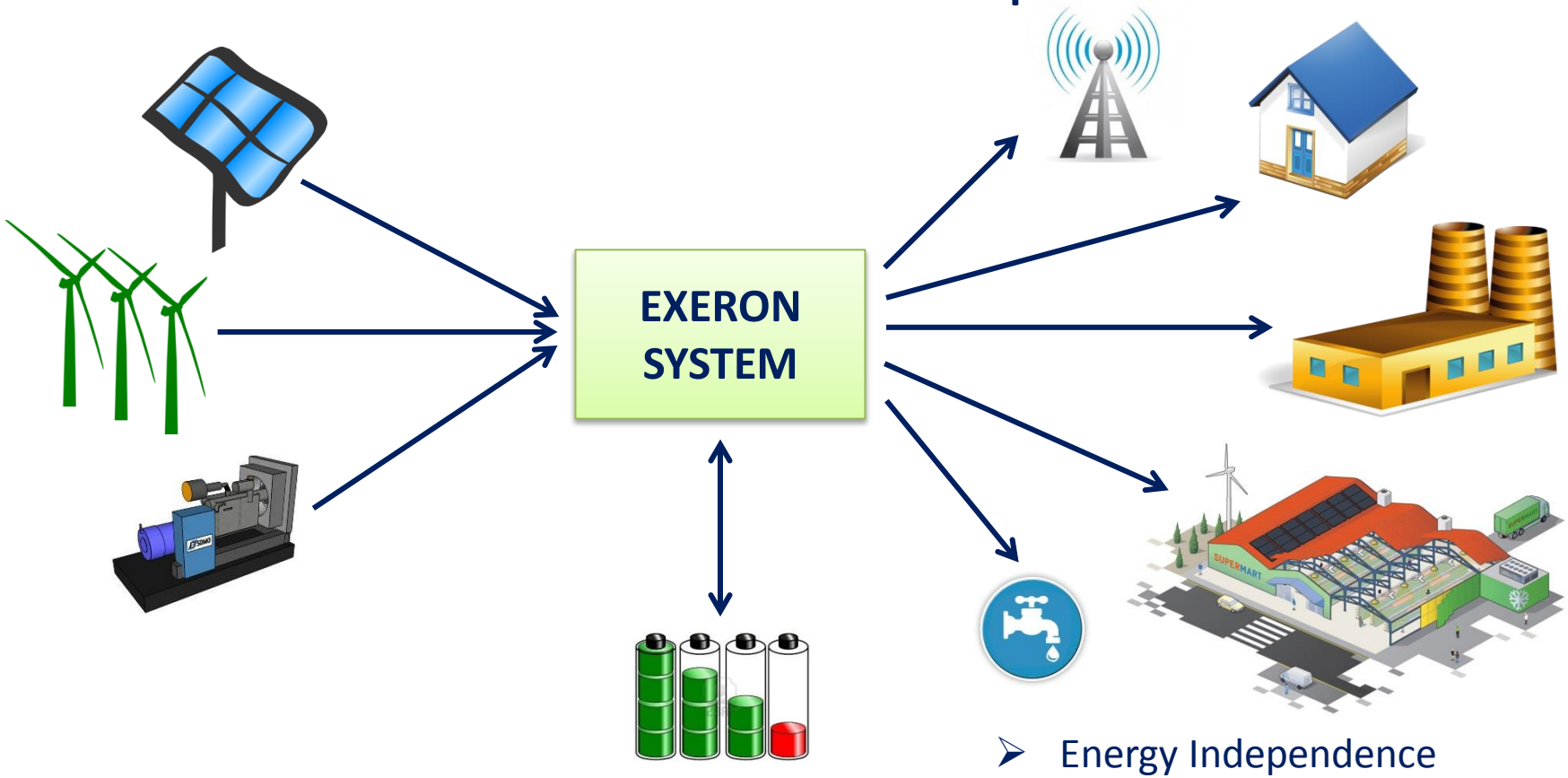
International Power Supply

25 YEARS OF EXPERIENCE

Headquarter Sofia

EXERON - The Concept



- Flexible, Scalable, Compact and Modular Design
- Easy and Fast Installation and Maintenance
- Low Cost of Ownership, minimized OPEX

- Energy Independence
- Energy Efficiency
- Full Energy Autonomy
- Smart Energy Management
- Unlimited Energy Storage

Applications

Power outputs: DC voltage, pure sine wave AC voltage

Output voltages: 48 VDC; 110 VAC; 230 VAC; 50 Hz / 60 Hz; 1-phase / 3-phase

Telecom

Diesel replacement

Data centers

Houses

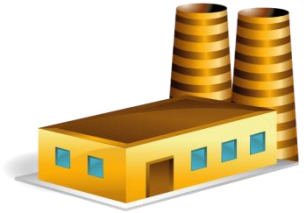
Hotels, office buildings

Residential areas

Water supply, cooling and heating

Agriculture, farming, irrigation systems

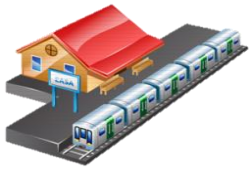
Warehouses, small size productions



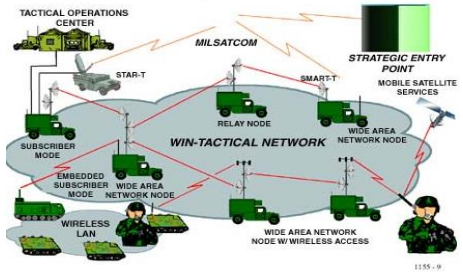
Factories, large size productions

ATM's, banks

Airports



Transport stations



Desert camps, remote objects, tactical military systems etc.

EXERON - The Concept

ees electrical energy storage AWARD 2014 WINNER

TOP INNOVATION: THE OFF-GRID MONSTER

FROM **2 kW**

UP TO **65 MW**

EXERON

MODULAR DESIGN

HIGHEST RELIABILITY

REDUNDANCY

FREE SCALABLE

WHY IPS EXERON?

- **Diesel replacement solutions**
- Up to 98% cost savings for objects running only on diesel generator.

- **Full power autonomy for remote objects or areas**
- Reduces dramatically fuel and maintenance costs.

