminal servers and network switches to connect device data terminals, it enables the collection, processing, storage, display, alerting, control, data forwarding, coordinated control, and fault handling of various equipment data within an organization.

Built on a multi-platform foundation with an integrated design philosophy, the system incorporates comprehensive monitoring capabilities, grid-connected/off-grid switching, coordinated control, sequential process control, data co mmunication and exchange, human-machine interface display, and advanced applications.

### 【Product Advantages】

- The flexibility and scalability of the hardware and software platform enable the construction of a versatile and adaptable controller support software platform, capable of seamlessly integrating smart terminal devices utilizing various co mmunication protocols and methods.
- Flexible scalability for grid-connected/off-grid operation switching and multi-source coordination control in microgrids. Enables flexible implementation of microgrid grid-connected control, off-grid control, smooth grid-connected/off-grid switching control, sequential control, and black start. Also facilitates complementary control among multiple power sources and coordinated source-grid-load control among power sources, energy storage, and loads.
- Self-diagnostic, self-analytical, and self-recovery capabilities. Through continuous online tracking, analysis, and diagnostics, it identifies potential hardware vulnerabilities and failures, as well as software vulnerabilities and faults during system operation. This provides robust analytical tools for rapid resolution of both hardware and software issues.



**Optimization of Photovoltaic Integration**

By integrating Conv-LSTM PV output prediction with deep reinforcement learning algorithms, AI-driven dynamic absorption control redirects curtailed solar power to storage conversion stations, boosting PV absorption rates from 50%-60% to 80%.




**Intelligent Vehicle Dispatch**

The B-BOX system is deeply integrated with the TMS (Transportation Management System), enabling charging/swapping route planning and AI agent-based optimization of dispatch strategies, resulting in a 15% improvement in vehicle dispatch efficiency.



