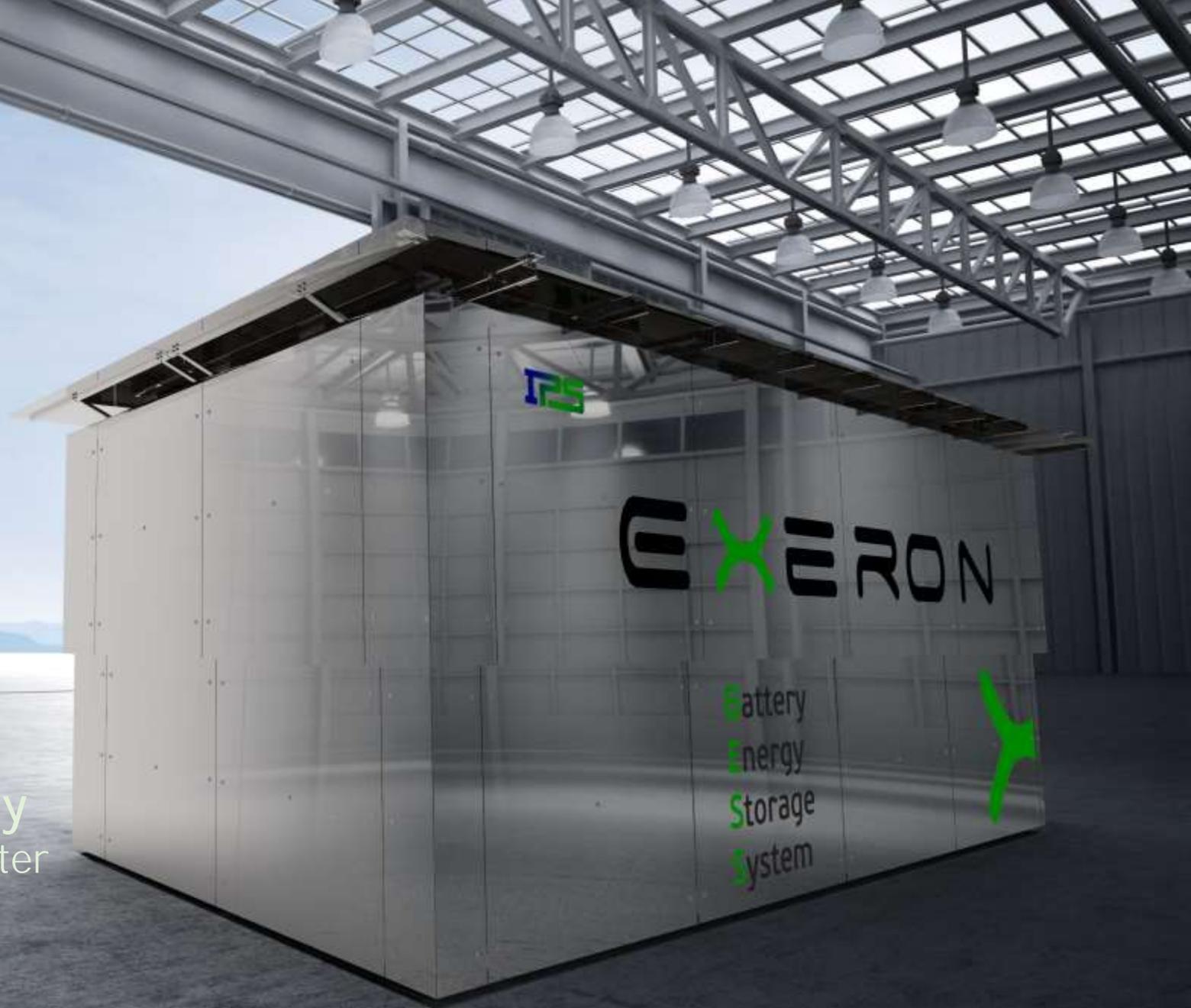




**X-BESS**  
BATTERY · ENERGY · STORAGE · SYSTEM

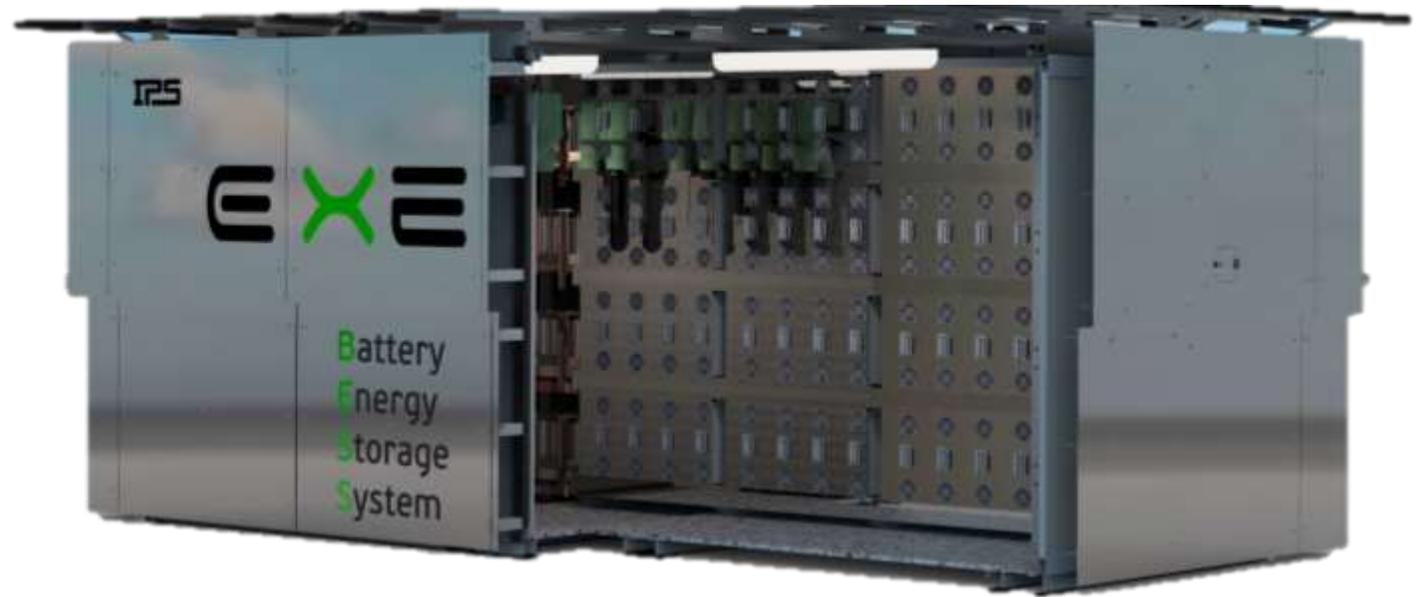
IPS EXERON X-BESS technology  
Incl. EXERON CheckMate battery inverter  
LFP battery storage & EMS



