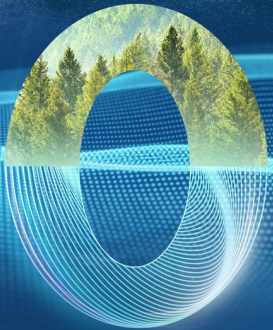
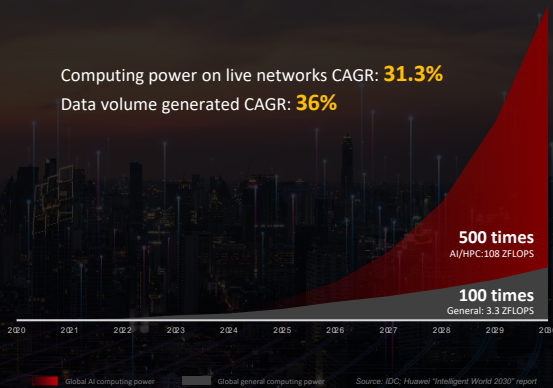
Low Carbon DC
Building the Green Future



Sanjay Kumar Sainani
Senior Vice President & CTO, Huawei Digital Power

Sustainable Data Centers, Demands of the Intelligent Era

DC surge by computing power explosion



Source: IDC, Huawei "Intelligent World 2030" report

Essential factors of data center development

Carbon neutrality

Policies: **PUE 1.3** or less VS 1.55 avg.*
Green energy, heat Reuse

Business agility

Short TTM: Simplified deployment
On-demand, ChatGPT: **100M users in 3 months**

O&M efficiency

Large scale: hundreds → **thousands of racks**
Shortage of O&M Personnel: **53%***

Service availability

Single rack availability: **99.999%**
Huge loss: **3.5M** websites out of service

** Data source: Uptime annual report 2022*

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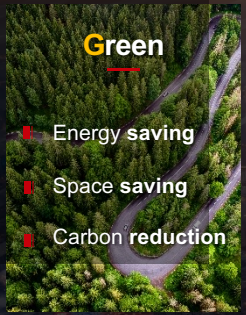
GSSR- the Way to Future-proof Data Center



Green

- Energy **saving**
- Space **saving**
- Carbon **reduction**

Simple

- **Simple** deployment
- **Simple** maintenance

Smart

- **Smart** O&M
- **Smart** optimization

Reliable

- **Reliable** architecture
- **Predictive** maintenance

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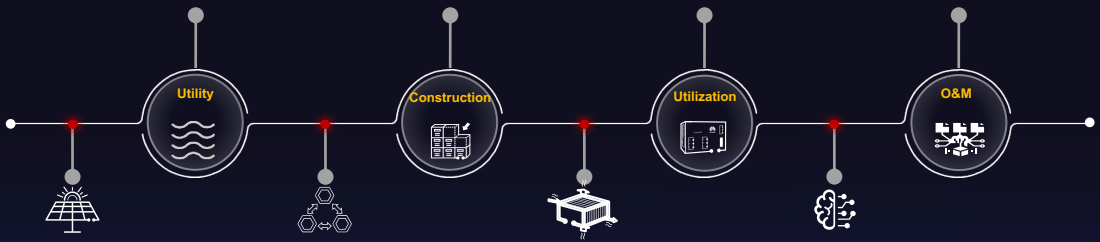
GREEN- Low Carbon DC



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GREEN- Clean Energy for DC Clusters

① Green power purchase / Direct supply

② Campus ESS

③Campus PV

④ Removing Genset

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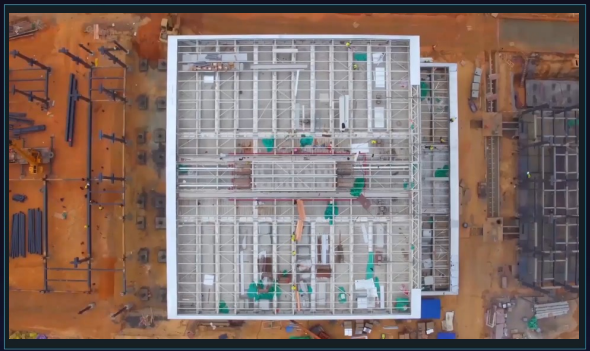
GREEN & SIMPLE- Low Carbon Construction



- **Reduced Carbon** emissions by **8,000+t**
- The data center TTM is **shortened by 50%**
- One Floor – One DC
- Low air leakage rate & low cooling losses