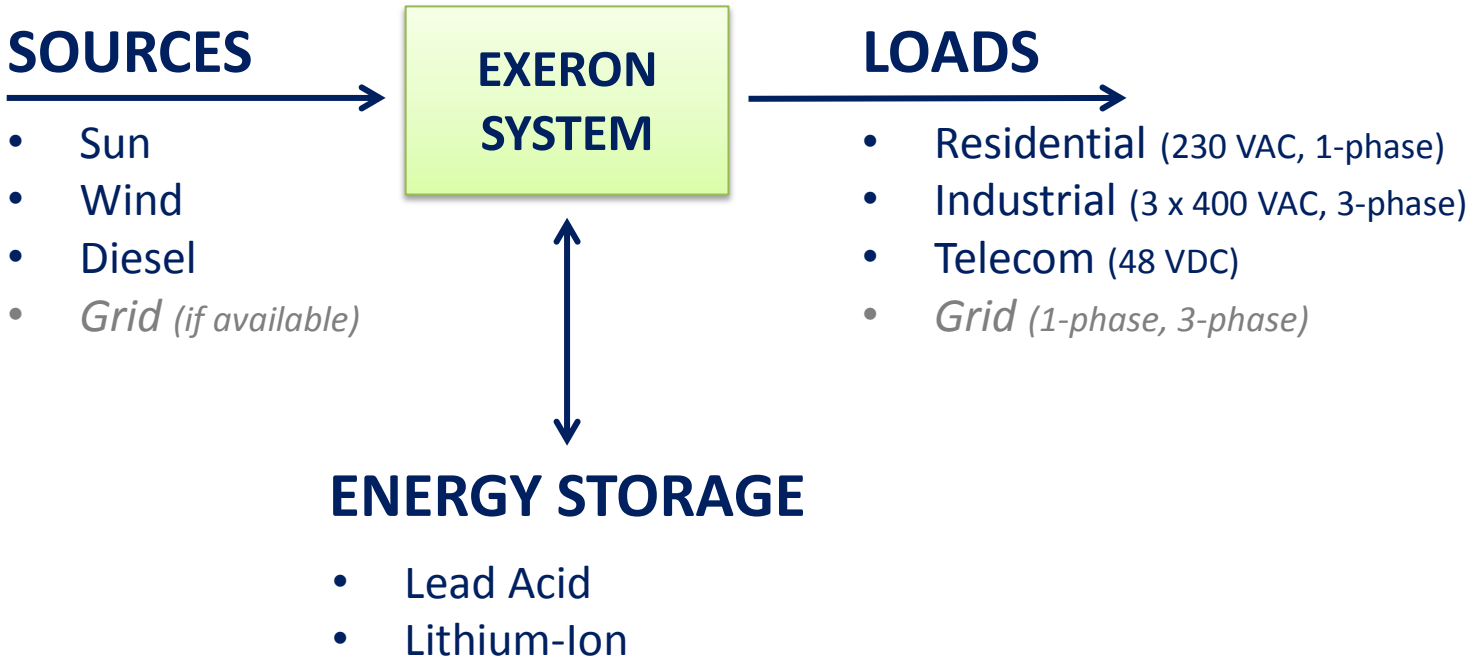
WHY IPS EXERON?

- Providing power for water supply at places without grid and water.

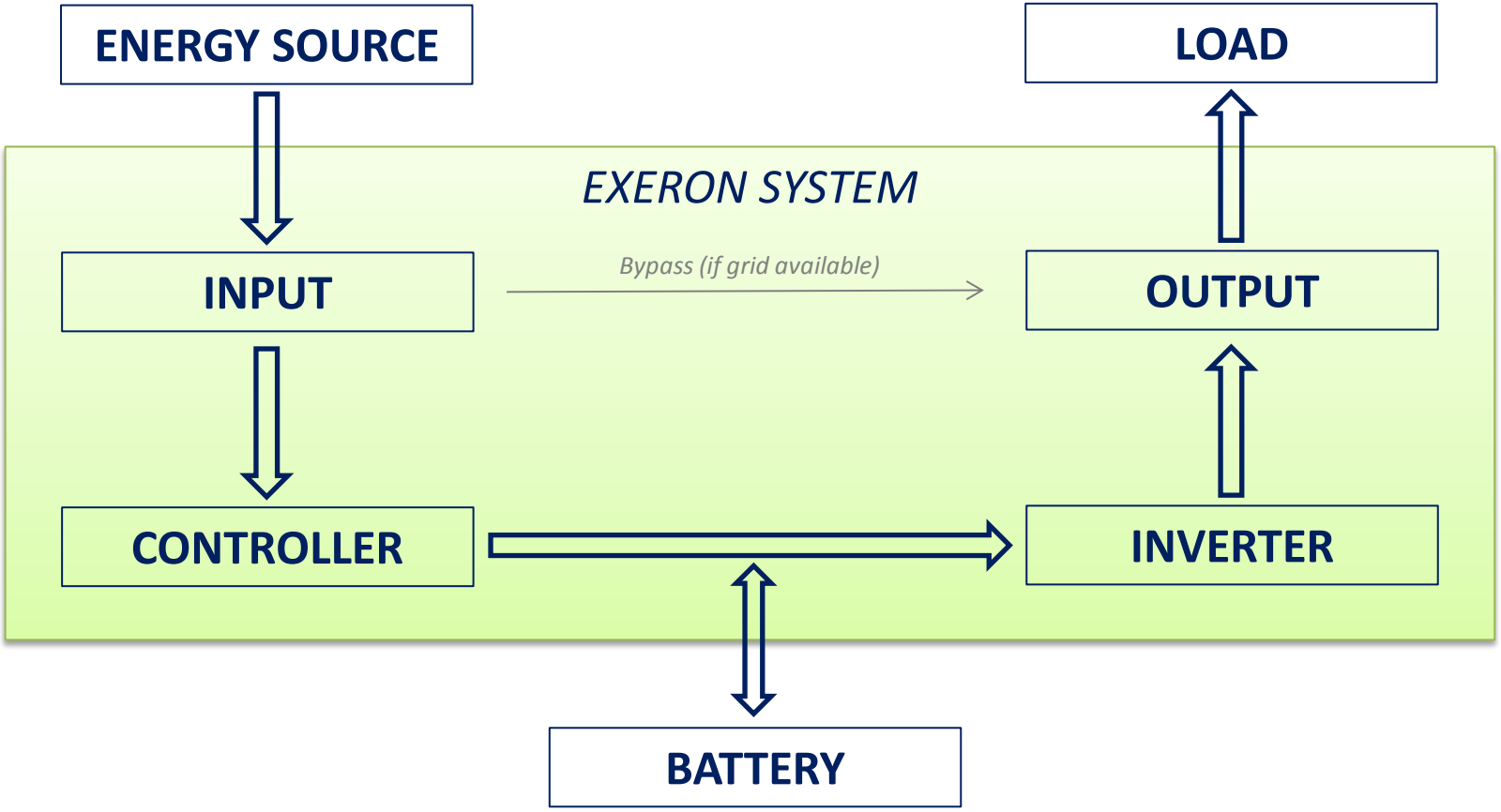
- Providing power at places and objects without grid power