# Presentation structure

- X IPS EXERON technology
- X Technical parameters
- X About IPS

**EXERON**  
CHECKMATE

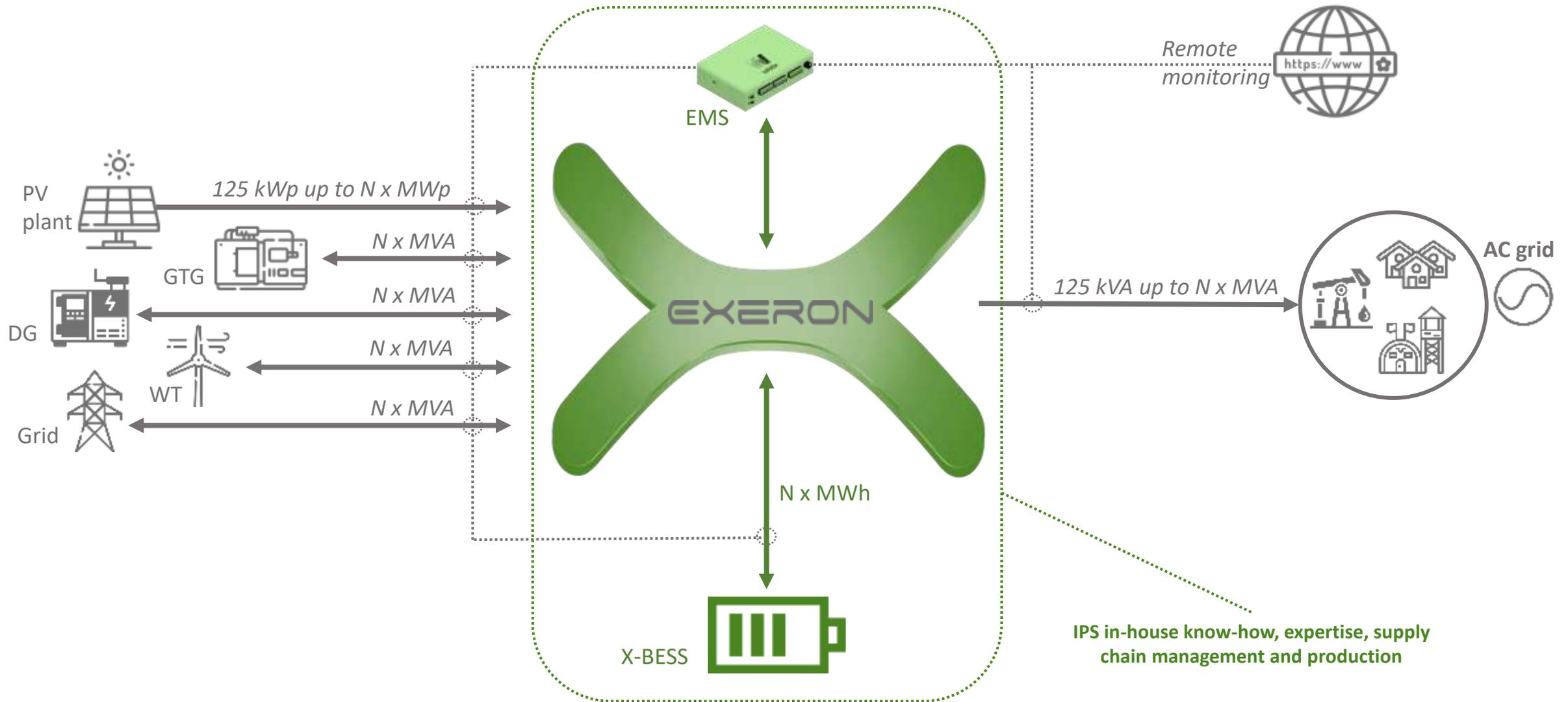