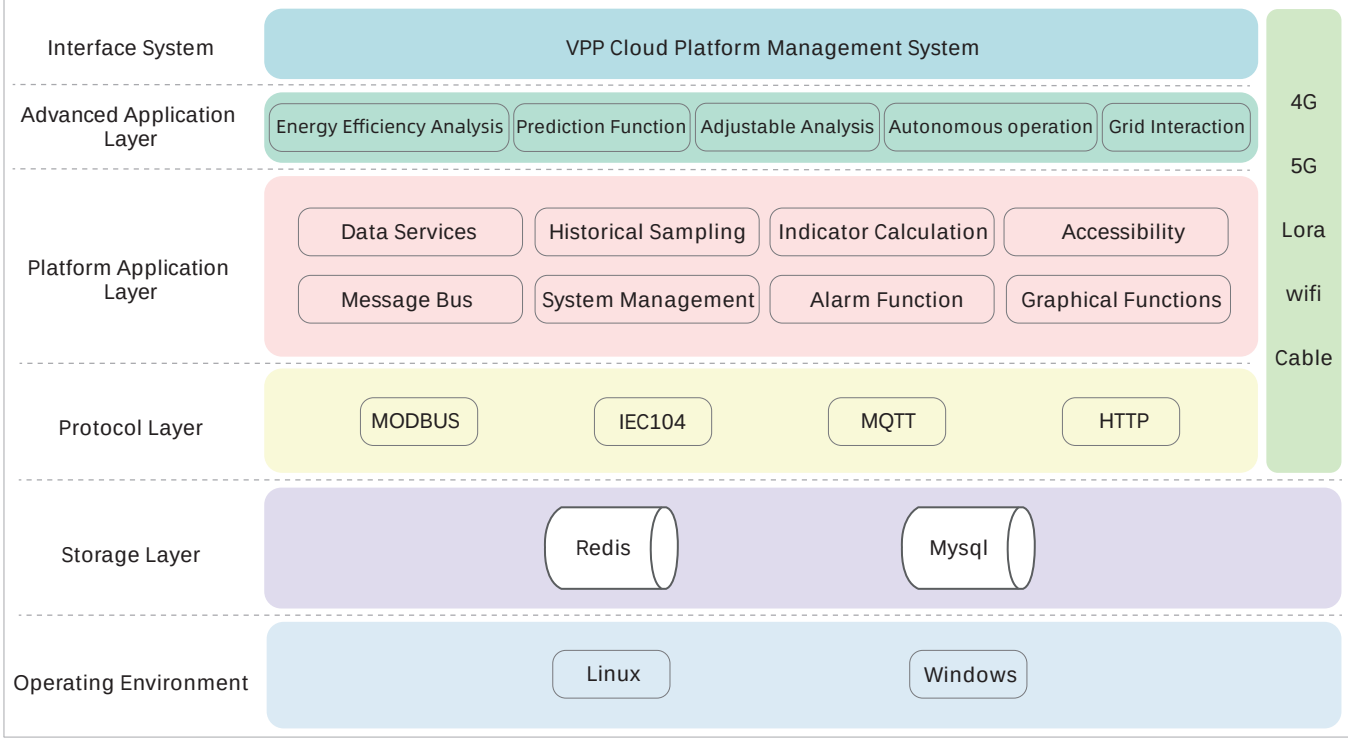
**Grid Synergy Gain**

S2G Peak Shaving and Valley Filling + Tiered Optimization Control (15-minute, daily, monthly levels) optimizes grid load, extends battery life, and reduces electricity costs.

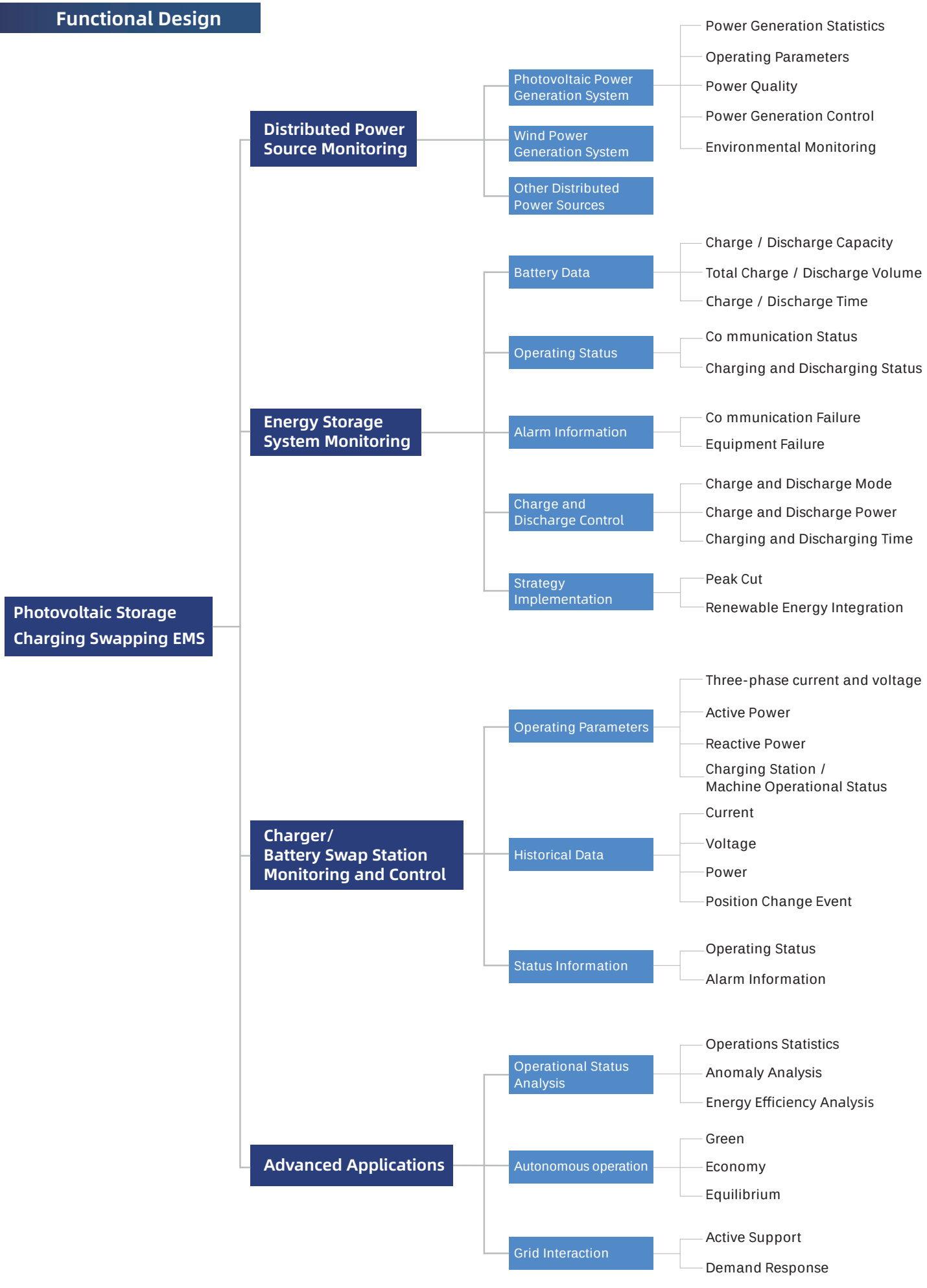
| EMS Energy Management System Parameters | | |
|---|---|---|
| **1.Hardware Specifications Industrial-grade server/industrial PC, reco mmended configuration** | | |
| CPU | Quad-core 3.1GHz or above | |
| RAM | 16 GB or above | |
| Hard disk | 500 GB or above | |
| Display | Dedicated graphics card with at least one VGA port | |
| Ethernet | The motherboard provides at least two 10 / 100 / 1000Mbps Ethernet controllers | |
| I/O Interface | At least 4 RS232 / 485 interfaces; at least 2 USB 2.0 ports | |
| Expand | Supports PCI / PCIe / mini PCIe expansion | |
| **2.Software Parameters** | | |
| Category | subitem | Requirements |
| Operational Response Performance | Page Switch | Less than 1 second |
| | Historical Data Query | Less than 3 seconds |
| | Report File Export | Less than 5 seconds |
| Data Co mmunication Performance | Control co mmand issuance | Less than 1 second |
| | Real-time alert pop-up | Less than 3 seconds |
| | Remote signaling refresh time | Less than 5 seconds |
| | Telemetry Refresh Time | Less than 10 seconds |
| Operational Response Performance | Processor usage | Less than 50% on average |
| | Memory usage | Less than 60% on average |
| | Network bandwidth | Less than 30% on average |
| Data Co mmunication Performance | Event Log | Over 10 years |
| | Data Logging | Over 1 year |
| | System Alarms and Failures | Over 5 years |
| | System Control Co mmands | Over 5 years |
| | Remote signal position change | Over 3 years |
| | Configuration Changes | Permanent Preservation |