GO OFF-GRID AND MAKE THINGS HAPPEN

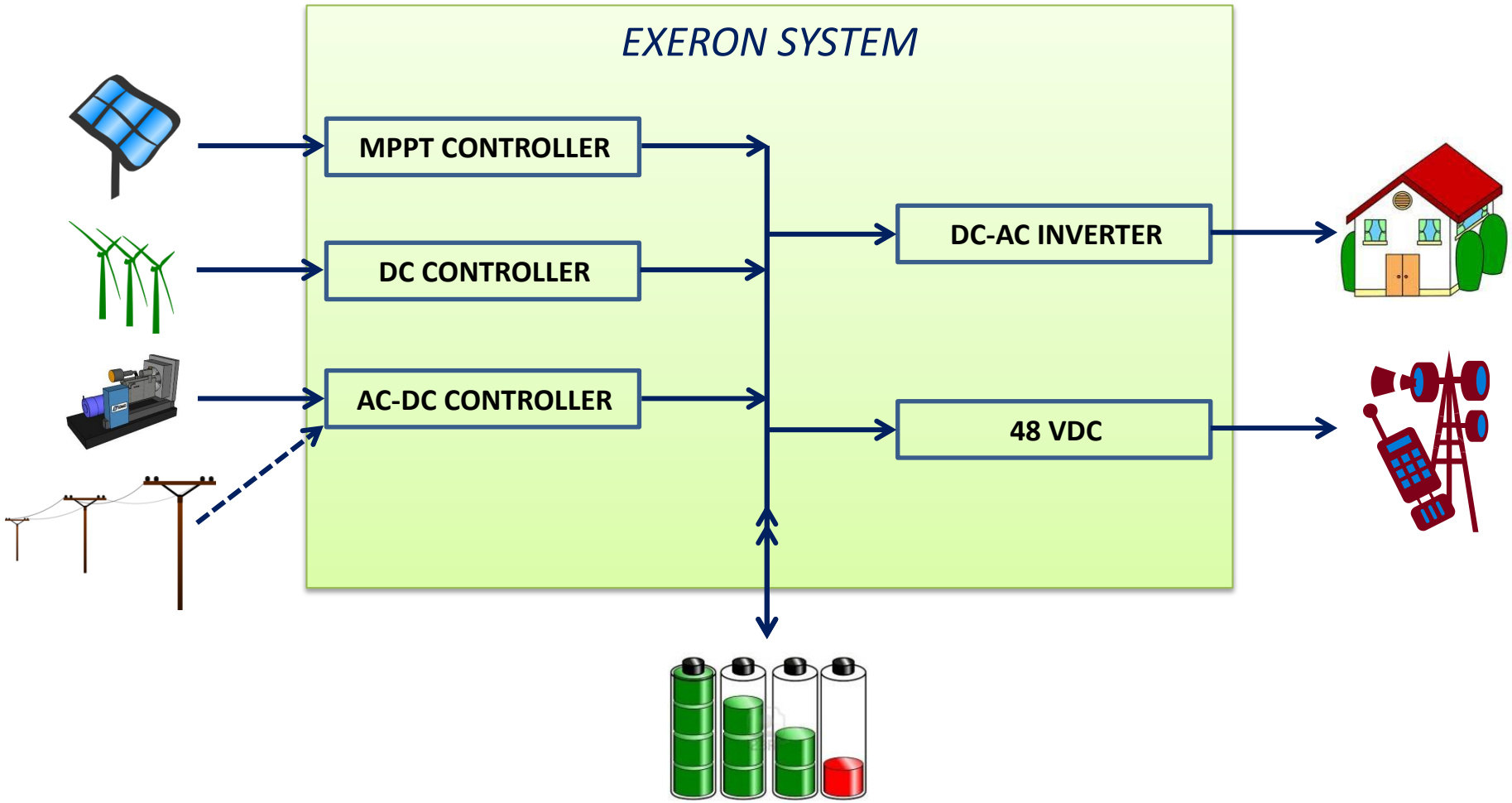
EXERON - The Concept



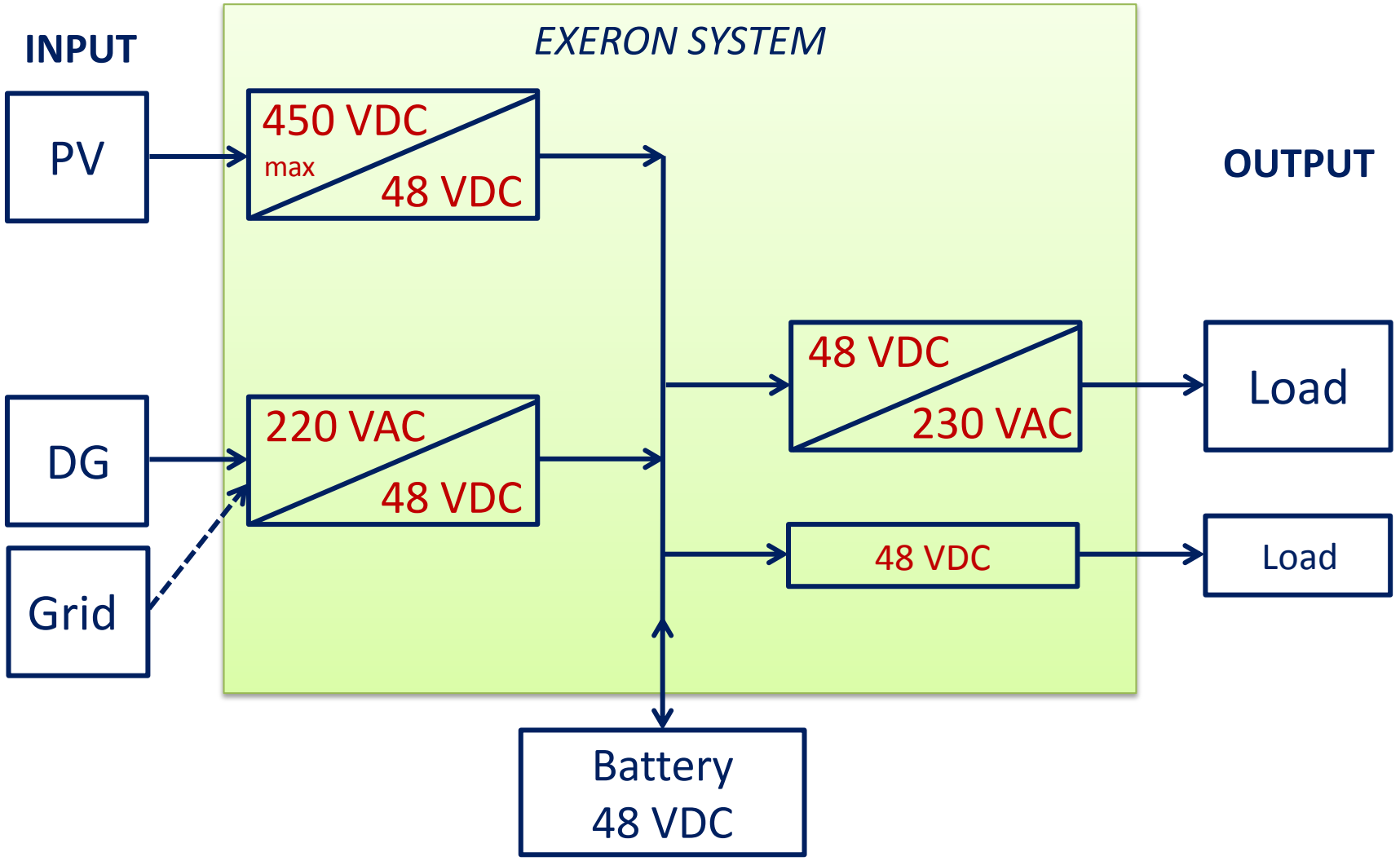
System design



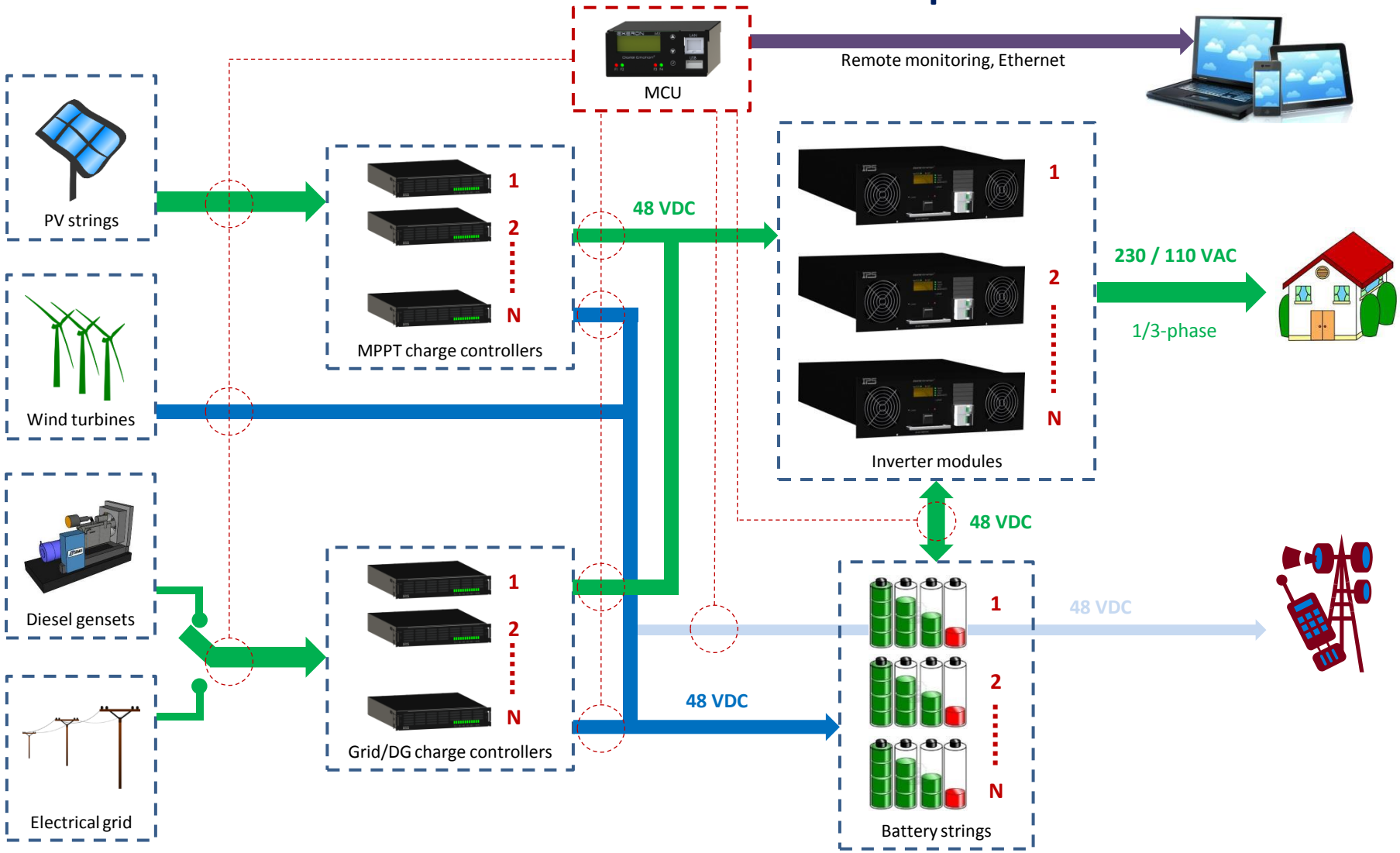
Hybrid off-grid + energy storage



System design

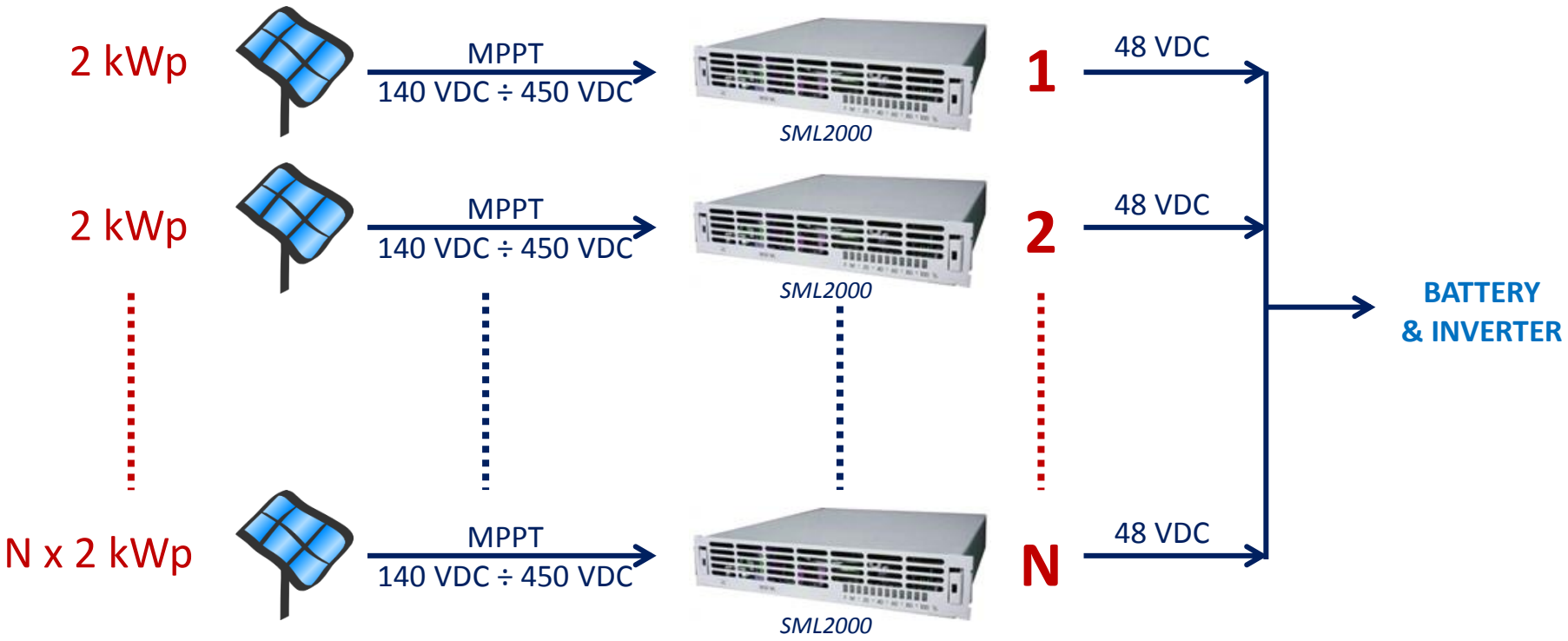


EXERON - The Concept



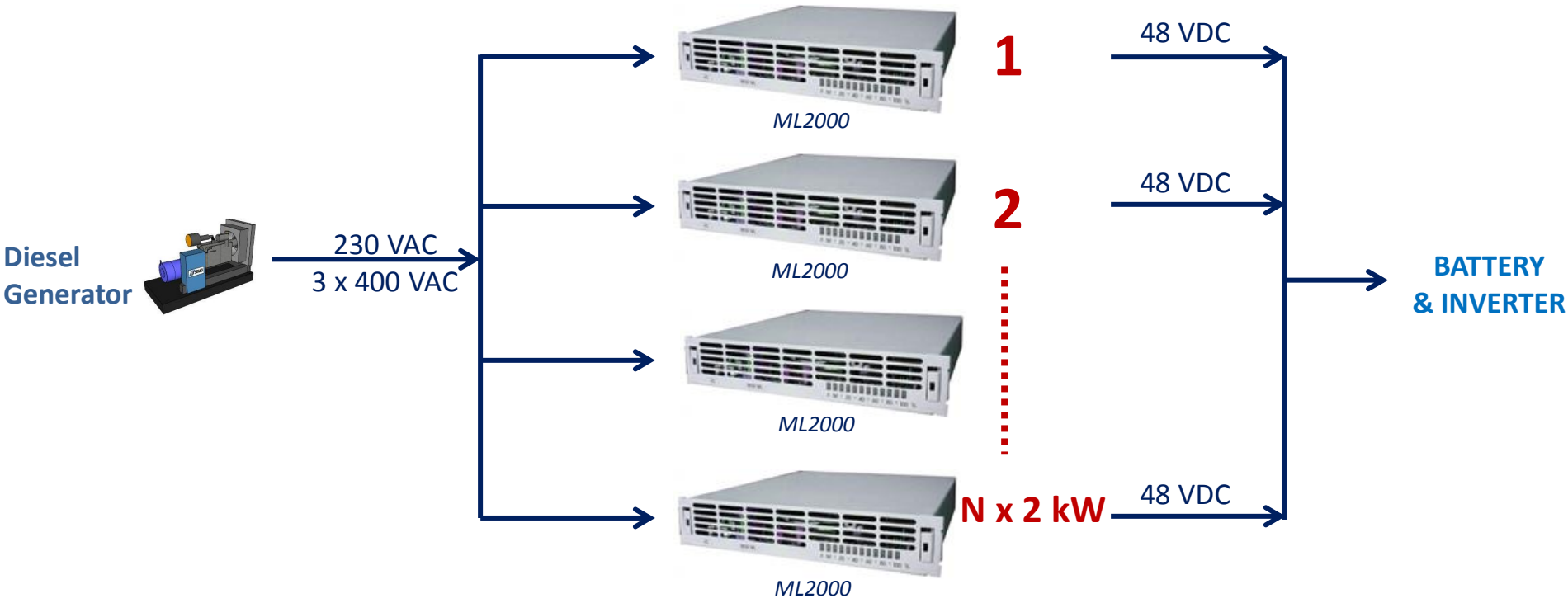
System components

PV INPUT – MPPT Solar Charge Controller SML: N x 2 kW