# IPS' EXERON technology



# IPS EXERON X-BESS technology

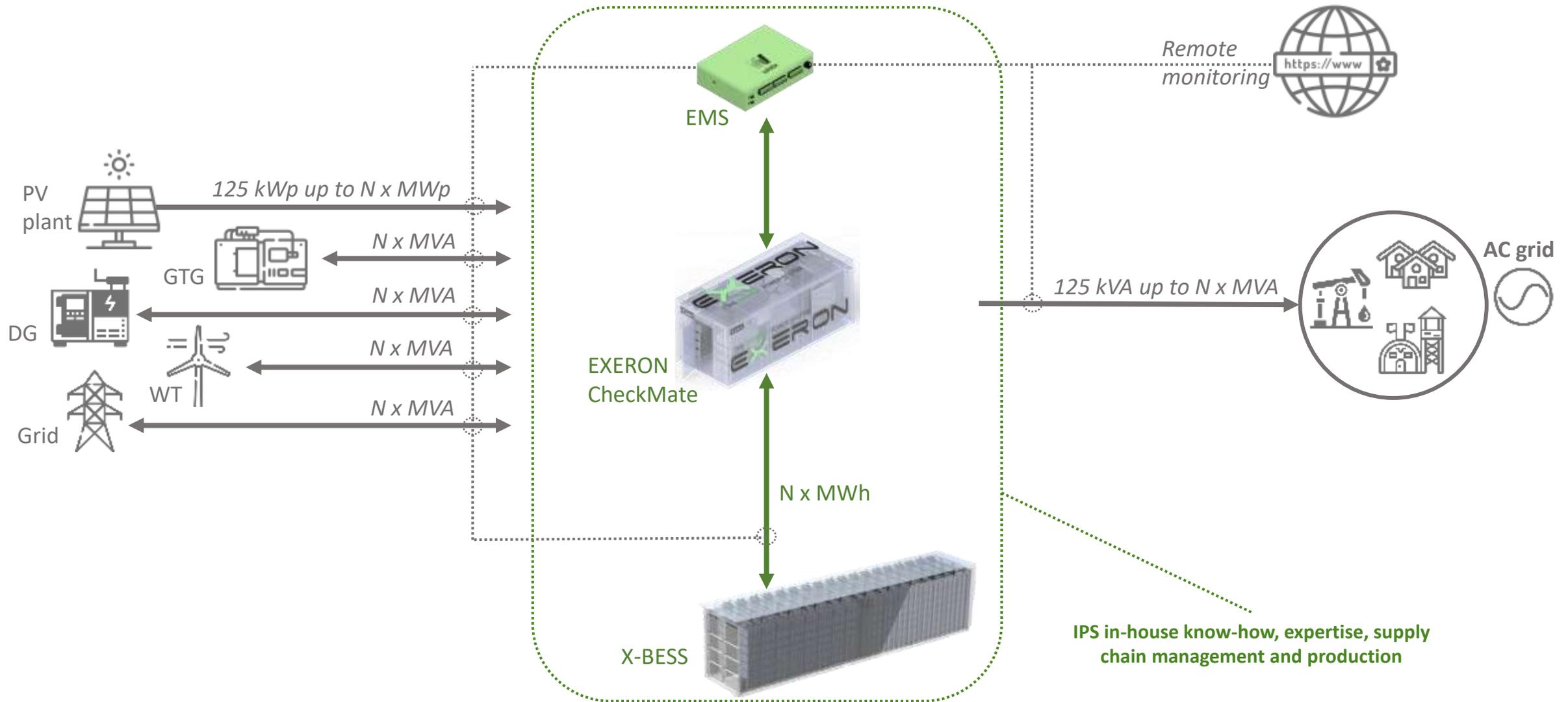
A unified platform for any grid-tie or grid-forming MW-scale applications