## Software Design

**EMS System Application Architecture Diagram**



## Functional Design



## Scenario 1: Charging and Swapping Station + Photovoltaic





| System Composition | Control Strategy | Control Logic |
|---|---|---|
| **Charging and Swapping Station + Photovoltaic + Grid Power** | Renewable Energy Integration | Adjust the power output of the charging stations to ensure the total load power exceeds the photovoltaic power generation output. |
| | Anti-backflow | Monitor the status of grid connection points and switches. By reducing the power output of photovoltaic inverters, ensure that power does not flow back to the grid at the connection points. |
| | Surplus Power Export to Grid | When photovoltaic systems meet the total load demand, the surplus electricity will be fed into the grid under conditions permitted by the grid. |

## Scenario 2: Charging and Swapping Station + Energy Storage





| System Composition | Control Strategy | Control Logic |
|---|---|---|
| **Charging and Swapping Station + Energy Storage + Grid Power** | Peak-Valley Price Arbitrage | Based on peak-off-peak electricity pricing, control energy storage / charging devices to charge during off-peak hours and discharge during peak hours to maximize electricity cost savings. |
| | Demand Response | Receive dispatch instructions from the upper-level platform to control the charging and discharging of energy storage systems and charging stations, meeting requirements such as peak shaving and valley filling, as well as market transactions. |
| | Planned Electricity Consumption | Customize the charging and discharging power of energy storage / charging units by time segment to acco mmodate customized application scenarios. |
| | Off-grid operation | In the event of a power grid failure, switch to energy storage as a voltage source to regulate power supply balance within the area, enabling off-grid operation and ensuring equipment safety. |

## Scenario 3: Charging and Swapping Station + Photovoltaic + Energy Storage







| System Composition | Control Strategy | Control Logic |
|---|---|---|
| **Charging and Swapping Station + Energy Storage + Grid Power** | Renewable Energy Integration | Adjust the charging power of the battery swapping station's chargers and energy storage systems to ensure the total load power exceeds the photovoltaic power generation output. |
| | Peak-Valley Price Arbitrage | Based on peak-off-peak electricity pricing, control energy storage / charging units to charge during off-peak hours and photovoltaic generation periods, discharging during peak hours to maximize electricity cost savings. |
| | Demand Response | Receive dispatch instructions from the upper-level platform to control the charging and discharging of energy storage systems and charging stations, meeting requirements such as peak shaving and valley filling, as well as market transactions. |
| | Planned Electricity Consumption | Customize the charging and discharging power of energy storage / charging units by time segment to acco mmodate customized application scenarios. |
| | Off-grid operation | In the event of a power grid failure, switch to energy storage as a voltage source to regulate power supply balance within the area, enabling off-grid operation and ensuring equipment safety. |

