IPS
ELECTRIFY BY INNOVATION

MINI-GRID & OFF-GRID POWER SOLUTIONS

www.exeron.com

www.ips-group.net

WHO WE ARE

IPS (International Power Supply) was established in 1989 and specializes in the R&D and precision manufacturing of power electronics and energy conversion technologies.

Over the past three decades, IPS has delivered industry leading products and solutions, and currently has a portfolio of several different product lines including hybrid and off-grid power systems, rectifiers, inverters, UPSs, frequency converters, turnkey outdoor power systems, etc.

INNOVATION

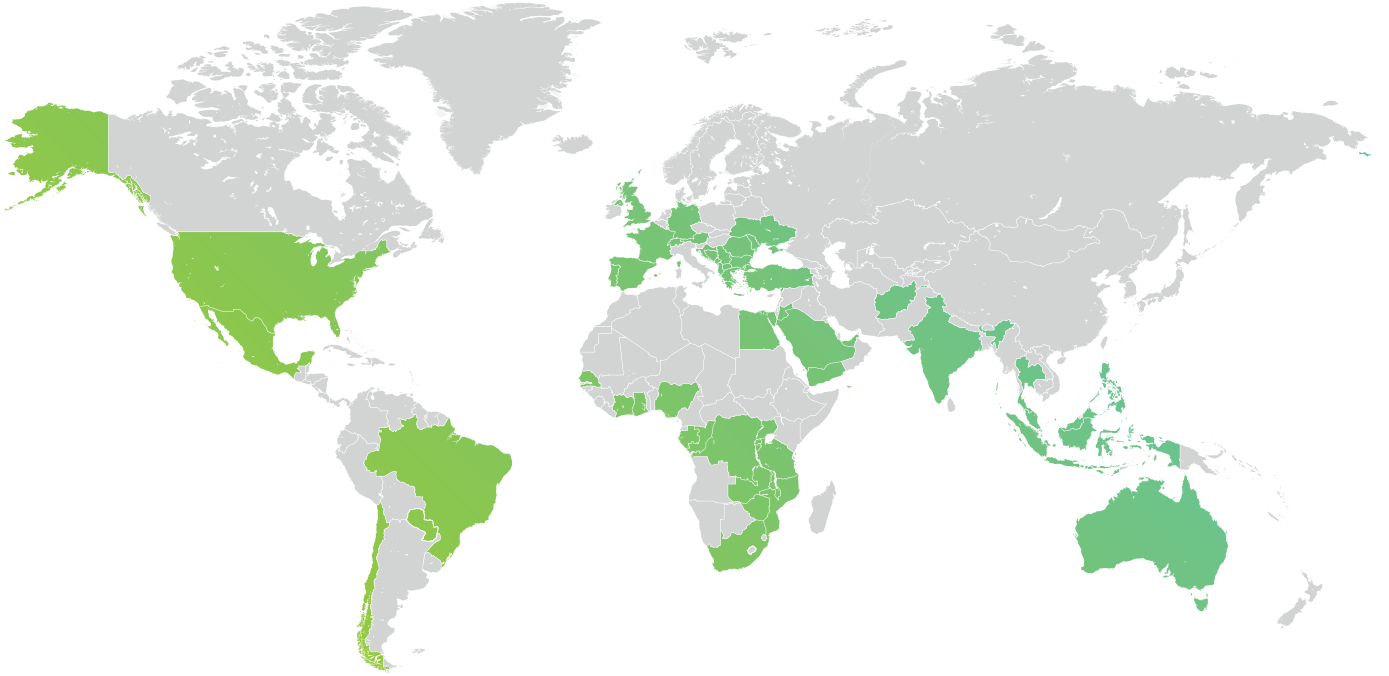
2014 ees Award, Germany
2017 Space X award, USA