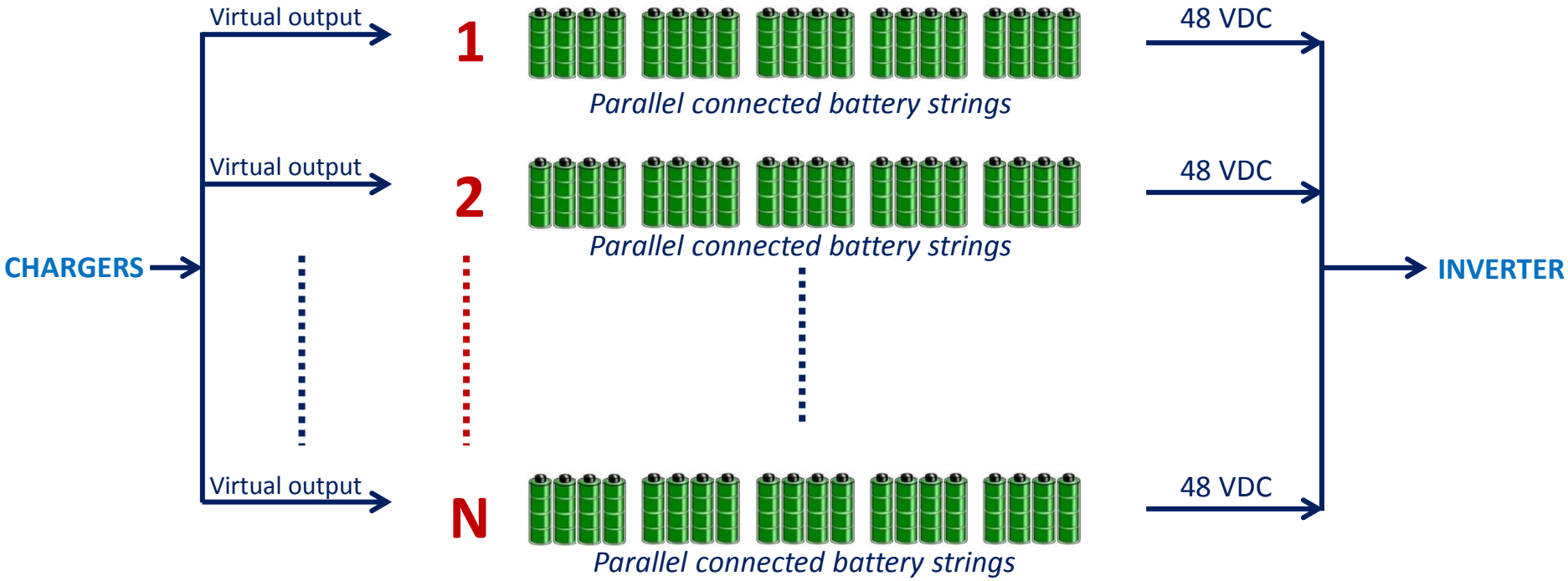
System components

GRID / DG INPUT – Charge Controller ML: N x 2 kW



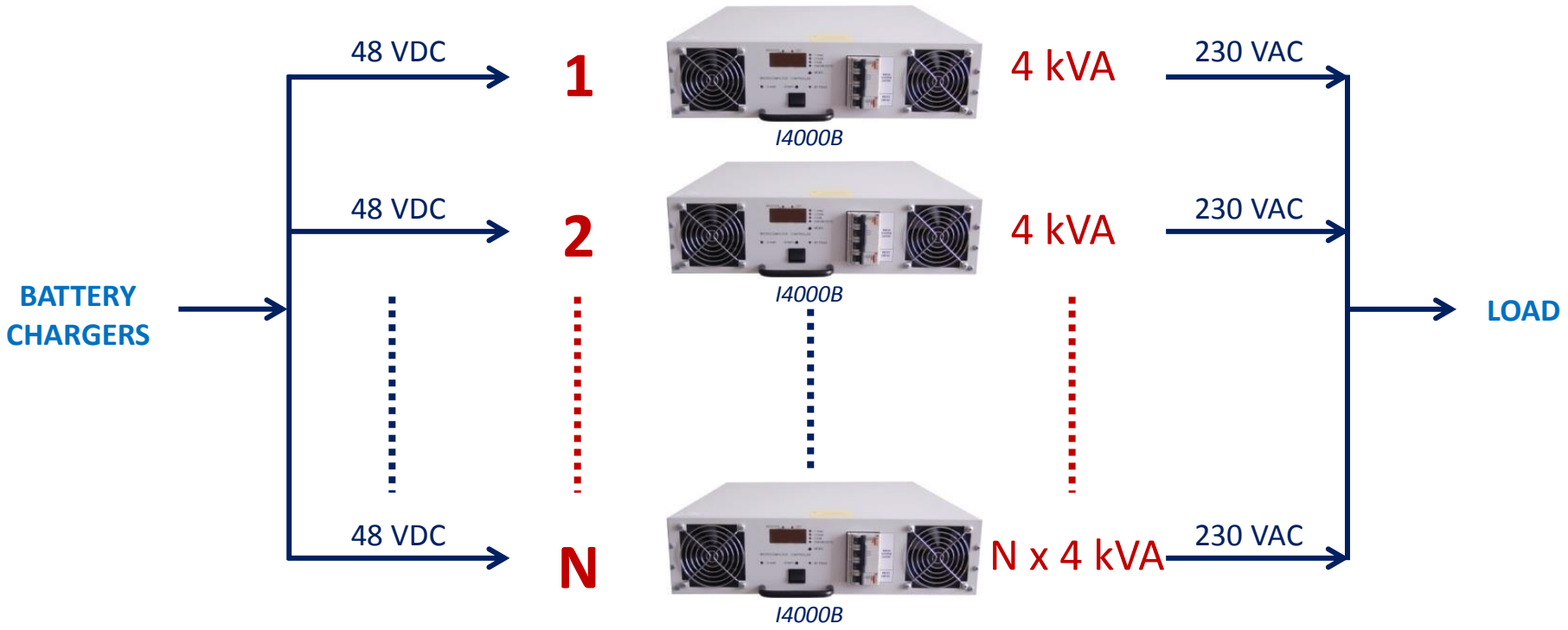
System components

BATTERY: Unlimited Parallel Connection Through N x Virtual Outputs



System components

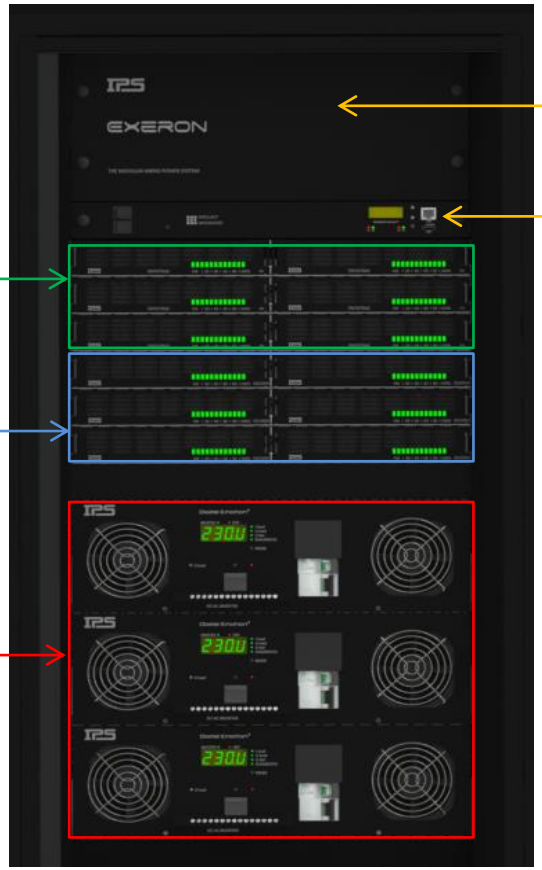
OUTPUT – Inverter I4000B: N x 4 kVA



EXERON system

Modular design // Unified structure // Redundancy N+1