# Applications



## Port (High Humidity, High Salt Spray)

# Shanghai Port Elevated Road Unmanned Heavy-Duty Truck Battery Swapping Project

### China's First Unmanned Heavy-Duty Truck Battery Swap Station: Swap in Just 2 Minutes!

This station serves as a supporting facility for the Yangshan Port water-land-rail integrated transport system. It employs a 900-series intelligent autonomous parallel battery swap station equipped with 12 battery modules and 13 charging bays. Utilizing Enneagon's newly developed ground-track gantry dual-station swapping robot technology, the station achieves coordinated battery swapping through a robotic system paired with a telescopic arm mechanism. This approach reduces swapping time by 50% compared to the previous single-robot hoisting method. The fastest swap time is 1 minute 50 seconds, capable of handling up to 288 daily vehicle swaps. This provides green energy services for intelligent heavy trucks traveling between Yangshan Port and the New Area's distribution center, covering a 35-kilometer one-way route. The battery swap station employs a customized high-salt-fog-resistant design to withstand seawater vapor corrosion while enhancing wind and earthquake resistance, ensuring resilience against sea winds and typhoon impacts.








## Yangshan Port Phase IV Chassis-Side Battery Swap AGV Project

### China's first fully automated electric driverless AGV battery swap station—entirely unmanned!

This station serves as the energy support battery swap facility for the AGVs (Automated Guided Vehicles) at Yangshan Phase IV Automated Terminal. It is also China's first fully automated AGV battery swap station, addressing the operational endurance challenge for AGVs and ensuring 24/7 continuous operation. Concurrently, Enneagon supplied AGV battery pack assemblies for this project. The use of high-capacity lithium batteries enables AGVs to operate continuously for 12 hours on a full charge. The battery-swapping robot completes the entire battery replacement process in just 6 minutes, with a full recharge taking only 2 hours. Beyond the swapping system, Enneagon also installed high-power charging stations at Yangshan Port. The combined charging and swapping system serves the terminal's fleet of 50 AGVs.








# Mainline (High Temperature, High Wind and Sand)

## Battery Swapping Project at Naomao Lake Industrial Park, Hami, Xinjiang

### Racing across the Gobi Desert, stable operation in 12-level winds + extreme sandstorms!

This station serves as a transportation support facility for the Naomao Lake Coal Mine mining area, primarily servicing over 100 heavy-duty tractor-trailers operating on the mine's dedicated transport routes. Local winds consistently exceed Beaufort Force 5, with gusts reaching Force 12. The facility comprises two 800-series pre-assembled battery swap stations. Utilizing advanced sealing materials and technology, along with a unique wind-sand barrier design, it effectively prevents dust intrusion into the swap stations. Reinforced structural components ensure robust adaptation to extreme environments, guaranteeing stable and efficient battery swapping services for electric heavy-duty trucks even during Category 12 gales and severe sandstorms.



## Xinjiang Chichuan Daheyan Battery Swap Project

### Unfazed by scorching 70°C surfaces! Zero-stress charging and swapping!

This station is located along Provincial Highway 301 in Daheyan Town, Turpan City, Xinjiang, primarily providing battery swapping services for 50 coal transport trucks serving stations along the Hami–Lop Nur Railway and Lanzhou–Xinjiang Railway. It is equipped with one FX-Mini battery swapping station and four 320kW chargers. Designed for extreme su mmer conditions where surface temperatures exceed 70°C, the station's enclosure features intelligent temperature control. When temperatures surpass preset thresholds, the system automatically activates to maintain safe operating conditions. A liquid cooling system automatically engages during battery charging to ensure thermal safety. The charging and swapping equipment utilizes high-temperature resistant, anti-aging, and highly efficient thermal insulation materials, effectively minimizing the impact of external heat on internal components to ensure long-term stable operation of the entire station under high-temperature conditions. Operating 24/7, the station has saved customers approximately 3.5 million yuan since its launch!