IPS in-house know-how, expertise, supply chain management and production

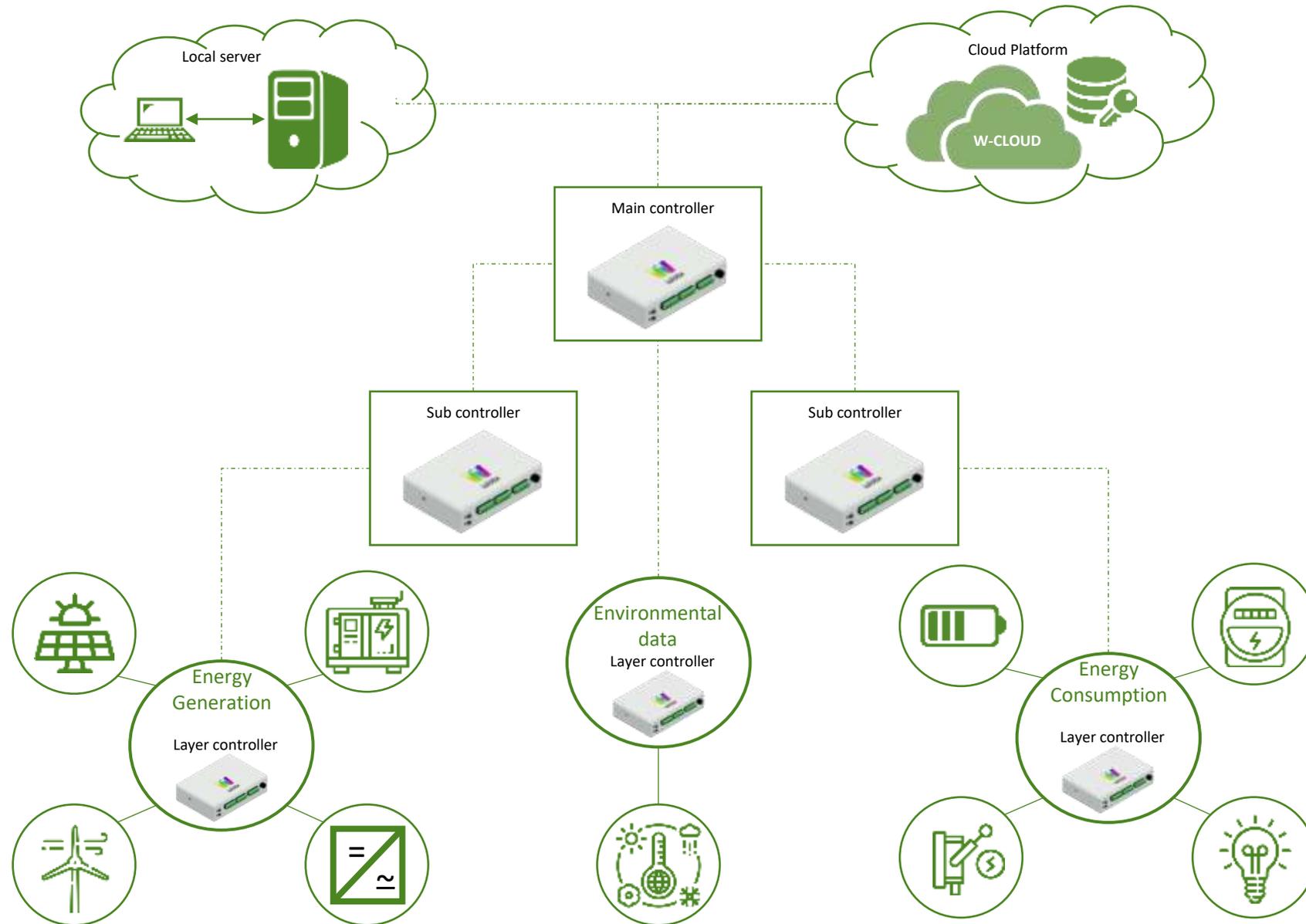
# IPS EXERON X-BESS technology

A unified platform for