Example: EXERON MX (Input: PV 12 kWp, Grid/DG 12 kW; Output: 12 kVA)



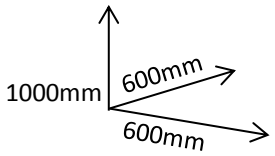
PDU – Power Distribution Unit (all input connections)

MCU – Monitoring and Control Unit

Solar charge controllers
6 x SML2000

Rectifiers
6 x ML2000

Sine wave inverter
3 x I4000B



Standard EXERON configurations

- Free scalable
- Easy modular configuration
- As much power modules as you need

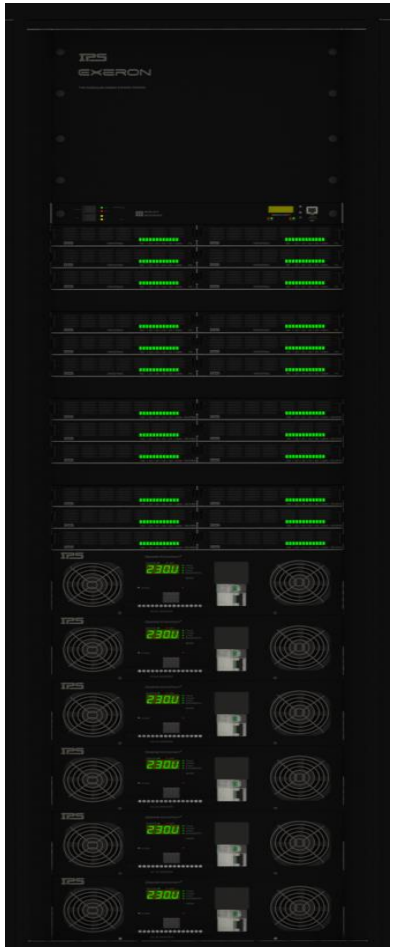
From 2 kW to 4 kW

Exeron SX

From 2 kW to 12 kW

Exeron MX

From 2 kW to 24 kW



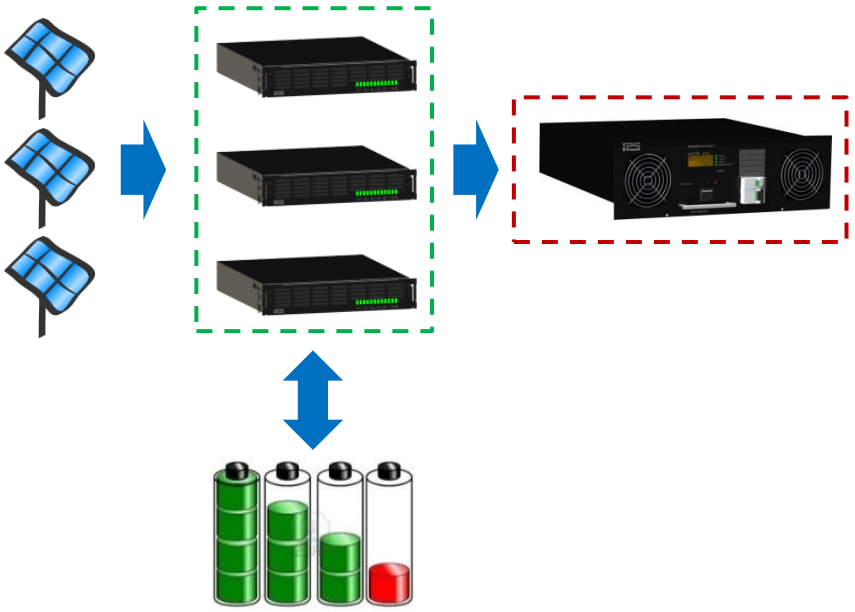
Exeron FX

Configurations

Power imbalance between input and output is one of the biggest advantages of the system concept that allows 100% adjustment to the concrete application.

More input, less output power.

High battery capacity



