Rebuild. Recharge. Renew: Huawei’s 25-Year Story in Ukraine’s Energy Transformation

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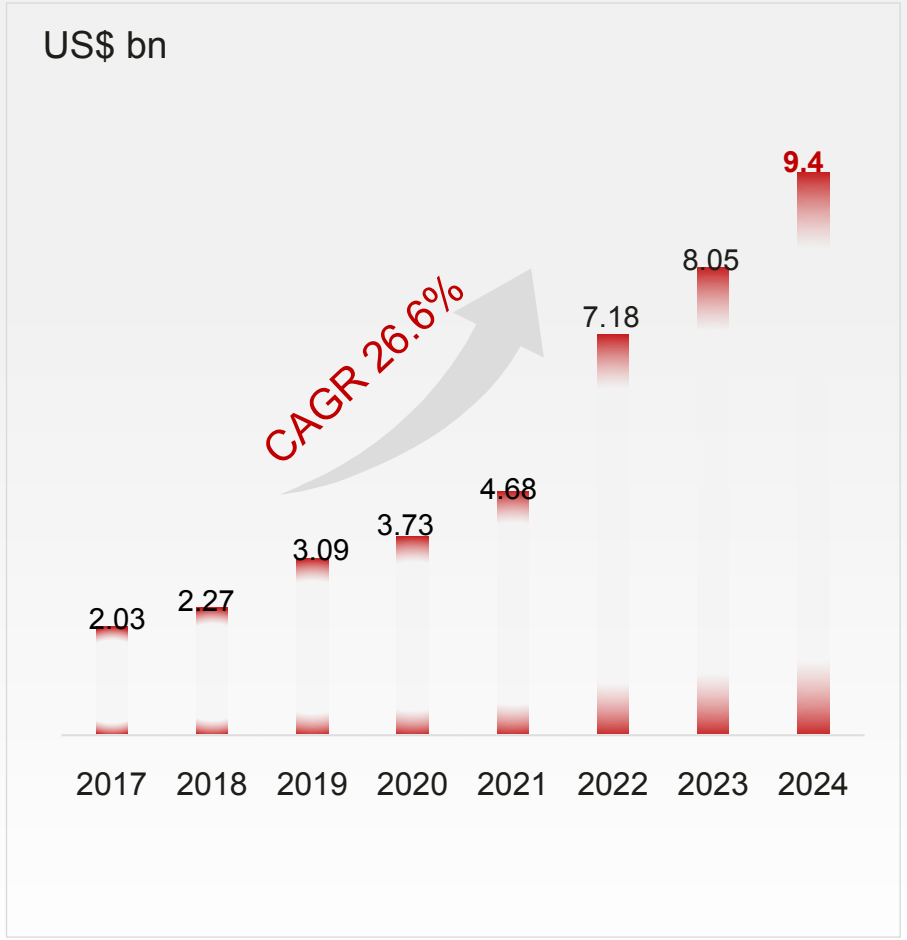
Steady growth of digital power businesses

Stable business growth



Integrating digital and power electronics technologies to promote green transformation in the industry

Smart PV: Global PV inverter shipments in 2024 reached **176 GW**, ranked **No. 1** globally for 10 consecutive years. **Pioneered the shift to string inverters**, establishing them as the mainstream technology with a market share of approximately 80%.

(Source: Wood Mackenzie)

Grid Forming ESS: Cumulative global ESS shipments reached **36.5 GWh**. The **Smart String Grid Forming ESS underwent a rigorous technology appraisal** by five academicians from the Chinese Society for Electrical Engineering, earning recognition as a world-leading solution in GWh-scale applications.