FOOTPRINT

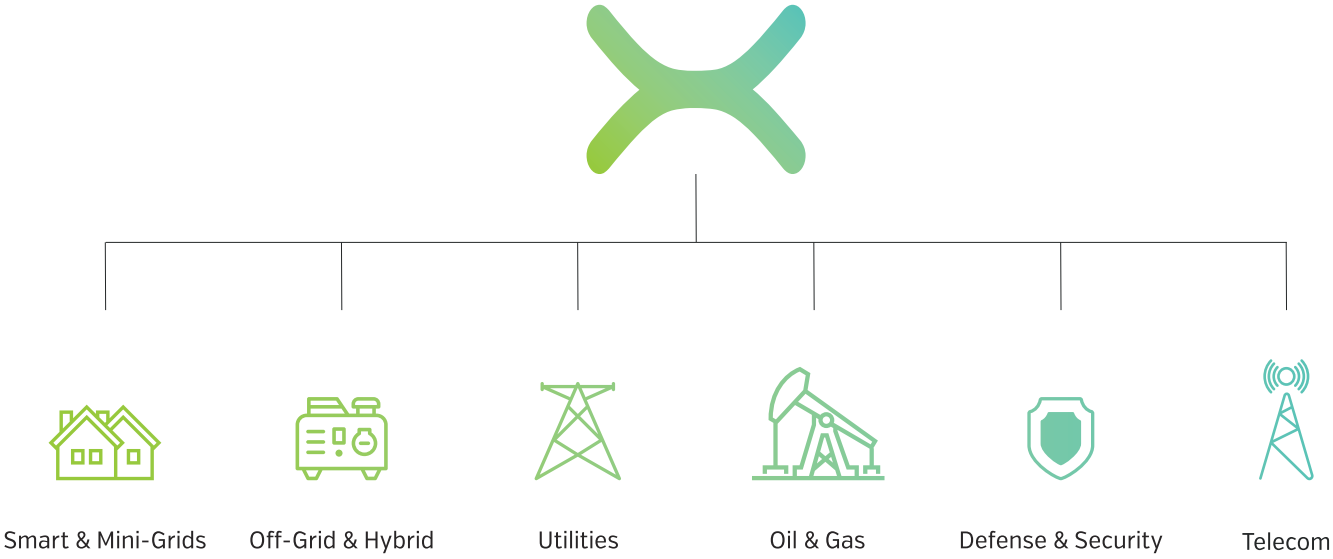
58 countries

EXPERIENCE

30 years



EXERON APPLICATIONS & REFERENCES



Cutting-Edge Technology & Unique System Architecture

- **Specially Developed for O&G Desert Applications**
- **Up to 70°C Ambient Temperature**
- **Unique Battery Cooling**
- **Battery Life Extension**
- **Patented in the USA**
- **No Maintenance Required**

