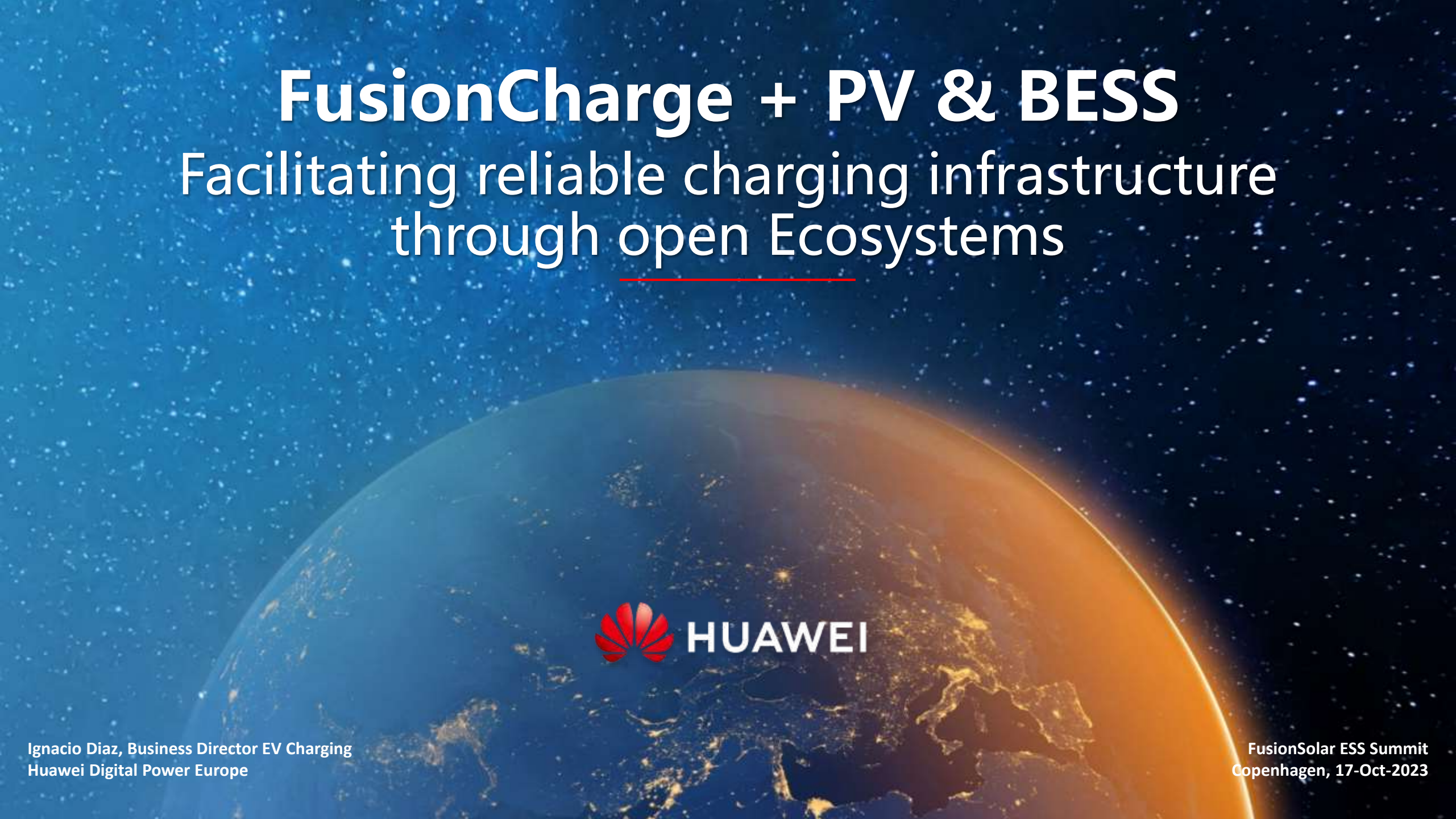
FusionCharge + PV & BESS

Facilitating reliable charging infrastructure through open Ecosystems



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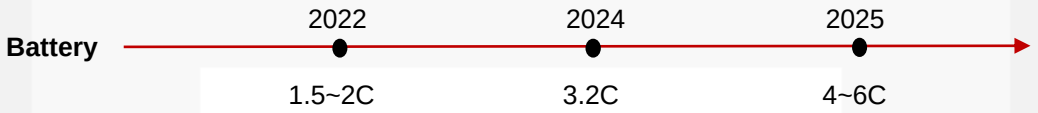
Ignacio Diaz, Business Director EV Charging
Huawei Digital Power Europe

FusionSolar ESS Summit
Copenhagen, 17-Oct-2023

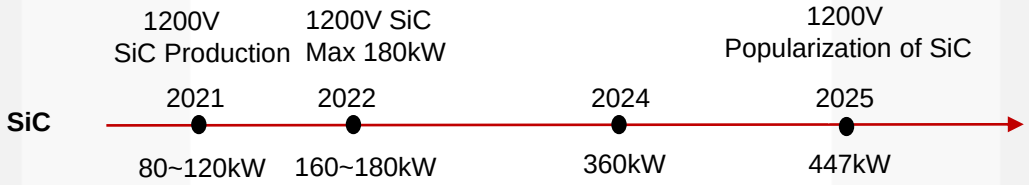
Ultra fast charging is becoming more and more popular

More EVs support ultra fast charging

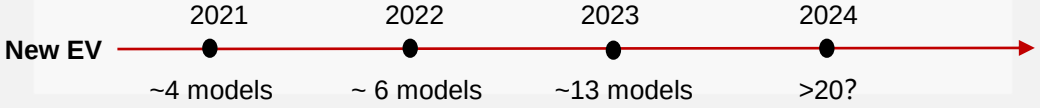
>4C Battery C-rate are becoming popular, allowing more EVs to support ultra fast charge