(As of the end of 2024)

Smart Charging Network: 50,000+ fast and ultra-fast chargers along **50+** highways and in **200+** cities in China

(As of the end of 2024)

DriveONE: DriveONE eMobility solution adopted in **50+** vehicle models by **10+** automobile manufacturers, with **1.6+ million** powertrains delivered

(As of May 2025)

Data Center Facility & Critical Power: Modular UPS ranked **No. 1** globally for 9 consecutive years; FusionModule ranked **No. 1** in the global modular data center market for 7 consecutive years; FusionDC ranked **No. 1** in the prefabricated modular data center market for 10 consecutive years

(source: Frost & Sullivan, *ICTresearch, and omdia)*

Site Power Facility: ranked **No. 1** globally by serviceable addressable market (SAM) for 12 consecutive years

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BESS Cases—All Business Model Applications

Globally Signed 34GWh+, Europe Signed 7 GWh+

App① *Nordic 400MWh+* (Frequency Modulation Market)

Customer S×, E×
200ms Fastest Response & Modulation

App② *Germany 760MWh+* (Innovation Market +Trading)

Customer A×, E×
One-stop solution instead of patchwork

App③ *France 500MWh+* (Auxiliary Market)

*Customer **GAZEL***
Reliable Grid Connection Capability

App④ *Bulgaria 1.7GWh+* (Arbitrary Market)

Customer S×, B×
Dedicated Localized Service Save Huge O&M Labor Cost

App⑤ *Greece 1 GWh+* (Subsidy Market)

Customer P×, F×
Dedicated Localized Service & One stop solution

App⑥ *Romania 660MWh* (ESS + Gas FM market)

Customer E×
Quick: 50MWh @ 30 working days

App⑦ *Hungary 200MWh+* (Subsidy Market)

Customer M×
One-stop solution instead of patchwork

App① *Middle East Saudi 1.3GWh+* (Grid Forming Market Off Grid)

World's Largest 100% RE City
＞1 year Steady operation under strictest power grid

App② *China Qinghai 100MWh+* (Grid Forming Market On Grid)

World's 1st 100 MWh Complementary ESS power station

App③ *Philippines 4.5GWh+* (PV & ESS Combination)

Reliable Grid Connection Capability and One-Stop Solution

App④ *Singapore 116MWh+* (Auxiliary Market)

Customer S×
Fastest (6 months) Hundred MWh ESS Construction
Long consistent power→Higher Revenue

App⑤ *Uzbekistan 300MWh+* (Capacity Market)

Customer H×
Largest ESS Project in Central Asia
Grid Forming Ready + Local Service Ability

One Platform Supports All Business Model Applications: Higher Revenue in Full Life Cycle

Energy market	Capacity market	FM market	GFM Market	PPA	Long-term power With renewable energy	Microgrid

SCL	Inertia	Black start	Wideband oscillation suppression	1st /2nd /3rd FM	Reactive overload capacity	Constant power capability	SOC accuracy	Availability	On and off grid
1.5/3/6 times VS 3 times	**3-20s** VS 20s	**Mins level** VS day level	**0.1~100HZ** VS 0.2~2.5HZ	**< 100ms** VS >200ms	**1.5 times** VS 1.2 times	**0~100%** **VS 0~94%**	**3%** VS 5%	**99.9%** VS 98%	**One platform support**

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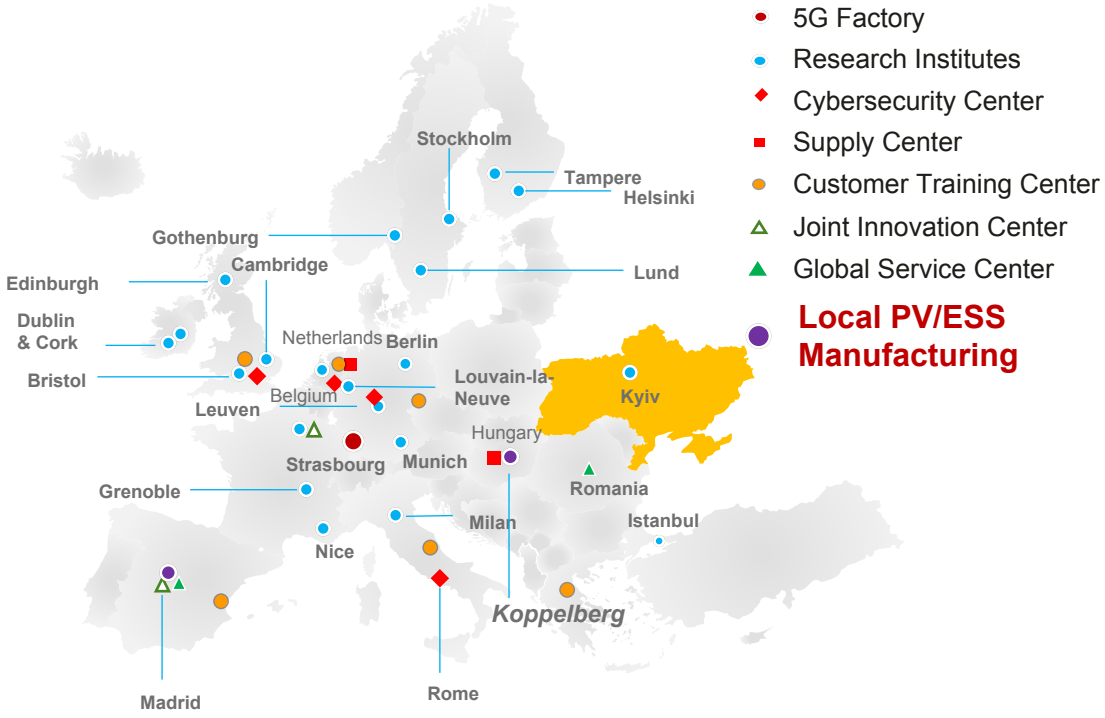
In Europe, For Europe: Huawei Adds Value to Europe w/ Local Manufacturing