References

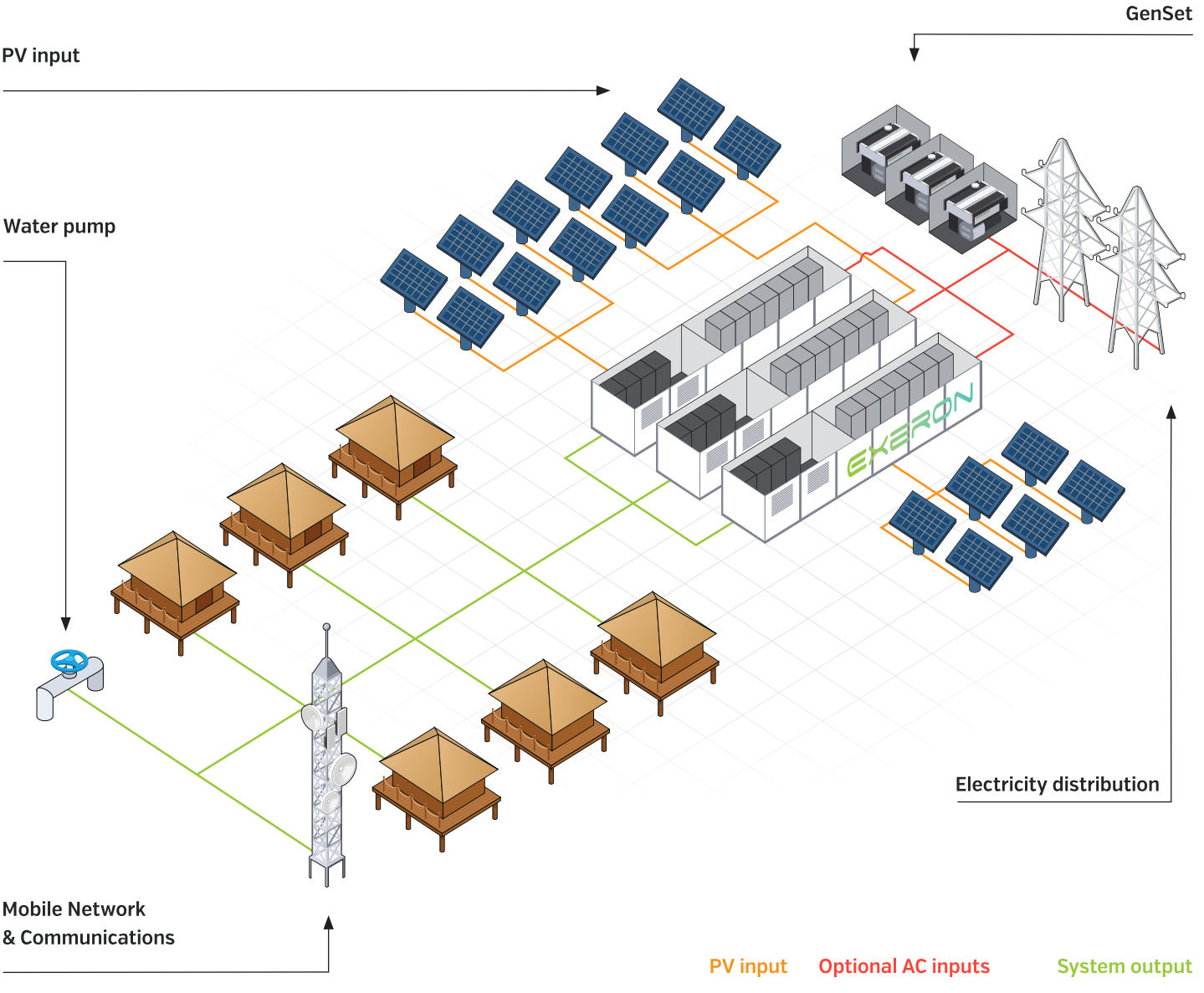
Saudi Aramco | Lukoil | Enel | NATO

Siemens | ABB | Thales | AES

SMART MINI-GRID SOLUTION

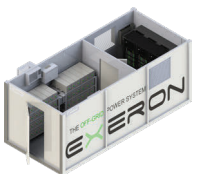
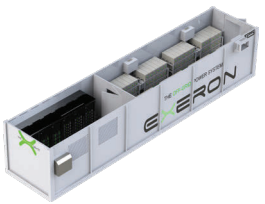
Mini-grids are a self-sufficient combination of renewable and conventional power generation sources, energy management system and battery storage, mostly deployed in rural and remote areas. The generated electricity is supplied to the end customers through medium and low voltage distribution network including load management, metering and billing.

TYPICAL POWER: 12-500 KW



OUTDOOR MINI-GRID SOLUTIONS

Completely customizable outdoor systems.