SiC begins mass production to support high voltage and high power charging



OEMs launch **new EV** that support ultra fast charging is increasing year by year (800V)



More scenarios require ultra fast charging

En-route

Highway

City Charging Station

Charge Duration：10min~30min

Depot

Bus/Truck Depot

Charge Duration：0.5h~1.5h

Destination

Shopping Mall

Campus

Charge Duration：2h~4h

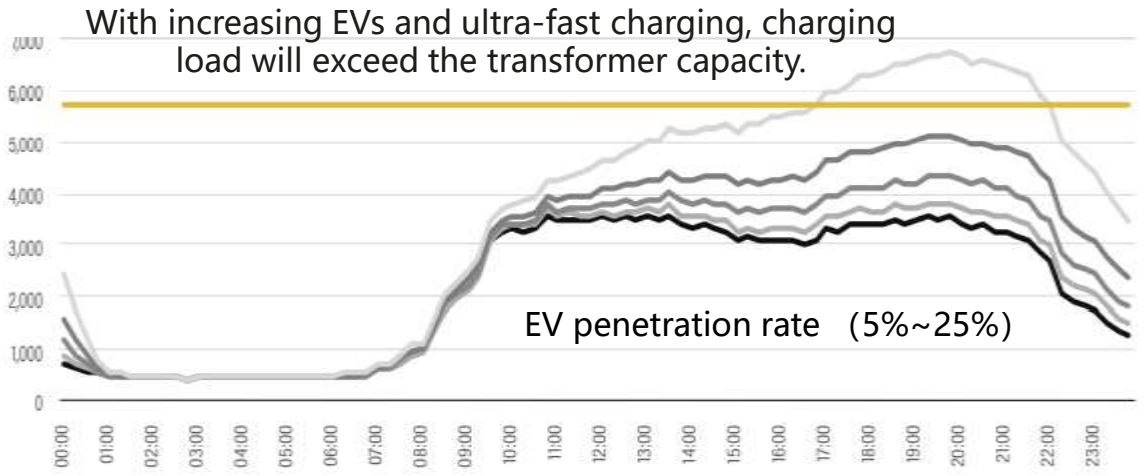
Home

House

Charge Duration:8h~10h

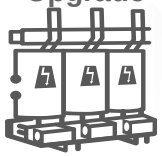
BESS is the best solution to allow faster rollout of EVCI and enhance power capacity