- 5G Factory
- Research Institutes
- Cybersecurity Center
- Supply Center
- Customer Training Center
- Joint Innovation Center
- Global Service Center

Local PV/ESS Manufacturing

13,000+ employees

3,400+ researchers **27** R&D Centers in **13** countries

230+ tech. partnership agreements with 150+ universities and institutes

140+ universities collaboration across Europe

10,000+ patents at the European Patents Office (EPO)

Zero network & security incident

GTAC

Supply Center

1st wireless equipment manufacturing factory outside of China (€200M, 80K ㎡)

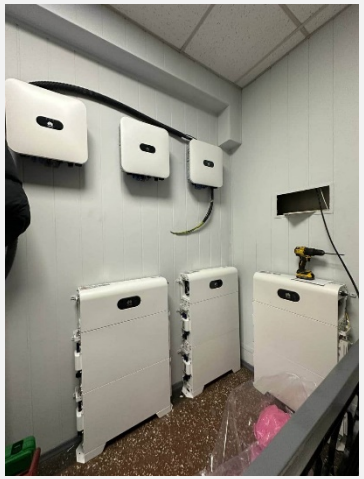
Invertor factory in Koppelberg, Hungary, 30k m².

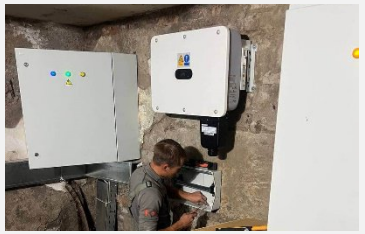
Ensuring energy independence: support for utilities and critical infrastructure

9 Hospitals Project: Energy security of health care facilities (since 2023-2024)

Energy-saving equipment to provide essential medical services.

- **Dergachi** (Kharkiv region)
- **Khodoriv** (Lviv region)
- **Berestyn** (Kharkiv region)
- **Lozova** (Kharkiv region)
- **Valky** (Kharkiv region)
- **Nova Vodolaha** (Kharkiv region)
- **Pisochyn** (Kharkiv region)
- **Nadvirna** (Ivano-Frankivsk region)
- **Stryi** (Lviv region)





We are actively continuing the in 2025 :

- **Novomayske** (Kryvyi Rih district, Dnipro region)
- **Odesa** (Odesa region)
- **Izmail** (Odesa region)
- **Pavlohrad** (Dnipropetrovska oblast)

Chortkiv community (June , 2024)

power equipment for the Road to Life municipal institution to ensure **the autonomous operation of the rehabilitation center for children with disabilities.**

Pumping station (Feb, 2025)

Supporting reconstruction of the pumping station in Novovorontsovka (**Kherson region**).

«City of Goodness»
Ukraine's largest shelter for women and children in Chernivtsi

Energy equipment for the operation of the entire centre

- **6 buildings** – can accommodate 400 people
- Over **2,5 гектарів –** the shelter's territory

Together with our partners, we provided a **Huawei LUNA2000 energy storage system**, **which instantly provides uninterrupted power in the event of power outages.** For a rehabilitation centre and hospice where children are treated every day, this is a matter of life and safety.