< 4 kW	< 24 kW	< 60 kW	< 120 kW	up to MWs
				
SINGLE	DOUBLE	X-SMART [20' CONTAINER]	X-SMART [40' CONTAINER]	X-SMART GRID

Benefits

Integrated battery storage

Battery life extension software

Temperature controlled battery compartment

-30° to +70° C operating temperature

Intelligent power input prioritizing

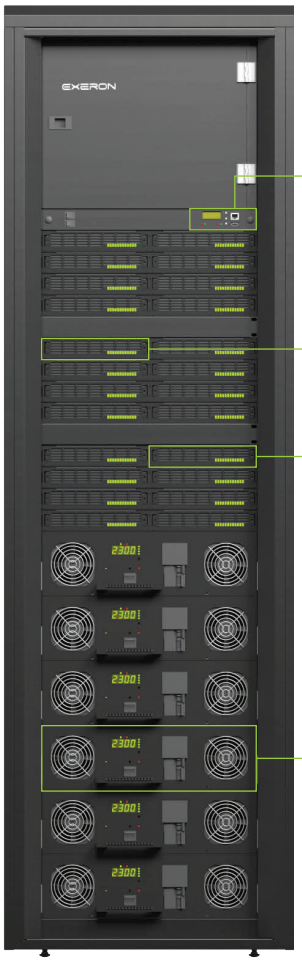
Zero maintenance solution

Reliable operation under harsh ambient conditions.

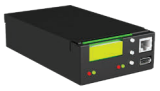
Quick and easy deployment

25+ years design life

EXERON - THE OFF-GRID BEAST



Monitoring & Control Unit



- 0.2 kg
- Hot plug

Grid/DG charge controllers

- 2 kg
- 2 kW
- Hot plug

PV MPPT Charge Controllers

- 2 kg
- 2 kW
- Hot plug

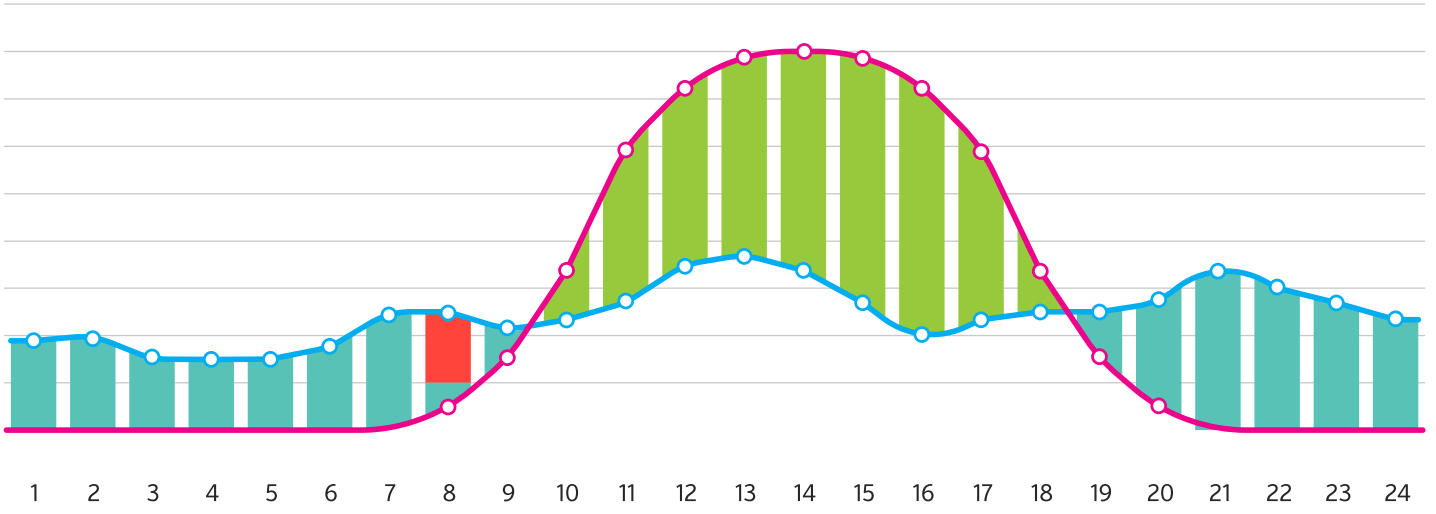
Inverters

- 9 kg
- 4 kVA
- Hot plug

Benefits

- Cloud based platform for remote monitoring of all system parameters
- Intelligent automated diesel generator control (start, stop, loading)
- Plug & Play and hot swappable power modules
- 100% protection of all electrical devices connected to the system (overvoltage, frequency disturbances and spikes)
- Smart prioritization of power sources (PV, battery, grid, diesel genset)
- Modular design ensures effortless upgradability and zero maintenance cost
- Easy to install and maintain with small footprint and light architecture
- Unmatched reliability – built-in redundancy and load sharing ensure zero system downtime
- Military certified – guaranteed operation in harshest ambient conditions