EVs and ultra-fast charging bring challenges to power system



Load Curve of a Shopping Mall with Different EV Penetration Rates

Transformer Upgrade



Cost

35.000-2.5million €

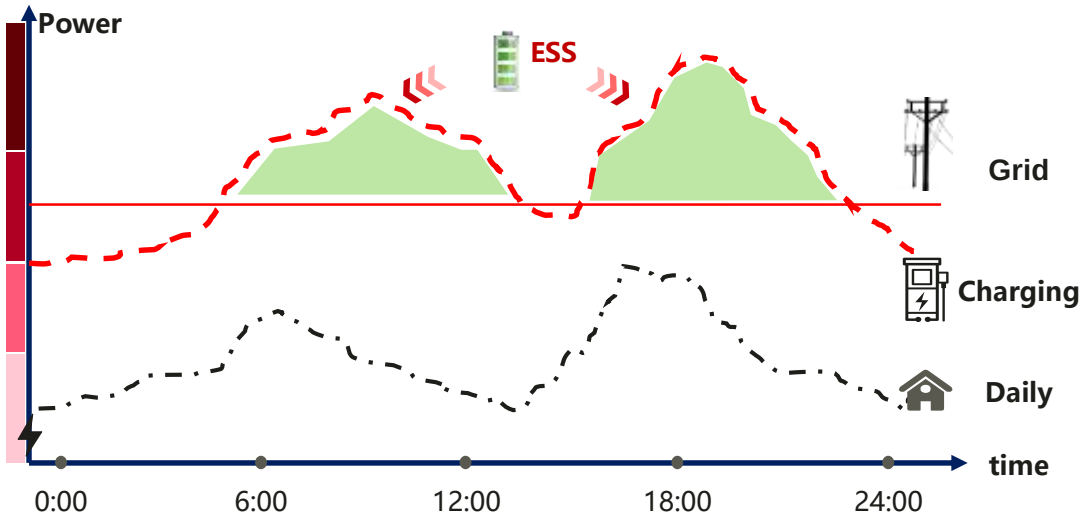
@200-1000 kw

Lead time

0.5~1Year

@10-35㎡

Increase ESS to fill the gap of capacity



Fill the gap of grid to promote output power

Earn from peak-valley electricity price

Emergency backup power

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High-quality charging infrastructure with liquid-cooled ultrafast charging

FusionCharge liquid-cooled ultrafast charging solutions

Better ROI

- **power utilization** increased by up to 5~10%
- E2E **efficiency** improved by 2.5%

Smoother investment

- Modular design, smooth investment by phase
- Smooth stacking of **DC link BESS**

Higher product quality

- **10-year** service life
- **0.5% Annual failure** rate
- Three-dimensional Safety Design

Optimal user experience

- Charging noise **< 55 dB**

Higher Power Density and Reliability, Fully Liquid-Cooled design with 10 years lifespan and lower failure rate