Uninterrupted operation of the Butterfly House Medical Centre

A medical centre for rehabilitation, round-the-clock medical care and palliative care for seriously ill children.

Round-the-clock power supply for life support equipment.

The Chernivtsi region suffered a **massive attack on 10 July 2025**. During the strikes on the region, a seriously ill girl at the centre stopped breathing.

The centre's infrastructure helped save the child's life and provide shelter for all the residents of the City of Goodness.

Shelter for the rescue and evacuation of victims of war and violence

- orphans from evacuated boarding schools; seriously ill single children;
- mothers with children who need physical, psychological, and medical protection, those who cannot raise their children due to poverty and are at risk of having their children taken away to an orphanage.
- those who have lost their homes due to war or domestic violence.
- Rescued animals that also need support and protection.

«Digital Power Lab»

Training laboratory based at Igor Sikorsky Kyiv Polytechnic Institute

15 лютого 2024 року компанія «Хуавей Україна» за підтримки **«Атмосфера-Дистрибуція»** відкрила **навчально-наукову лабораторію Digital Power Lab на базі Національного технічного університету України «Київський політехнічний інститут імені Ігоря Сікорського» (КПІ).**

On 15 February 2024, Huawei Ukraine, with the support of **Atmosfera-Distribution,** opened **the Digital Power Lab educational and research laboratory at the National Technical University of Ukraine 'Igor Sikorsky Kyiv Polytechnic Institute' (KPI).**

Національний технічний університет України «Київський політехнічний інститут імені Ігоря Сікорського»

Digital Power Lab at KPI — is a smart laboratory for training students of all levels, from bachelors to doctors of science. It is equipped with **modern Huawei equipment:** SUN2000-450W-P optimiser, SUN2000-5KTL-L1 inverter, two LUNA2000-5-E0 battery packs and LUNA2000-5KW-C0 power supply unit. This will enable students to gain skills in sustainable development and learn about energy-efficient solutions.

The laboratory allows for real-time analysis and optimisation of solar systems, storage of excess energy, and backup power supply. The Digital Power Lab promotes energy independence, the development of a 'green' university, and a continuous educational process.

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Wi-Fi in shelters (2022-2023)

A joint project of "Huawei Ukraine" and the “Fund of Educational initiatives, initiated by the Ministry of Digital and the Ministry of Education of Ukraine.

- Delivered and installed equipment:
  500 access points,
  50 switches,
  200 power adapters

- stable network equipment for universities shelters during bombing and air attacks.

27 institutions

134 shelters

17 regions

750 equipment pcs

>50,000 users

State University "Kyiv Aviation Institute“

Kharkiv National University of Radio Electronics is a technology university

Kyiv College of Communication

08.09.2023

Ініціатива «WiFi в укриттях»

Національний університет “Чернігівська політехніка” стала учасником ініціативи Міністерством цифрової трансформації України та Міністерством освіти і науки України.

State University of Telecommunications, Kyiv

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Huawei ICT Academy Ukraine: universities in 13 cities

Huawei ICT Academy - A Bridge between Academy and Industry Linking academic education with the ICT industry through the acquisition of practical ICT skills.

- **equipment for training**
- **research laboratories and centers**
- **Students support in international competitions**