** 1500 cabinets, 8 kW/cabinet, 2N, 40-year lifecycle*

FusionDC

Prefabricated + Modularized, Low Construction Wastage

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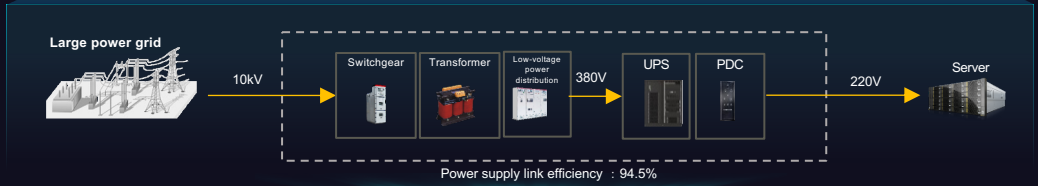
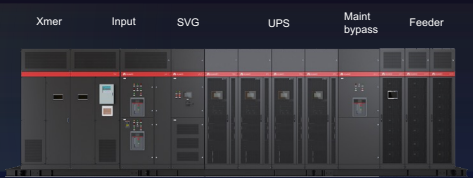
GREEN & SIMPLE- Converged Power Train

Traditional DC Power Supply: Long Transmission Paths, Multiple Conversion Layers, and Low Efficiency





- **Power supply link efficiency is 97.8%**
- Reduced area: Component integration, **reduced footprint by 40%**
- Time-saving:, **Delivery period reduced from 2 months to 2 weeks**.
- Peace of mind: **"autonomous driving"** power supply system

Core technology: Reconstruct power modules and load switches, **600 kVA/cabinet**. Hot backup unit, hardware clamping patent, intelligent-online mode realize **0 ms switching**

*2.5MW，65% 负载

Shorten Transmission Paths, Improved Conversion Efficiency

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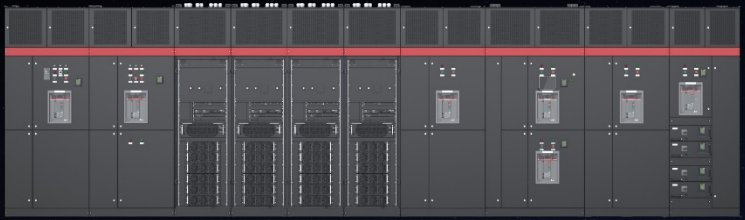
PowerPOD 3.0



Capacity: 2.5MW | Protection grade: Form 4B | Installation against the wall

Green

Footprint & power saving

30%↓ footprint (18 → 10 cabinets)

3 PCT↑ efficiency (95.4% → 98.4% @S-ECO)

Power Module
100kVA/3U

Load Switch
80% width reduced

Simple

Time saving

TTM **75%↓** (2 months → 2 weeks)

Prefabricated busbar

120 cables + 134 busbar → 170 busbar
cabling free

Smart

Smart O&M

Full link visible, manageable, and controllable

Reliable

Worry free

Predictive maintenance
from reactive to proactive

Life prediction

Temperature Prediction

150+ NTC temperature measuring points covering key nodes

GREEN & SIMPLE- Converged Cooling

Chilled water system

7 sub cooling systems: Tower, Chiller, Pump, Tank, CRAH, Pipe, Valve

6 auxiliary systems: UPS, Battery, Damper, BA, Humidifier

- Long construction period, the cooling system takes up 66 % time.
- Four-time heat exchange, low exchange efficiency
- Seven components, which depend on manual O&M

EHU

Cooling
Dust filtration
Humidity control

AI optimization
Two-in-one damper
Continuous cooling

- **One box, one system**, simplified delivery
- From chilled water to natural cooling source
- **AI-supported**, the only commercial AI energy saving
- Lithium battery direct drive, continuous cooling, **"0" interruption**

Traditional Solution		EHU	
7 cooling system + 6 auxiliary systems		1 cooling system+1 energy storage system	Heat transfer stages 4→1
TTM	6 months	3 months	50% less
PUE	1.22	1.15	Saving power 32% Annual saving 0.44M $
WUE (L/kWh)	1.41	0.94	Saving water 33% Annual saving 22k $
O&M	12 O&M personnel	9 O&M personnel	O&M personnel reduced by 25% Annual saving 45k $

Model: 1500 racks, 8kW/R, 50% load@Beijing, 0.12$/kWh

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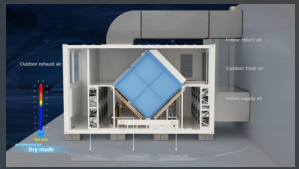
Cooling System: Indirect Evaporative Cooling & Smart Fan Wall

Indirect Evaporative Cooling



Power saving

Maximum free cooling:
PUE 1.30 → **1.15**

Water saving

Water utilization:
WUE as low as **0.37**

Time saving

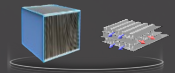
Highly integrated:
TTM 6 → 3 months

Easy O&M

Qty of O&M item:
52 → **21**

Innovative Technologies

EHU Polymer heat exchanger

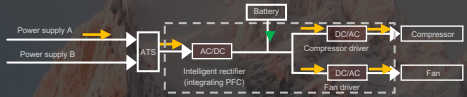


- Lower water quality requirements
- Field-based enhanced heat exchange technology saving water by **30%+**