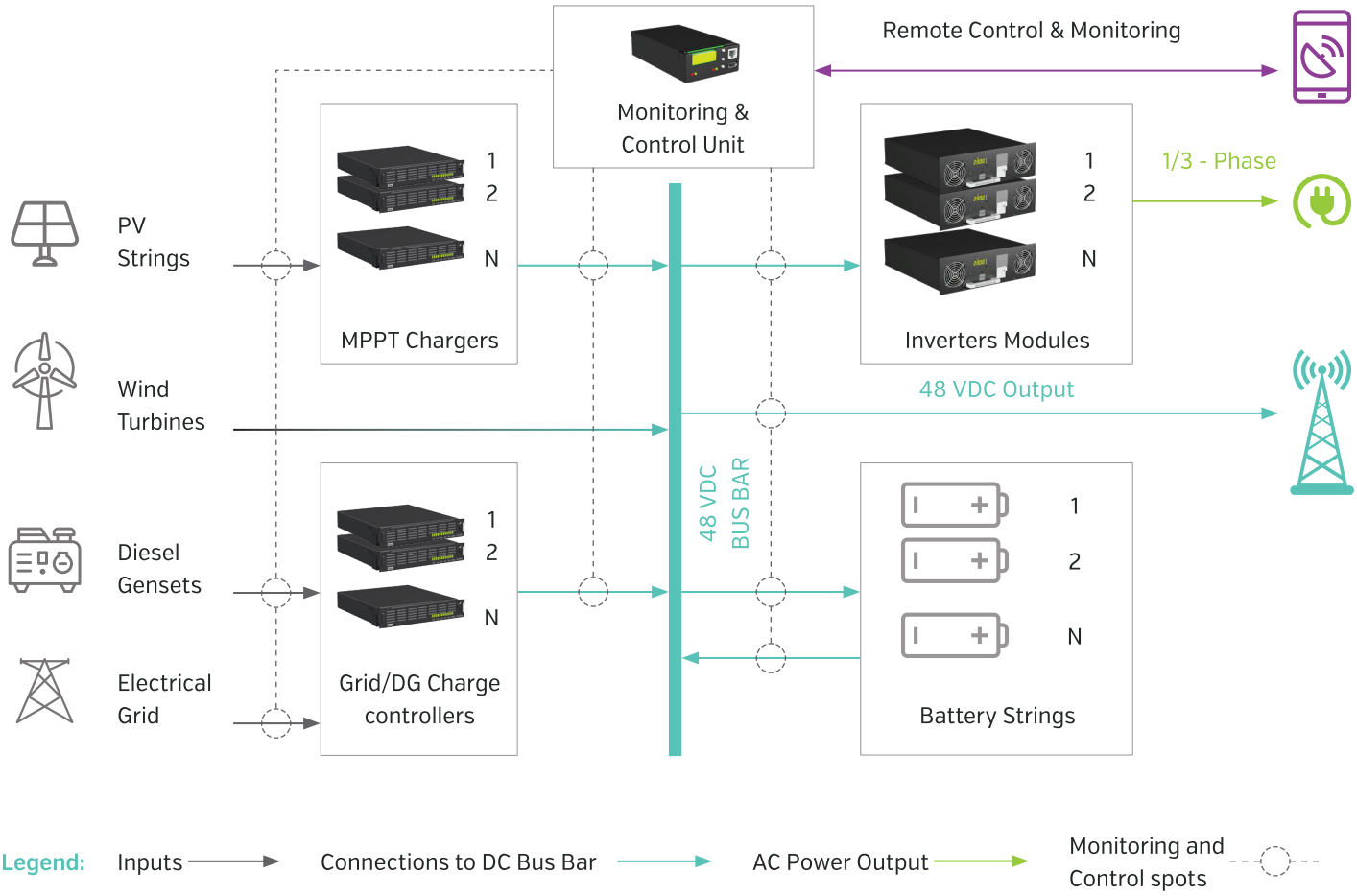
Typical EXERON performance profile



TECHNICAL DESCRIPTION

Main components of the system:

- Power Distribution Unit (PDU) - Containing all I/O connection terminals, different types of circuit breakers, SPD's (Surge Protection Devices) and other types of switchgear. Fully pre-cabled and ready to operate.
- Monitoring & Control Unit (MCU) - This device acts as the brain of the system. With state of the art software and unique communication protocol, the MCU makes the most proper decisions for the system's behavior. The MCU communicates to all system components. It ensures the most proper battery treatment, since in such a system, the battery is one of the main components that needs protection. The MCU has an integrated web server, 4G router, Ethernet port and provides local, remote and cloud based remote monitoring and control.
- Grid/DG Charge Controller – The rectifier is a power conversion unit, converting AC to DC voltage. The rectifier is switch mode type with perfect PFC (Power Factor Correction).
- Solar Charge Controller (SML2000) – The solar charge controller is basically a DC to DC converter with a state of the art MPPT (Maximum Power Point Tracking) with more than 99%.
- Inverter (I4000B) – The inverter is responsible for the DC to AC conversion of the system. The inverters main function is to supply the load at all times.
- Cathodic protection module (XCP)- Used in the Oil & Gas industry, IPS's XCP module converts AC to DC and DC to DC with great efficiency and extremely high power density.
- DC/DC converter (XDC) – The DC to DC converter is usually used for powering low voltage DC equipment or to charge the battery of the diesel generator.



CLOUD MONITORING SYSTEM

Remote cloud monitoring 24/7

Live network and operating center

User friendly interface

Technical customer service line support

Continuous system, battery and user equipment's health check

System performance and environmental impact data base

For more information visit:

www.monitoring.exeron.com

EXERON COMPARISON

DISCOVER WHAT MAKES OUR SOLUTIONS BETTER

Alternative solutions	EXERON
Customizable & Modular	
 • Fixed design options, few modification options • Limited scalability • Complicated and costly upgrades	 • Customizable and efficiently project-based design • Unlimited scalability • Upgradability within seconds due to its modular and hot-pluggable structure
Complete System (All power sources, one manufacturer)	
 • Various components to be wired and connected • Different communication protocols • Sometimes, components from various manufacturers are used	 • Unique and same communication protocols for all components
Reliability	
 • General design • No or minimal redundancy	 • Robust design • N+1 module redundancy • Load sharing capability
Remote Monitoring & Control	
 • General alarms • Monitoring main values of the system	 • All inputs and outputs are monitored • Simple and advanced monitoring available • Customizable alarms • Communication with all external sensors and actuators
Temperature Regulation & Protection	
 • Regular maintenance • Locally distributed airflow • Vulnerable to weather conditions	 • Maintenance-free • Equally distributed airflow • Anti-corrosion cover

CASE STUDY - SAFARI LODGE

TIMBAVATI RESERVE, LIMPOPO, SOUTH AFRICA

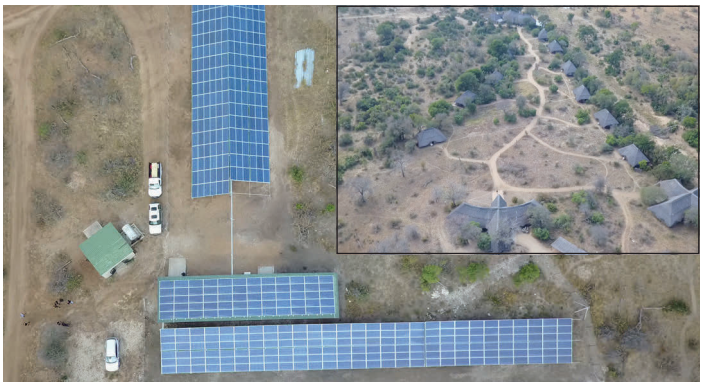
Hybrid mini-grid EXERON system for a lodge (PV + Grid + Diesel generator)