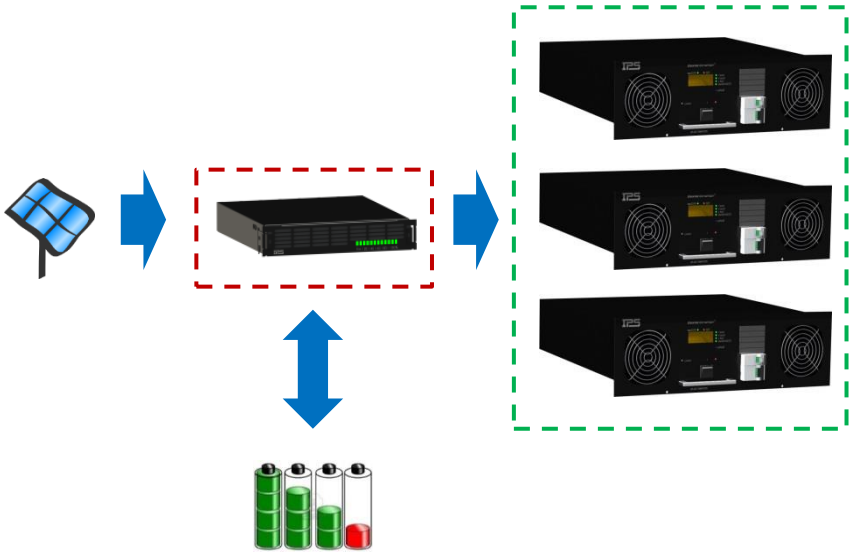
- **Fast battery charging during day**
- **Large energy storage capacity**
- **High power independence**
- **Low continues load consumption**
- **Continues power availability**
- **Long time power without sunshine**

Configurations

Power imbalance between input and output is one of the biggest advantages of the system concept that allows 100% adjustment to the concrete application.