Air-Cooled

High module loss rate, life time: 3-5years

3-5years
Life time

3~8%
Annual failure rate

4 times/year
Dust removal

VS

Fully Liquid-Cooled

More than 10years, Maintenance-free

~10 years
Life time

<0.5%
Annual failure rate

"Dust-free"
Dust removal

Emulation
300 Thousands Failure Mode Analysis

Designing
Advanced liquid cooling technology

Verifying
200+ reliability verification tests

Quiet & Friendly: More muted Without Complaints

Air-cooled Charging Pile

VS

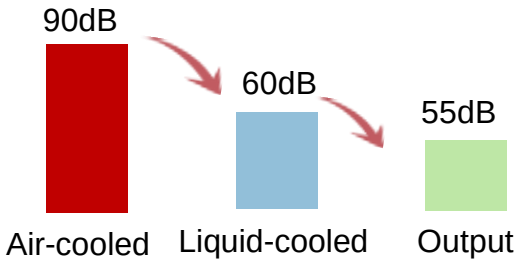
Liquid-cooling PowerUint

- **Noise from:**
  - Fans of charging module
  - Fans of Cabinet
- **Near by** Noise up to **90dB**
  - Resident complaints
  - **Experience Complaints**

- **Full Liquid cooling system**
- **Large size fan,** 25% less noise
- **Mute mode** : 55dB@25℃

Noise decreases more than 25 dB.

Noise perception
90dB: heavy truck driving， 60dB: in a meeting room



- Without Complaints
- Cover more scenarios
- Better experience

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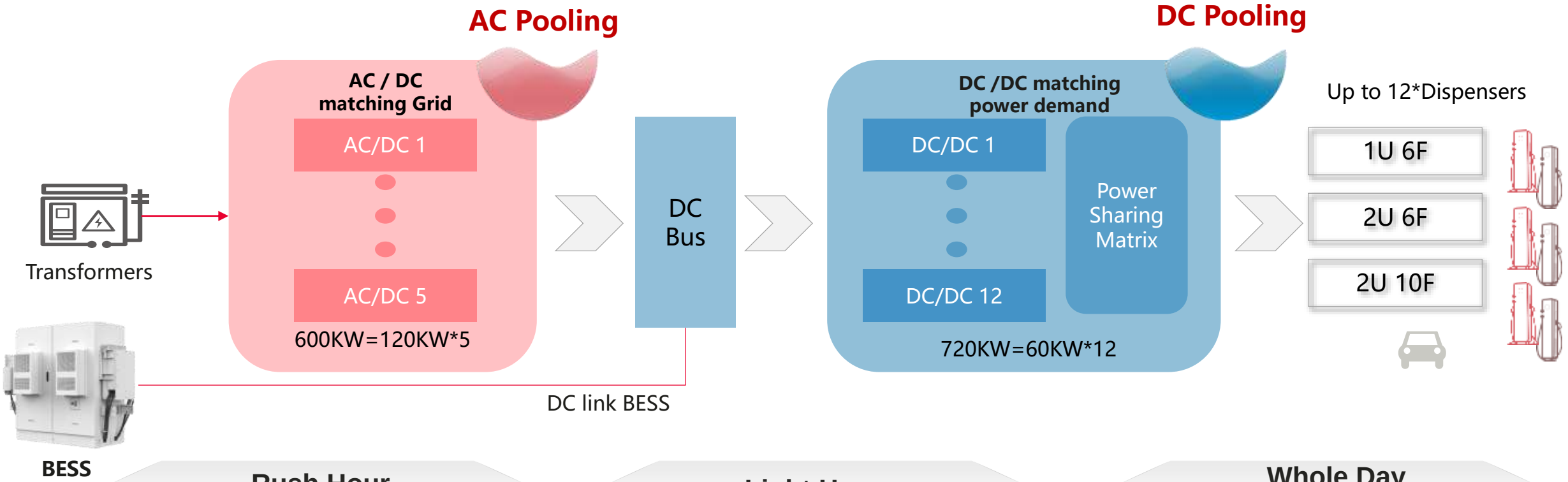
Double power pooling increases grid power utilization by 5~10%



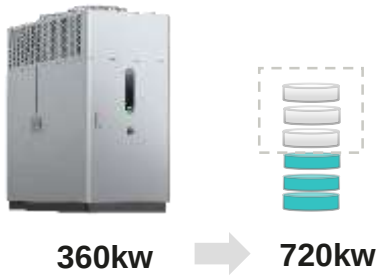
Rush Hour	Light Hour	Whole Day
Double Pooling + DC Over Matching	480kW*/Ultra-Fast+180kW*/Fast	Rapid \ Better Utilization
Grid utilization +20-30%	**Offer Max Power & Raise turnover**	**Optimize Served charging sessions & Sell more electricity**