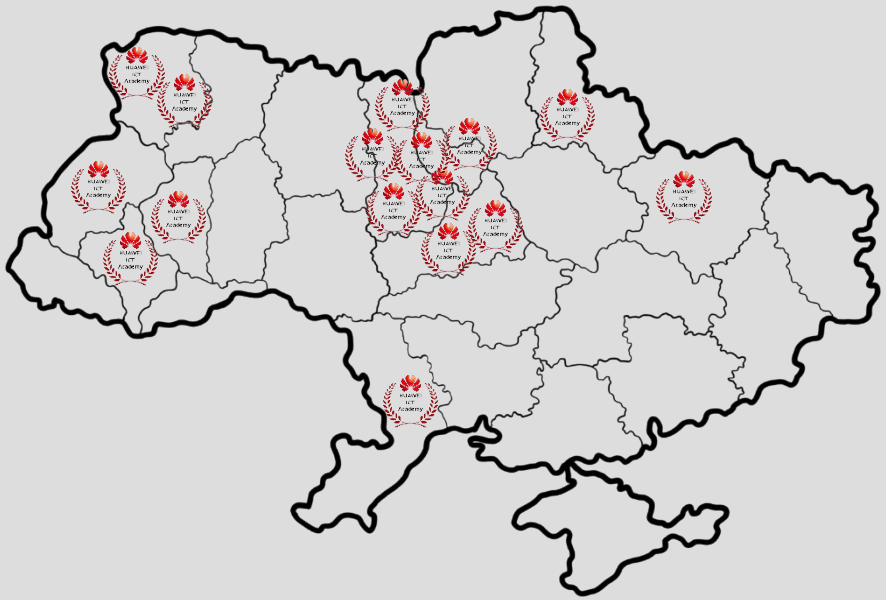
Through this partnership, Academy delivers Huawei ICT technologies training, encourages students to get Huawei certification, and develops talents with practical skills for the ICT industry and the community.

KAI Huawei Excellence Center (Kyiv Aviation Institute)

Huawei Digital Power lab (Kyiv Polytechnic Institute)

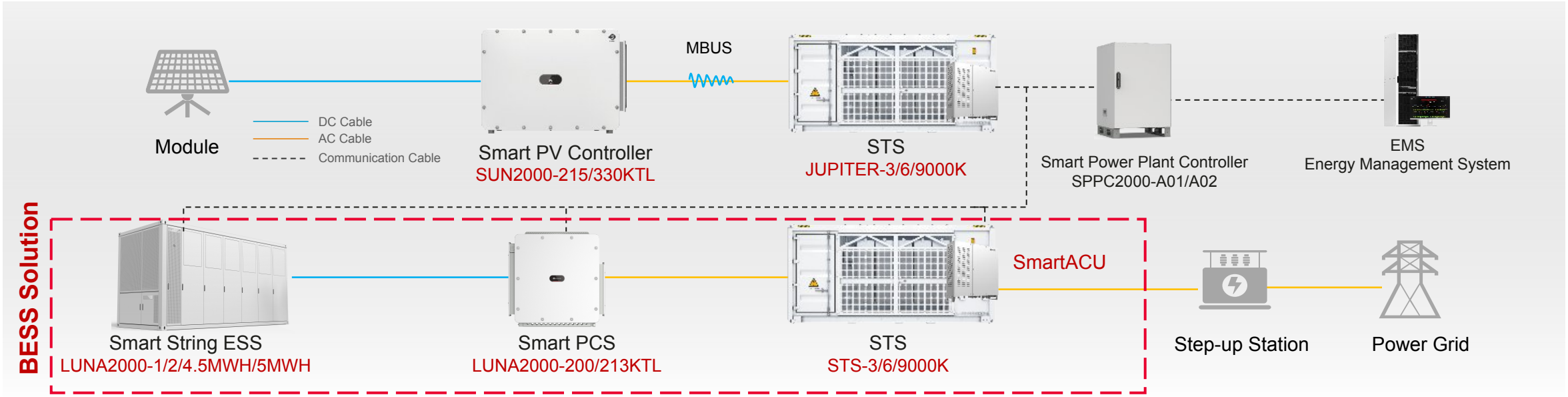
Team of winners of the Regional stage of the ICT Competition (Taras Shevchenko National University of Kyiv)

Training laboratory at SUICT



- **303 active students**
- **83456.30 minutes** spent on ICT Academy courses by students
- **15 academies** registered
- **1 Ukrainian team** is National finalist in ICT competition 2023-2024

Huawei Provides One-Stop Solution for PV+ESS

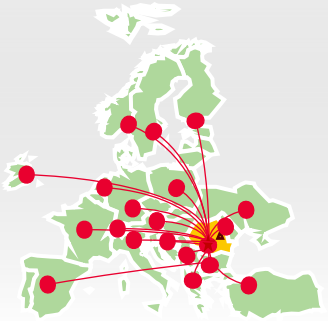


① Safety

- **All-architecture safety:** Cell-Pack-System-Grid All inclusive

② Local Service

- 100+ **Service Engineers**
- Romania Spare Parts **Warehouse**



③ Leading Grid Forming

- Grid Forming in **20 years** lifecycle, all-grid scenario (**SCR ≥ 1.2**)