System requirement	EXERON CM Configuration
PV system 136 kWp polycrystalline	68 x 2 kW MPPT charge controllers SML2000
DG / Grid input 64 kW	32 x 2 kW rectifier modules ML2000
Total output power 108 kVA (3-phase)	27 x 4 kVA inverter modules I4000B
Battery 48 VDC / 9000 Ah	

Optimal System Performance

The hybrid solar mini-grid system with EXERON as an energy conversion unit ensures unmatched reliability and uninterruptible power supply to the safari lodge. The use of the Diesel Generator is optimized, with annual OPEX savings post hybridization of more than 50%. The avoided CO2 emissions are 194 t/year. The price per kWh is 0.33 $/kWh. The payback period is 2.7 years.

Safari lodge, South Africa



EXERON system

Battery strings

Distribution board and battery fuses

CASE STUDY - MILITARY BASE

ARMED FORCES OF PARAGUAY, PARAGUAY

Hybrid mini-grid EXERON system for a military base (PV + DG)

System Requirement	EXERON CM Configuration
PV system 42 kWp polycrystalline	21 x 2 kW MPPT charge controllers SML2000
DG input 64 kW	32 x 2 kW rectifier modules ML2000
Total output power 36 kVA (3-phase)	9 x 4 kVA inverter modules I4000B
Battery 48 VDC / 9000 Ah	

Optimal System Performance

This hybrid solar mini-grid system is currently powering a military base in harsh tropical conditions with high ambient temperature and humidity. EXERON was installed to reduce the OPEX reaching savings of 58% with payback period of 4,8 years. The system is performing as expected, providing reliable power to this strategic base 300 km far away from any distribution line.

The military base

Site overview

The EXERON system

The PV arrays

CASE STUDY - STUDENT'S COLLEGE

COLLEGE BUILDING, NIGERIA

Off-grid EXERON system for a college (PV)

System Requirement	EXERON CM Configuration
PV system 50 kWp polycrystalline	25 x 2 kW MPPT charge controllers SML2000
Total output power 60 kVA (3-phase)	15 x 4 kVA inverter modules I4000B
Battery 48 VDC / 9000 Ah	

Optimal System Performance

This hybrid off-grid system is currently powering a college in Onitsha, Nigeria. EXERON was designed to provide 100% green energy by powering all loads during sunny-hours with energy from PV modules. The consumptions during evenings and cloudy days are powered by the energy stored in the battery.

EXERON system and battery strings

EXERON container equipment

Site overview

PV arrays

CASE STUDY - RESIDENTIAL

HASKOVO, BULGARIA

Hybrid mini-grid EXERON system for a private house (PV + Grid + DG)

System Requirement	EXERON CM Configuration
PV system 12 kWp polycrystalline	6 x 2 kW MPPT charge controllers SML2000
DG / Grid input 10 kW	5 x 2 kW rectifier modules ML2000
Total output power 24 kVA (3-phase)	6 x 4 kVA inverter modules I4000B
Battery 48 VDC / 9000 Ah	

Optimal System Performance

The EXERON hybrid system achieves the desired goal to reduce electricity bills through less reliance on the grid. The electricity generation is stable during all seasons as expected, covering the needs and harnessing the optimal PV power respectively. The use of the Grid and the diesel generator is managed to save maximum costs for the client. The annual OPEX savings post hybridization are 42%, the CO2 emissions avoided are 51 t/year. The payback period is 3,9 years.

Private house, Bulgaria

EXERON system and battery strings

Battery string and fuse

PV arrays

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