## Xinjiang Jiuzhou Hengchang Charging and Battery Swapping Project

### 300 km Flexible Recharging! Freely Traverse the Gobi Desert Highway

This project comprises two horizontal coal transportation logistics trunk lines within the Xinjiang Autonomous Region, connecting approximately 30 power plants and 38 key coal-consuming enterprises. The total length of the integrated logistics trunk line network is approximately 1,500 kilometers.
This station is configured for the transportation needs of the Toksun Black Mountain Coal Mine in the Zhunan Coalfield, primarily serving 450 tractor units operating on the 300-kilometer dedicated coal transportation line within the mining area. The station comprises two FX-Mini battery swap stations and eight 320kW chargers. Its pre-assembled design minimizes footprint, significantly reduces civil engineering requirements, and facilitates rapid deployment and relocation. With a short swap duration (3.5 minutes per swap), it enables efficient 24-hour service for 184 vehicle swaps daily. Highly favored by customers, it has become the primary energy replenishment solution along this trunk line.







# Mine (Extreme Cold, High Altitude)

## Yellow River Mining Truck Battery Swap Project

### Safe, intelligent, and cold-resistant! Effortlessly meets the high-energy demands of mining truck transportation!

Located at the Shiyarhamu Nickel-Cobalt Mine—China's second-largest nickel-cobalt deposit—this station primarily serves electric mining trucks transporting quarry materials. Enneagon 450-series intelligent autonomous parallel-type battery swap station features seven 422kWh high-capacity batteries, effortlessly meeting the high-energy demands of mining truck operations. Its gabled roof effectively withstands falling rocks and slag accumulation in mining areas. The overhead battery swapping system enables fully automated robotic battery replacement. With a single scan via the mobile app, trucks can complete a battery swap and depart within 5 minutes effectively resolving the slow charging issue for electric mining trucks. Advanced thermal insulation and cold-resistant technology ensure operation down to -40°C.









## Jinnan Steel Heavy Truck Battery Swap Project

### Boosting Transport Efficiency by 90%! Helping Enterprises Achieve Environmental Excellence! Shanxi Province's Steel Industry Green Power Transportation Benchmark Demonstration!

This station serves as an internal logistics support project within the Jinnan Steel Group industrial park, utilizing an 800-type pre-assembled battery swapping station. Upon commissioning, electric heavy-duty trucks transitioned from 1.5-hour charging sessions to 5-minute battery swaps. This not only eliminates queuing time but also reduces land requirements for charging facilities and the number of backup vehicles, thereby enhancing transportation efficiency and lowering operational costs. Powered entirely by direct photovoltaic supply, the station achieves truly “zero-carbon” transportation from the energy supply end, creating favorable conditions for Jinnan Steel Group's environmental compliance.








# Thermal Power Plant

## Battery Swapping Project at Yuzhong Power Plant, Zhengzhou, Henan

### Run more, earn more! Green transportation maximizes efficiency!

This station serves as an internal coal transportation support project for Zhengzhou Yuzhong Power Plant, primarily servicing 40 on-site tractor units with an average daily battery swap capacity of approximately 10,000 kWh. The operating cost per 100 kilometers for electric heavy-duty trucks is only 45% of that for conventional diesel trucks with equivalent carrying capacity, reducing carbon dioxide emissions by 320 tons annually. The 800-series pre-assembled battery swap station can meet the daily demand of up to 168 vehicle swaps and is compatible with over 84% of battery-swap heavy-duty trucks on the market (approximately 600+ models). Run more, earn more! Enneagon maximizes efficiency for our customers!









# Charging Station

## Hongqiao Airport Taxi Holding Area

### China's first dedicated taxi depot charging station enabling simultaneous 'standby queuing + charging' for public service!

The project features 80 charging bays, designed to facilitate Hongqiao Airport's integrated management of new energy taxi operations, ensuring both “standby service” and ‘charging’ functions are efficiently managed. After charging in designated areas, new energy taxis are exempt from entering traditional taxi queuing lanes and may depart directly via dedicated exits. However, they must adhere to “charging duration limits” and relevant management regulations. High-power DC fast charging with a maximum output of 100kW enables the Roewe Ei5 pure electric taxi to achieve a full charge from 0 to 100% in as little as 35 minutes. The charging station employs standardized, modular design and construction from chargers to the power supply system, enabling intensive utilization of land and electricity resources.