Less input, more output power.

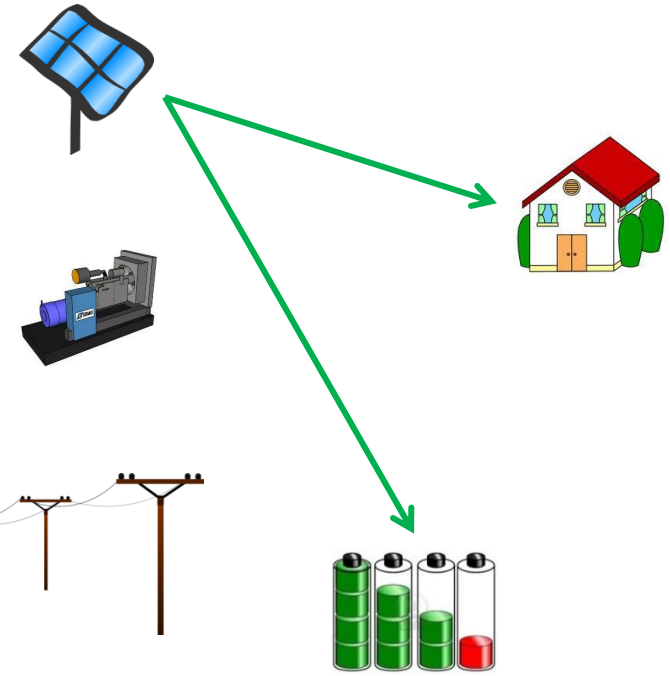
Low battery capacity



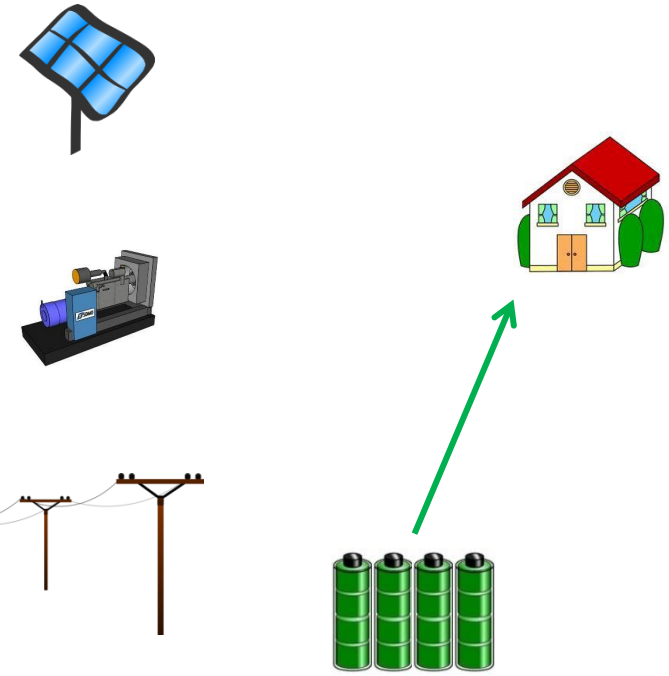
- **Slow battery charging during day**
- **Small energy storage capacity**
- **Non continues load consumption**
- **Short time peak load consumption**

System scenarios

Day
(battery mid)



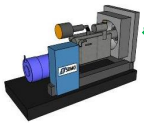
Cloudy / Night
(battery full)

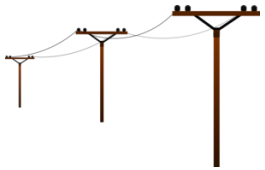
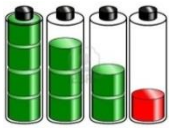


load is powered from the battery

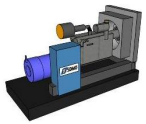
System scenarios

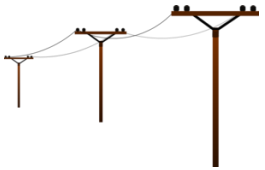
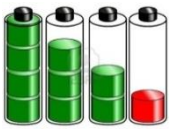

Cloudy / Night
(battery low)


Cloudy / Night
(battery low, no fuel)

EXERON system

Features

- Modular design
- MPPT solar charge controllers
- U_{OC}: 140 VDC ÷ 450 VDC (min ÷ max)
- U_{MPPT}: 140 VDC ÷ 450 VDC (full range)
- Unified design for all charge controllers
- N x power unlimited design
  - Input: N x 2 kW charge controllers
  - Output: N x 4 kVA inverter modules
- Poly-, Mono-, Thin-film modules
- Redundancy (N + 1)
- Easy configuration and installation
- Fast module exchange
- Plug & Play modules
- Hot swap technology
- Small size and light weight

What makes EXERON unique?

Advantages

- Full integration of all types of modules – MPPT chargers, rectifiers, inverters
- Unique communication protocol allows parallel connection of up to 65 MW modules (each 2 kW)
- Self diagnostic and failure prevention through special IPS software
- Extreme redundancy through load sharing between the modules
- Extremely fast MPP tracking algorithm leading to 12% efficiency improvement
- MPP tracking covers the full input range which leads to 14% efficiency improvement
- Integrated CPU in each power module – the hologram principle
- Automatic and manual bypass
- AVR and automatic start/stop of diesel gensets
- Intelligent power input prioritizing
- Small and light hot plug power modules – MTTR < 10 s
- Unlimited parallel connection of battery strings through virtual charger outputs
- Extend the battery life with more than 3 years or 1200 cycles
  - *Temperature compensation of the charging voltage*
  - *Battery asymmetry control*
  - *Automatic periodical battery capacity test*
  - *Automatic float and boost charging mode*
  - *Specific charging algorithms*

Cost analysis

Two facts can be considered from the drawing:

1. IPS Exeron's initial investment is higher, but as a long-term investment is clearly economically better, because of the almost maintenance free operation and the long-life design thanks to the implemented military standards.
2. Compared to using only diesel generator, the OPEX costs are dramatically lower when replacing with hybrid off-grid.