EC fan

- Separated architecture: air volume **45%↑**, efficiency **6%+ ↑**, online maintenance in **1-minute**

Convergence of cooling & back-up power



No UPS required

Uninterruptible cooling

THDi<5%
PF>0.99

Smart Fan Wall

Applicable to the areas:
High annual average temperature

Capacity:
110/220/330/440kW

Power saving

Supply & return water temp. 20-28℃

Chiller efficiency improved by **15%**

Time & Cost saving

Avoids Raised Floor – Cost & Time Saving

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SMART & RELIABLE- AI enabled Operation

AI-based remote inspection

Smart sensing @IoT/voice recognition/ image recognition

Reduce people on site, unattended

Active prediction

AI high temperature warning
AI lifespan prediction
AI fault alarm

Reduce resources invoked to handle failures

Resource optimization@AI

Intelligent matching between SPCN demand and supply

Optimized utilization of resources and balanced air distribution

Energy scheduling@AI

On-demand call of green power, energy storage, and backup power

Using Energy Storage to Achieve Peak Cutting and Valley Filling

Improved O&M Efficiency a Reliability, Resource Optimization

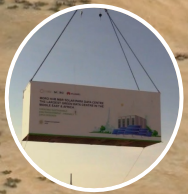
SPCN : Space, Power, Cooling, Network

100% solar energy DC in Mideast

Total scale of 18 MW

12 months to deliver a **1.8 MW** data center with a footprint of 2,000 m^2

100% powered by clean energy, preventing annual carbon emissions of **13,000 tons**



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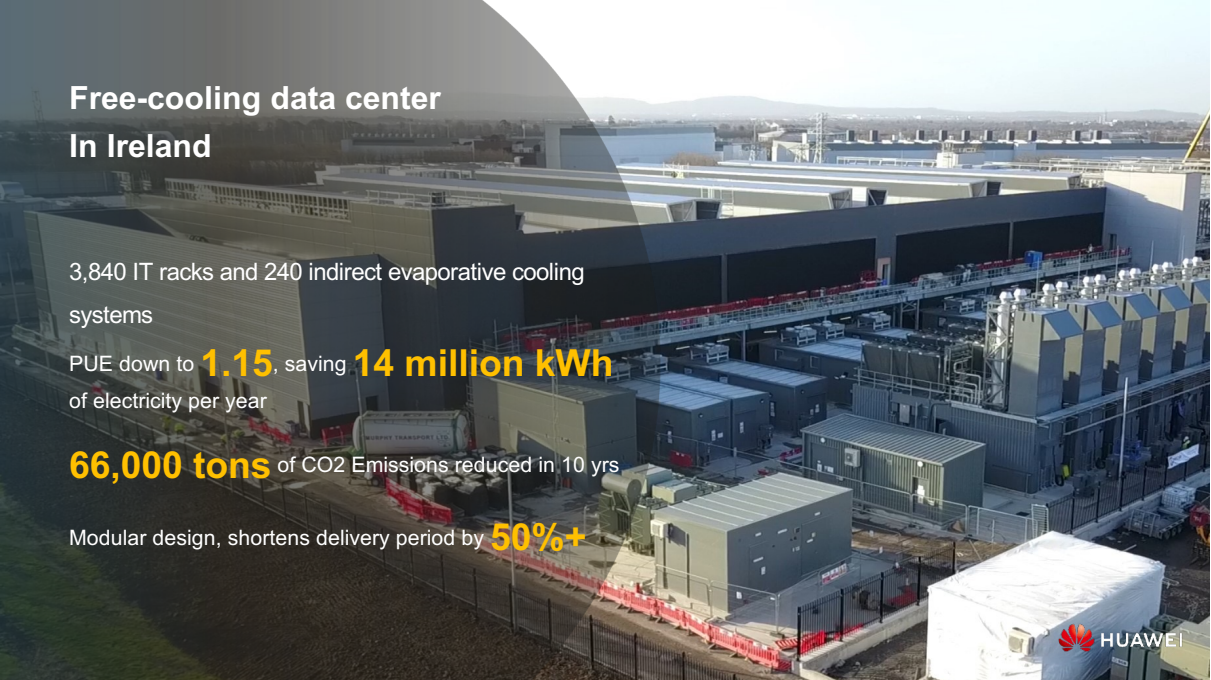
Free-cooling data center In Ireland



3,840 IT racks and 240 indirect evaporative cooling systems

PUE down to **1.15**, saving **14 million kWh** of electricity per year

66,000 tons of CO_2 Emissions reduced in 10 yrs

Modular design, shortens delivery period by **50%+**

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Thank you.

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