## Quanzhou Jinjiang Riverside Charging Station

### Low-Cost Operations, High Returns!

This charging station provides power supply services for electric buses along the riverside in Jinjiang City, Quanzhou, serving a fleet of 40 buses. Equipped with an off-grid mode to meet emergency charging needs, the station also supports optional photovoltaic power integration. By utilizing clean energy, it reduces its own power consumption while meeting the daily charging demand of 4,800 kWh.



# 10kV Direct-Drop Ultra-Fast Charging Station

## EPDD High-Efficiency Ultra-Fast Charging Station

### Boosts station efficiency by at least 4 percentagepoints, significantly reduces power loss, and increases operational revenue

EPDD's high-efficiency ultra-fast charging system employs 10kV high-voltage step-down technology, boosting station efficiency (including transformers) by at least 4 percentage points compared to traditional solutions while substantially reducing daily operational power losses. Featuring an independent air duct + heat exchanger cooling design, the unit achieves an IP65 protection rating, effectively shielding against high-pollution factors like dust, humidity, and salt spray. It is suitable for harsh environments such as ports, mines, and power plants.


Bijie, Guizhou

**2025**
One EPDD 1200 kW ultra-fast charging system


Xingning, Meizhou

**2025**
Four EPDD 1200 kW ultra-fast charging systems


Huangpu, Guangzhou

**2025**
Two EPDD 600 kW ultra-fast charging systems


East China Region

**2026**
One EPDD 2400 kW ultra-fast charging system


Southwest Region

**2026**
One EPDD 600 kW ultra-fast charging system

# Flexible Charging Station

## Flexible Charging Stack Station

Features intelligent, dynamic, and flexible power distribution, as well as an intelligent cooling and noise-reduction system, balancing safety, user experience, and energy efficiency

- Flexible Allocation -- Intelligent dynamic power distribution with full-range coverage
- User-Friendly Experience -- Features a high-brightness screen for clear visibility in bright light
- Space-Saving -- Front-and-rear access design eliminates side clearance requirements
- Energy Efficiency and Noise Reduction -- Multiple temperature sensors with intelligent thermal management and noise reduction technology



Huanghua, Hebei

**2025**
Six 1,280-kW charging stations, with a daily average charging capacity of over 40,000



Guangzhou, Guangdong

**2026**
Three 1920kW charging stacks



Ordos, Inner Mongolia

**2026**
One 2400kW charging stack

# Heavy-Duty Truck Charging Stations

## Heavy-Duty Truck Charging Stations

### Peak efficiency ≥ 95%, effectively reducing customers' operating costs

The Enneagon's DC All-in-One Charging Station delivers powerful performance, with a dual-port charging rated current of up to 300A and a maximum current of 400A, ensuring efficient and fast charging. Equipped with triple-layer safety protection technology, it ensures safety throughout the entire charging process. It can be integrated with battery swap stations for combined charging and swapping, supports power upgrades from 240 to 500 kW, achieves a module efficiency of up to 97%, and can be seamlessly upgraded to a charging and swapping platform, offering excellent scalability.




- Jiangshan: 19 x 400/500 kW DC all-in-one units (2024)
- Quzhou: 16 x 400 kW DC all-in-one units (2026)




- Phase 1: 27 x 320 kW units (Nov 2024)
- Phase 2: 13 x 400 kW units (Mar 2025)
- >1.4 million kWh monthly




- 14 x 320 kW DC all-in-one units (2025)
- >1 million kWh per unit per year




- 20 x 320 kW DC all-in-one units (2025)
- >1 million kWh per unit per year




- 16 x 320 kW dual-port DC all-in-one units (2025)
- >1 million kWh per unit per year




- 12 x 400 kW dual-port DC all-in-one units (2025)
- >1.05 million kWh monthly

# Ship Charging and Recharging

## Anhui Wuhu Battery Swap Vessel Project

### Assisting in the launch of China's first standardized battery pack swapping vessel!

This project represents China's first standardized PACK battery swap vessel equipped with an integrated “vehicle-vessel-storage” PACK swap solution. Compared to traditional charging and container swap models, it offers significant advantages: trickle charging extends battery lifespan while improving safety and residual value; simplified structure and precise power matching substantially reduce investment and operational costs; lightweight individual packs enable flexible swapping, making them suitable for small and medium-sized ports; Battery swap efficiency is substantially improved. For a typical 3,000-ton vessel, overall swap time can be reduced by over 50%. This battery system has obtained full-series product certification from China Classification Society (CCS). Centered on high safety and adaptability, it provides a standardized, highly reliable solution for new energy marine propulsion, filling an industry gap and serving as a key demonstration for the shipping sector's green transition.