④ High Efficiency

- RTE up to **90.3%**
- Availability up to **99.9%**

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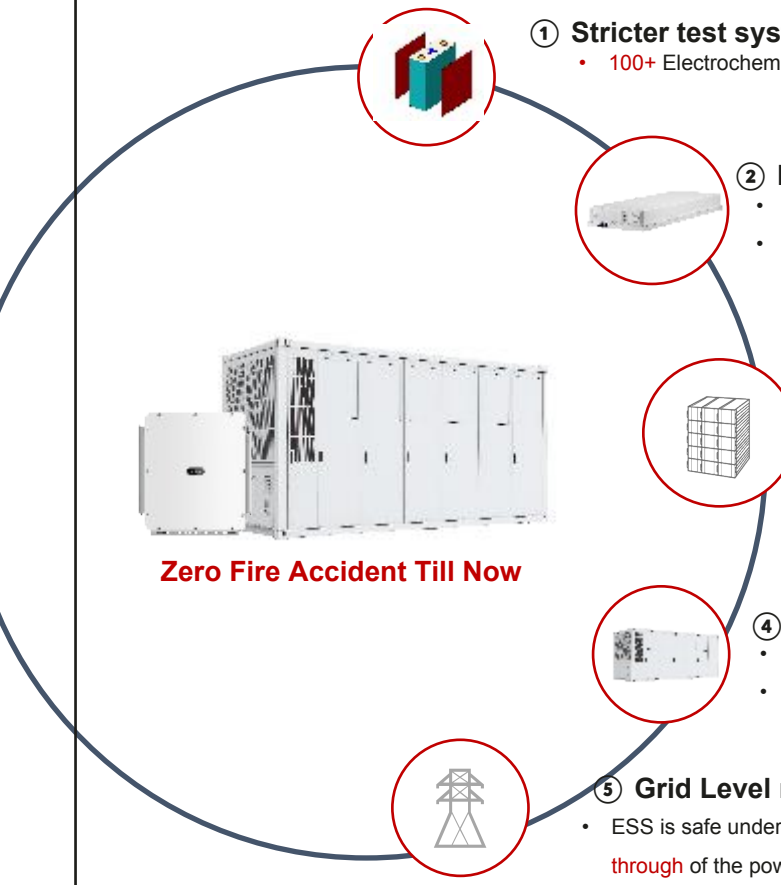
Safety is from design, C2G architecture guarantee highest standard

Multi-layer safety design from Cell to Grid



① Stricter test system
- 100+ Electrochemical cell test standard

② Minimum Diffusion Range
- Pack-level non-diffusion
- Resist oxygen leak

③ Rack Active Shutdown
- 4 active shutdown: BMU + contactor + quick disconnector + DC/AC overcurrent

④ All-round suppression
- Directional Deflagration
- Gas extinguishing + water spray

⑤ Grid Level reliably operation
- ESS is safe under high and low voltages ride through of the power grid

Zero Fire Accident Till Now

Extreme combustion test of the ESS

HUAWEI DNV

16:11	17:45	19:11	19:41
Test start	12 cells is out of control	four more cells after no step evolution is observed. Accumulated 3 hours	5th and 6th Ignition Not Burned Accumulated 3.5 hours

18:20	05:05	23:18	22:31
Site cleaning	Test End	Start burning	Total 6.3 hours
The container structure is complete and can be hoisted.	13 hours, burns for 6 hours	Accumulated 7 hours	Continuous thermal runaway of the cell

- **In all scenarios, battery pack-level thermal runaway no spread.**
- **Building a three-dimensional protection from cell - battery pack - battery cluster to system**

Advantage : Safety: Highest Safety Certification –Leading Industry Safety

➢ Highest Safety Certification –Leading Industry Safety

Security classification	Dimension	Definition of safety levels
Level 1	Basic Safety	Only meets basic regulations and achieves market access.
Level 2	Enhanced Safety	Comprehensive and reinforced design, some degree of thermal runaway non-diffusion
Level 3	HUAWEI **Premier Safety**	**In all scenarios, battery pack-level thermal runaway no spread. Protecting assets, investments and operatives.**

