GREEN CUBES
THE POWER TO PERFORM

GUARDIAN

Utilizing Hybrid Power Systems in Telecom Applications

Introduction

The use of renewable energy sources for remote telecommunication systems has become more popular recently due to technological advancements and lower costs. Renewable resources such as the wind and sun offer valuable energy and reduce overall operating costs of system infrastructure, as well as reducing the carbon footprint of the system.

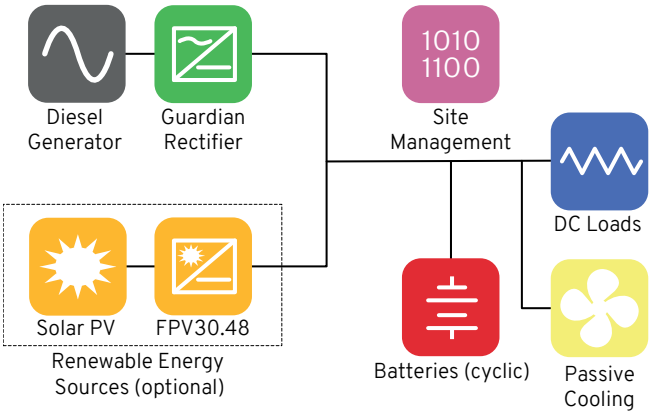
Modern hybrid power supply systems for telecommunication markets, which allows using inputs from the different energy sources for feeding operators equipment in remote site areas with no or extremely unreliable AC grid, offer a clear advantage.

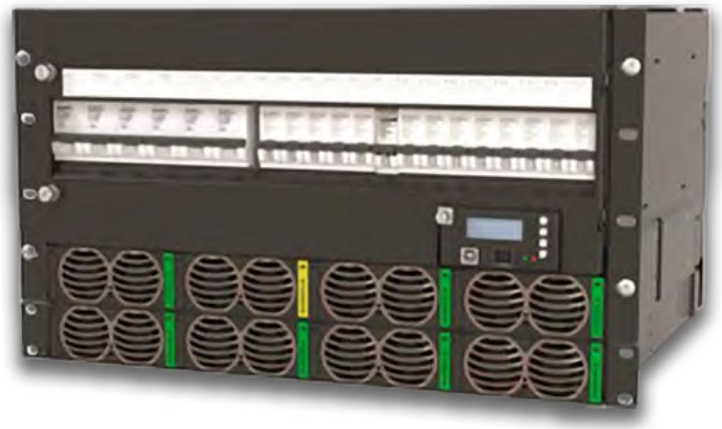
Green Cubes offers modern Hybrid DC power systems based on the Guardian platform.

Common Hybrid Bus Architecture allows simultaneous use of various energy converters as part of a uniform system. In this case power supply system input could be an electricity grid and diesel generator sets, as well as PV solar panels in tandem.

It is important to highlight that the main priority for operation of the system will be using energy derived directly from solar converters.

The system utilizes deep cyclic batteries with the capability to perform a large number of discharge and recharge cycles and provides a high rate recharge acceptance, high round-trip efficiency and high temperature resistance for energy storage.





Hybrid Solutions

The heart of the system is the Guardian AC-DC converter model FMPe30.48J which is a 48V rectifier module rated at 3kW, and which incorporates resonant technology to reduce components stresses, providing increased system reliability and one of the best in class efficiencies (>96%).

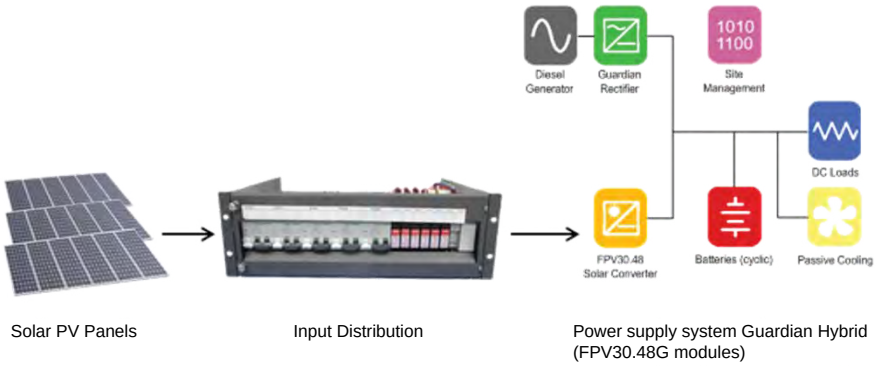
The rectifier features a wide input operating voltage (85-300VAC) and wide operating temperature (from -40° to +75°) to maximize power availability within demanding utility power environments.

Guardian Rectifiers and Converters

FMPe30.48J modules provide 3kW (62.5A max. current) of output power at 46-57,6VDC. Maximum extension of DC Hybrid system up to 14,5kW (using 1 x sub-rack with 5 x FMPe30.48).

Solar systems use the FPV30.48G module, which has a wide input voltage range: 130-360VDC (PV Input). A system solution using these converters can produce a maximum of 14,5kW (using 1 x sub-rack with 5 x FPV30.48).

These converters feature a patented algorithm which controls the maximum power point tracking (MPTT) which is >99%. Solar cells have a complex relationship between solar irradiation, temperature and total resistance that produces non-linear output efficiency. The purpose of the MPPT algorithm is to sample the output of the cells and apply the proper resistance (load) to obtain maximum power for any given environmental conditions.



Typical Solar System

Solar panels connects to the power supply system with a special PV Distribution panel, which consists of the in-put MCBs for connecting up to 5 string combiners (1 for each solar converter), surge protection device (SPD), output terminals, ground fault detection device (GFD) and GFD fuse (compliant with UL1741). PV panels can be grounded in the positive or negative branch.

FPV converters provide a modular building block for Renewable Energy and Hybrid sites and cater for a broad spectrum of CapEx, OpEx and ROI models.

One of the most important parts of a hybrid power supply produced by Green Cubes is a multi-functional digital HCX Advanced controller (Hybrid Site Controller), which is a micro-controller system that manages parameters of all units and monitors status of whole system.

HCX Controller

The main features of the HCX Advanced controller are:

- Intelligent management of all power supply system units and modules with local and remote connection possibilities (USB, Ethernet/ SNMP),
- Includes battery manufacturers preset database, which provides complete battery management, and help to extend lifetime.
- Optimize fuel consumption and battery life for the off-grid and unreliable genset sites.
- Extensive logging of site data.
- Manages renewable energy source power prioritization and using patented algorithm of maximum power point tracking allows to minimize Total Costs of Ownership (TCO) for operators.

The modular design of Green Cubes systems and versatile Guardian platform allows using these power systems in Indoor and Outdoor solutions that can satisfy the requirements of most Hybrid applications.

For more details, please check specifications and datasheets at greencubes.com

ABOUT GREEN CUBES TECHNOLOGY

Green Cubes Technology harnesses over 30 years of industry experience to ensure we design, develop and deliver solutions for the most challenging energy needs. We offer battery technology innovation, application design and performance management to drive productivity, scalability and sustainability.

Green Cubes provides complete power systems to the stationary power industry. With the addition of the Guardian and Aspiro Product lines offered under the UNIPOWER brand, these industry proven DC plant systems serve critical applications all around the world. Green Cubes offers complete power solutions including energy storage, power conversion, and seamless integration.

For more information, email **contact@greencubes.com** or visit **greencubes.com**

GREEN CUBES
THE POWER TO PERFORM