## Nanjing Longtan Port Container Ship Charging Project

### China's First Containerized Power Charging Station for Electric Container Ships!

To support the operation of China's first electric container ship, a set of 480kW marine containerized power charging stations provided by Enneagon Energy has been introduced at Charging Station No. 2 in Nanjing Longtan Port. Four 20-foot containerized power charging bays have been constructed to deliver efficient and convenient charging services.



# Autonomous Operations

## Guizhou Qianbei Autonomous Battery Swap Station Supporting Project

### Autonomous operation success rate: 99.34%, zero safety incidents, significantly reduced labor and maintenance costs

Located in Bijie City, Guizhou Province, this project features one EPDD1200kW system. The EPDD high-efficiency ultra-fast charging system employs 10kV high-voltage step-down technology, boosting station efficiency (including transformers) by at least 4 percentage points compared to traditional solutions, significantly reducing daily operational power losses. Featuring an independent air duct + heat exchanger cooling design, the system achieves an IP65 protection rating, effectively blocking dust, moisture, salt spray, and other contaminants. It is suitable for harsh environments such as ports, mines, and power plants.

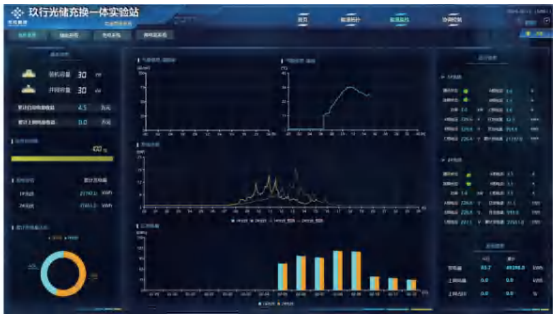


# Integrated Photovoltaic Storage, Charging, and Swapping Solution

## Jiading District, Shanghai Enneagon Energy Company Integrated Photovoltaic-Storage-Charging-Swapping Energy Experimental Station

The project includes two 30kW rooftop photovoltaic systems, a 200kWh energy storage battery cabinet, four 40kW DC charging stations, and one battery swap station. It enables microgrid operation within the industrial park, reducing electricity costs through photovoltaic power generation; flexibly dispatches energy storage capacity to optimize power curve regulation; analyzes charging patterns to coordinate optimized vehicle charging schedules; and deploys swap station batteries for grid regulation, enhancing the microgrid's overall power dispatch capability.





# Overseas Cases

## Thailand Industrial Park Battery Swap Station

### Aligning with the global trend toward low-carbon development, we are actively expanding into overseas markets!

Enneagon Energy delivered one 800-series pre-assembled battery swap station and ten 300kW Euro-standard chargers to a Thai client. Located within an industrial park in Thailand, the facility provides charging and swapping services for 200 electric tow trucks in the park. It currently serves an average of 150 vehicle trips daily. The fleet is equipped with Enneagon's 282kWh LHP-type power battery system. Featuring a lightweight enclosure design, IP67 protection rating, and efficient thermal management, the system delivers outstanding range performance alongside exceptional durability and stability. Combined with the charging and battery swapping solutions, this system helps customers reduce operating costs and enhance operational efficiency.




## Charging Station in Russian Mining Area

### Empowering China's electric heavy-duty trucks to go global, aligning with the worldwide low-carbon trend!

In Siberia, Russia, Enneagon Energy equipped the project with a 1560kW split-type DC charging stack featuring four terminals for mining operations in extreme environments. These products maintained stable operation under high-latitude conditions at temperatures as low as -50°C, demonstrating exceptional environmental adaptability and reliability, earning high recognition from the client.





# Shaping the future of global transportation and energy systems

**Shanghai Enneagon Energy Technology Co.,Ltd.**

258 Xupan Road, Xuhang Town, Jiading District, Shanghai

www.enneagon.com

info@enneagon.com

Follow Us & Learn More

**ENNEAGON ENERGY**

*The information in this brochure is for reference only. Enneagon Energy reserves the right of final interpretation.