***DNV whole container combustion test report released**

➢ Six Key Designs, Ensuring E2E Safety

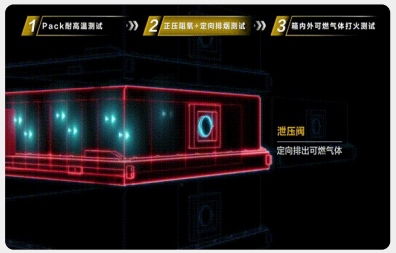
1 Higher cell test standard

Needle no catch fire

Drop no leak liquid

2 Battery pack thermal runaway non-diffusion

Metal shell withstand temperature 1500°C +



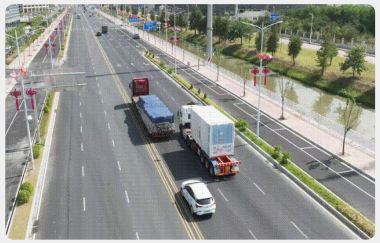
3 Rack-level directional smoke exhaust

Transportation, commissioning, smoke exhaust ensure safety

4 Container-level directional explosion

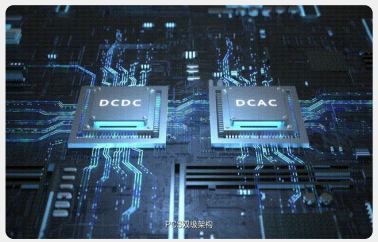
2m above the ground

No injury



5 System-level seismic reliability

5000 km multi-section transportation + random vibration



6 String dual-level architecture

High-through active power no derate, No current backfeed

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HUAWEI EU Digital Power Local Service System