** rated power*

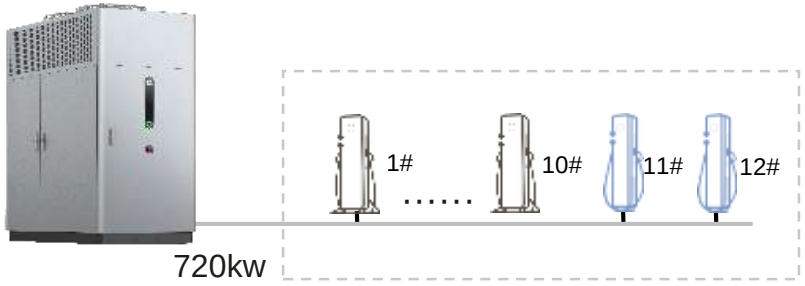
On-demand smooth capacity expansion, protecting investment

Scalable

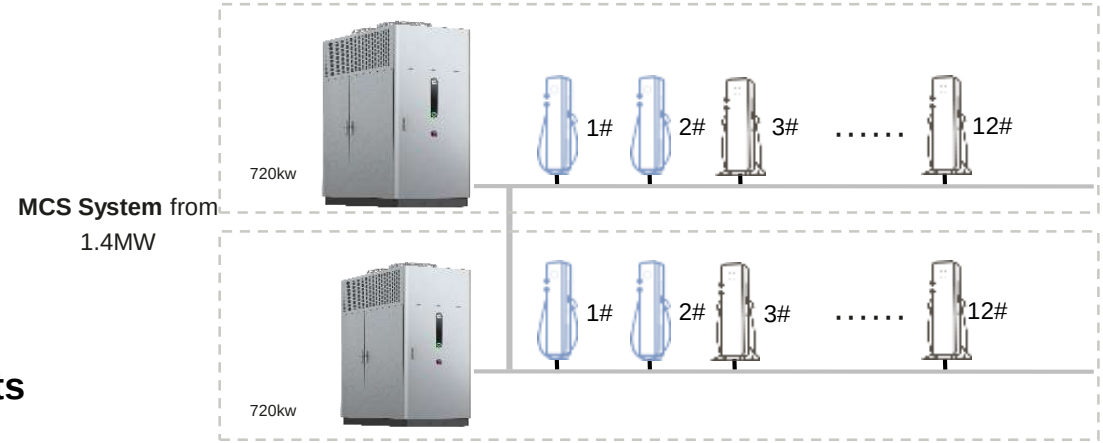
power modules inside



Flexible extension of #chargepoints



Power unit conceived for future MCS



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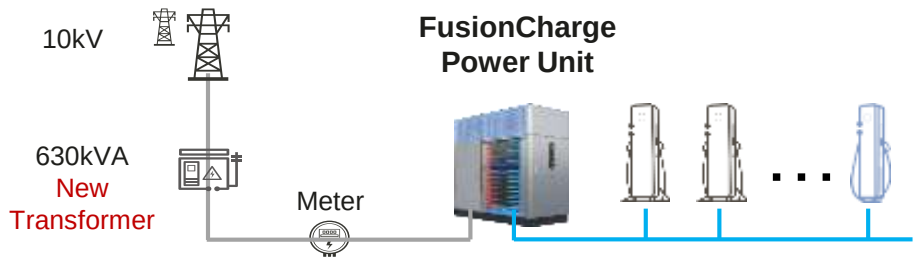
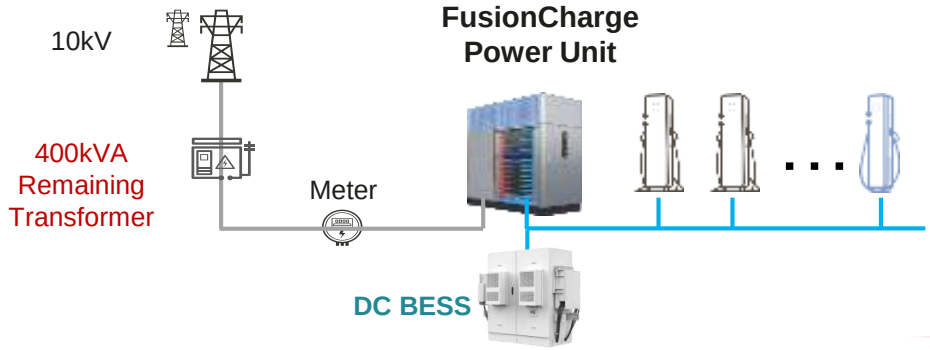
With BESS prevents grid capacity expansion, shortens site deployment time by 0.5~1 year, and **shortens ROI by up to 1.5 years**

Without BESS，ROI=7.0 years



VS

With BESS&PV, ROI=5.3 years



Reduce Size of Transformer

Reduce Cost of Electricity with PV

Match demand to PV generation

Faster Go-to-market

CAPEX / k€		
Charger cost	600+720kW	
Construction cost	Transformer, civil works, cabling, installation, etc.	
Subsidy	Subsidy for site construction	
Construction Period	> 9 months	
Annual OPEX / k€		
Cost of Efficiency	7% Efficiency cost on Electricity	
Rental/O&M	Parking space rental, interest, and O&M	
Annual Revenue / k€		
Charging Service Fee	630kVA Transformer, PV Power utilization=11%	
ROI/years		**7.0**

CAPEX / k€		
Charger / BESS / PV	600+720kw / 215kWh / 60kWp	
Construction cost	Civil works, cabling, installation, etc.	
Subsidy	Subsidy for site construction	
Construction Period	< 3 months	
Annual OPEX / k€		
Cost of Efficiency	5% Efficiency cost on Electricity	
Rental/O&M	Parking space rental, interest, and O&M	
Annual Revenue / k€		
Charging Service Fee	400kVA Transformer, PV Power utilization=13.8%	
ROI/years		**5.3**