any grid-tie or grid-forming MW-scale applications



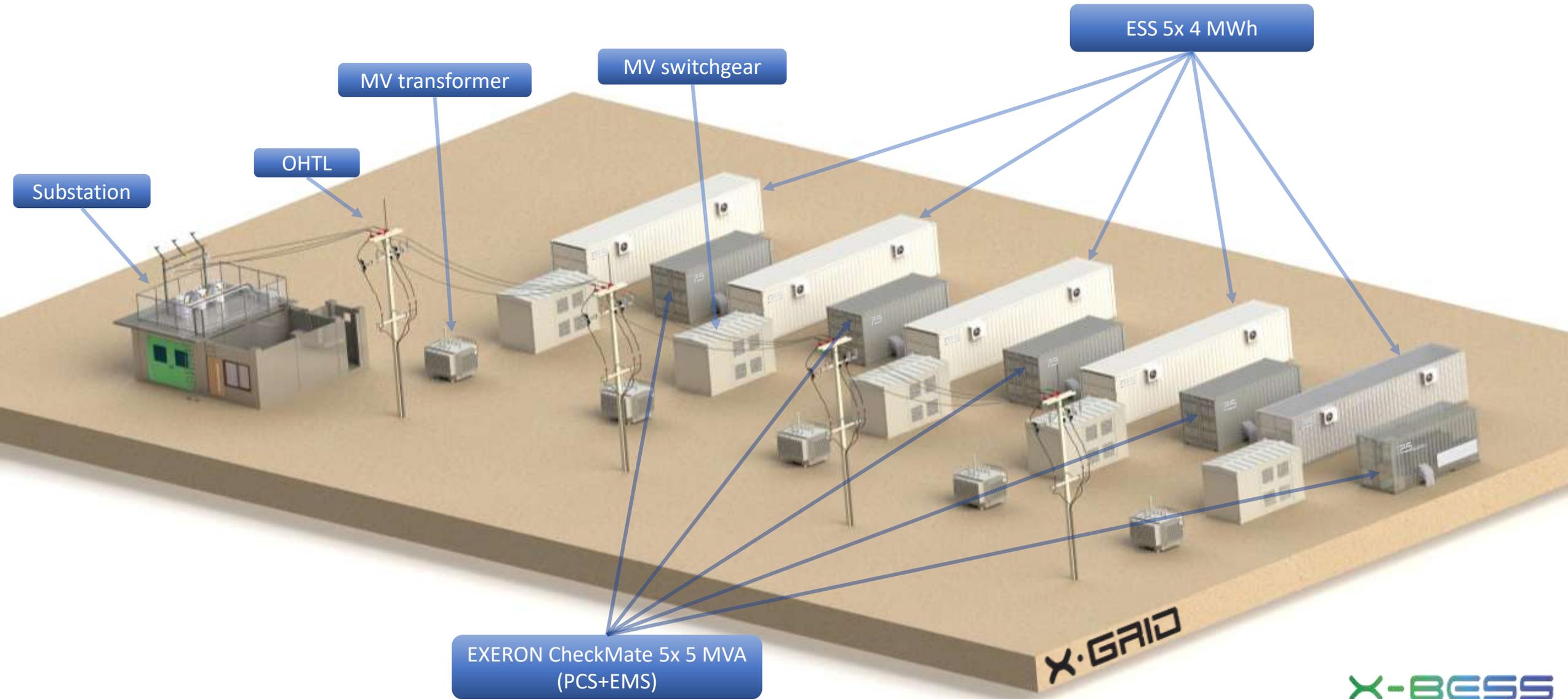
IPS in-house know-how, expertise, supply chain management and production