Ukraine Office

200+
Ukraine Rep Office Employee

10+
Digital Power Dept. Employee

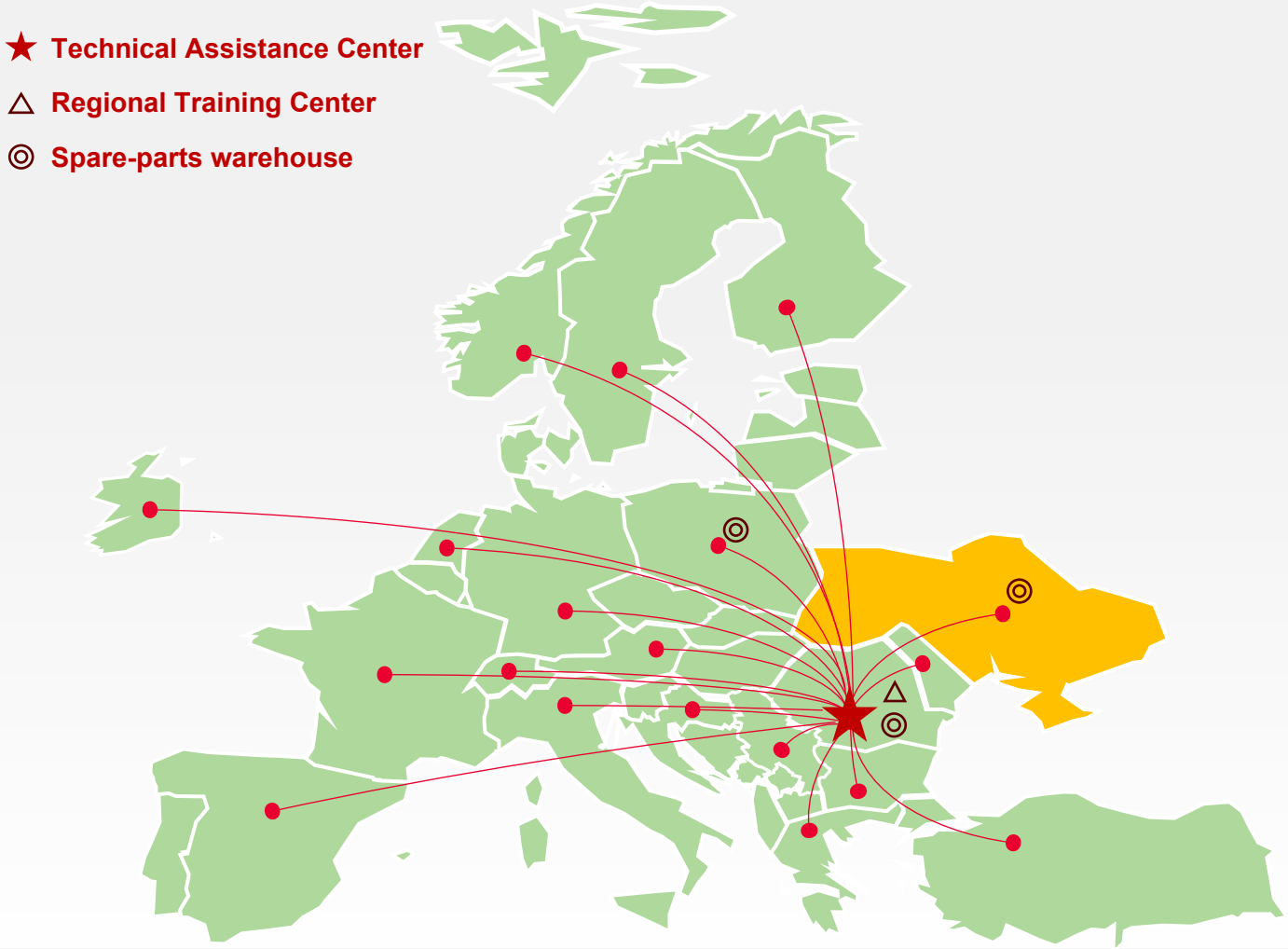
50+
TAC Service Engineers

50+
Partners Installers

Service Support Capability

- 100+ Valuable Partners and Service Engineers
- 5*24 Hours Technical Support
- Romania 7*24 Hours TAC Hotline

EU Digital Power Service & Training Center



Huawei Utility BESS Helps Gain Extra Benefit > 8.1 M€ For 100MWh (Usable Energy) In 10yrs , LCOS Reduce 5%~8% In Lifecycle

Large-scale energy storage plant

Resolving inconsistency and uncertainty of battery cells with controllability of power electronics

Centralized energy storage system

Low efficiency, short service life, difficult O&M, and low security

Smart string ESS

One package, one optimization, one cluster, one management, and full modular design

Smart String ESS

Smart PCS

	Huawei ESS	Other Solution	Cost Saving	Additional Revenue	Note
CAPEX	90.3% Higher RTE 0-100% Constant Power Range 3% SOC Accuracy	87-90 % Higher RTE 2-6% Inconstant Power Range 5% SOC Accuracy	**2.7 M€**	/	
OPEX (SOC)	Rack-Level SOC Calibration & Balancing Pack-Level SOC Calibration & Balancing	Manual SOC 3 times/ Year	**~4.5 M€**	/	10 Years
Availability	Reduce 1-3% Configuration With STS 98% Without STS 99%	With STS 95-97%	/	**0.9M€**	
In total			**8.1 M€**		

*The calculation is based on the 100MW/140mwh case.

Non-Stop Service to Protect Customer Business: Ukraine BESS Drone Attack Case

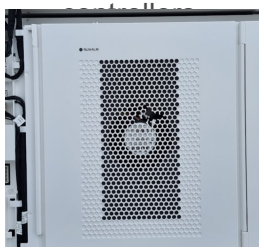
During drone attack, fragments struck the energy storage system after the drone hit a 35 kV distribution line pole

- Fragments penetrated the top layer of the container.
- Fully penetrated the explosion door, hitting the Battery Management System (BMS) module of the energy storage unit.
- Small fragments, likely low-speed, hit the ventilation grid and subsequently the electronic switch beneath the rack

Emergency Action:

- Clean all fragments, especially plastic fragments, from the affected areas.
- Protect exposed damaged surfaces with temporary measures (e.g., bitumen tape) until

Long-Term Repairs:
Replace the damaged explosion doors on Container 1.
Replace the BMS module affected in Container 1.



2024.12.27 Night

12.28

12.29

12.30

Special Souvenirs

HUAWEI

Thank you.

Bring digital to every person, home and organization for a fully connected, intelligent world.

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