*ROI and Business case are highly dependent on the characteristics of every single site and selected configuration

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Shenzhen YoTai PV-ESS-EV Low Carbon Charging Campus

Smart Low-Carbon Campus

Liquid cooling Power Unit

AC link BESS

Low Carbon，higher revenue，battery backup

- **8*Fast & 2*Ultra-charge** for campus and open to Public
- **200kWh BESS** can earn revenue from peak-valley price difference, and provide power backup when grid outage
- **100% PV self-consumption**, with annual energy yield of 0.12MWh

54tons
Carbon emission reduction

131kWp
PV Module

200kWh
Energy Storage

600 KW
Liquid cooling ultra-fast charge

Shenzhen Institute for Talents Development

works with Huawei to build Shenzhen's first liquid-cooled ultrafast charging station

One-off charging success rate: **99%+**

5-second charge for **20-kilometer** range

Plug-charge-and-go

Digital Power: Your Best Partner for a Better, Greener Future

By December, 2022, Digital Power has helped customers

generate green power

695.1 billion kWh

save power

19.5 billion kWh

reduce carbon emissions

340 million tons

equivalent to planting

470 million trees

Conversion note:

Note 1: Conversion coefficient of electricity carbon emissions – 1 kWh electricity is equivalent to 475 g CO_2 (global average). Source: IEA Global Energy & CO_2 Status Report 2018

Note 2: Lifetime CO_2 absorption of trees (equivalent number of planted trees) – A tree absorbs 18.3 kg of CO_2 a year, and each tree has a 40-year lifespan. Source: Open data of the North Carolina State University website