# IPS' EMS architecture



# IPS' turn-key X-BESS example design

## Main solution components

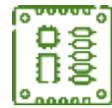


presents



# IPS' EXERON CheckMate Battery Inverter

## Competitive advantages



PCB topology



Modular structure



Plug & Play, Hot-plug modules



No de-rating up to 60°C



Very high overall system efficiency >99%



Close to zero maintenance



Lower costs for engineering, installation, maintenance



Higher overall savings and system efficiency



No special engineering skills and tools required



Unmatched spare parts management



Applicable in harshest environmental conditions



Safety first!  
Environmental protection for equipment and personnel

# Technical parameters

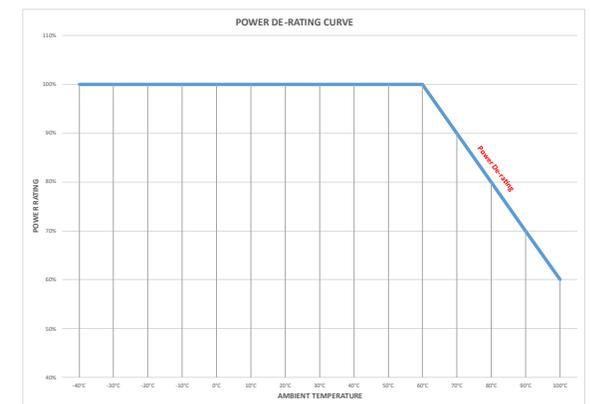
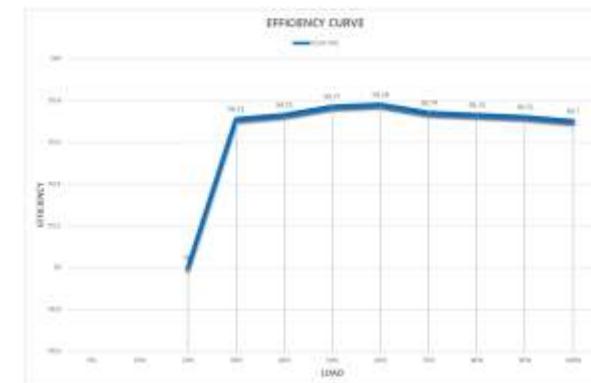


# IPS EXERON CheckMateG – technical details



**EXERON**  
CHECKMATE

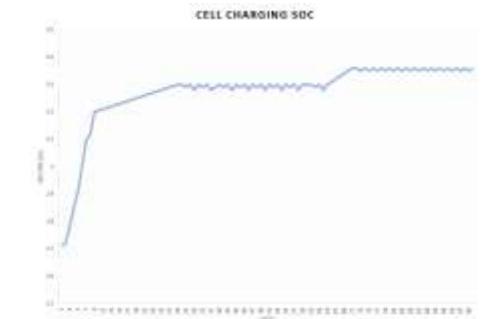
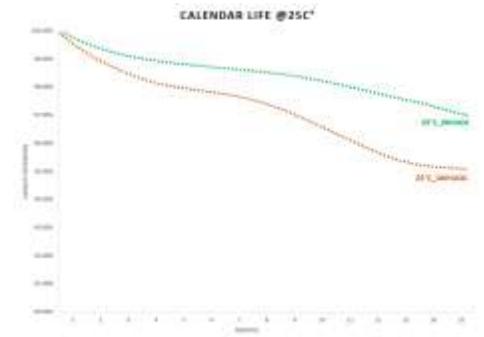
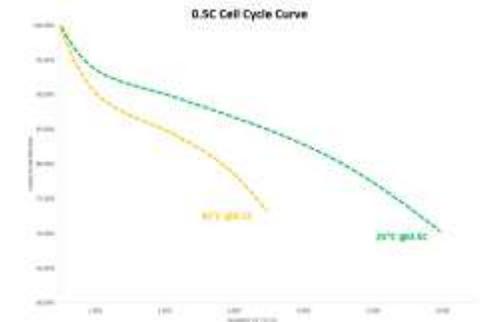
DC CHARACTERISTICS	CHECKMATE G 1000	CHECKMATE G 2000	CHECKMATE G 6000
Input voltage range		1000-1500 VDC	
Max. charging current	800A	1600 A	4800 A
Charging static voltage stability		+/- 0.5%	
Charging dynamic voltage regulation (10-90%)		+/- 5%	
Response time		<2 ms	
AC CHARACTERISTICS			
Output voltage		690 VAC	
Frequency		50 / 60 Hz	
Frequency accuracy		+/- 0.1 Hz	
Maximum output current	1450 A	2900 A	8700 A
Maximum output power	1 MVA	2 MVA	6 MVA
Power Factor		0-1.00 Leading or Lagging	
Peak Efficiency		> 99%	
Operation mode		Bi-directional	
THDI		< 3%	
OTHER			
Operating temperature		-40 - +70 °C	
Operating altitude		< 6000 m a.s.l.	
MTTR		< 120 sec.	
Hot Swap technology		Yes	
Load Sharing capability		Yes	
Smart Grid capability		Yes	
Communication		Modbus RTU/Modbus TCP-IP/CAN/SNMP/RS-232/RS-485	
Local Data storage device		> 2 000 000 samples/year	



# IPS X-BESS – technical details



Parameters / Items @ cell level	Value
V voltage @ cell level	3.2VDC   0.5C, 2.5-3.65VDC
Minimum capacity @ cell level	280Ah   0.5C, 25± 2°C, 2.5-3.65VDC
Minimum energy @ cell level	896Wh   0.5C, 25± 2°C, 2.5-3.65VDC
Charging Cut-off Voltage (Umax) @ cell level	3.65VDC
Discharging Cut-off Voltage (Umin) @ cell level	2.5VDC (>0°C) 2.0V (≤ 0°C)
Charging Current @ cell level	140A   0.5C
Discharging Current @ cell level	140A   0.5C
<b>Fundamental Parameters</b>	<b>Value</b>
Nominal voltage range	3.2VDC/ 48VDC/ 153.6VDC / 720VDC / 1228VDC
Maximum voltage range	3.6VDC / 54VDC/ 172.8VDC/ 810VDC/ 1500VDC
25°C ± 2°C @0.5C/0.5C Standard Cell Cycle	6000 cycles
45°C ± 2°C @0.5C/0.5C Standard Cell Cycle	2500 cycles
Rate Discharge Performance at 25°C	0.5C (A) : ≥ 100% 1C (A) : ≥ 98%
Charge Retention and Capacity Recovery @ 25°C, 28 days	Capacity Retention ≥95% / Capacity Recovery ≥97%
Storage @ 25°C, 28 days, 50% SOC	Capacity Retention ≥ 96% / Capacity Recovery ≥ 98%
Operation Temperature	Charging Temperature 0-60°C Discharging Temperature -30-60°C
BESS self-consumption >40°C	380W per 1MW
Storage Temperature 6 months	0°C - 35°C
Storage Temperature 1 months	-20°C - 45°C
<b>Battery Management System</b>	
Three-level BMS architecture	Stack, rack, and pack level
Stack Level	Collecting cell voltage, temperature and provide balancing management as well as thermal management.
Rack Level	Collecting rack voltage, current and temperature, calculating SOC/SOH and other states, execute balancing strategy, diagnose battery faults, and local protection.
Pack Level	Summarizing and displaying all data and fault diagnosis information, performing alarm and protection functions to ensure system safety, along with local storage.
Operating voltage	Up to 1500VDC
Communication	CAN, RS-485, Ethernet, MODBUS and other protocols



# About IPS



# ABOUT IPS

## Background: 30+ years R&D, Engineering and Manufacturing

- R&D and precision manufacturing of power technologies and solutions since 1989
- Unique and patented technology (US, EU, GCC)
- Highest reliability in extreme conditions, NATO approved

## Track record

- System deployments in 58 countries
- 162+ MW power system capacity installed
- 248 MWh total battery capacity deployed

### IPS capabilities

#### R&D & Manufacturing

PCS + BESS  
and energy management software



#### Turn-key power solutions

Engineering, design, integration  
and O&M for specific applications



### Recognition



SpaceX innovation Award  
California, USA

*"Modular power system  
EXERON for the pod of the  
Hyperloop competition"*



ees Award  
Munich, Germany

*"Best innovative off-  
grid power system  
EXERON with electrical  
energy storage"*



Innovation Award 2019  
Sofia, Bulgaria

*"Most Innovative company  
in Bulgaria for 2019 – state  
honorary award given by  
the President of Bulgaria"*

# IPS' MARKET FOCUS

## Turn-key smart electrification solutions for 6 key industries



Micro and Smart Grids: decentralized power generation and supply



Oil & Gas: oil, gas and water wells  
RTU, TETRA, CP, Decarbonization



Telecommunications: remote towers,  
OPEX reduction of DG



Defense & Security: radar systems,  
special equipment, TETRA, camps



Agriculture: water pumps, remote  
processing plants and facilities



Utility substations: Balance of System,  
battery charging, power to critical loads



IPS



# EXERON

EXERON - a US patented technology by IPS  
[www.exeron.com](http://www.exeron.com)