



Our **core business** is to implement **reliable clean energy solutions** in support of our clients to reach **NET ZERO**

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SwissSolar Lda - company profile

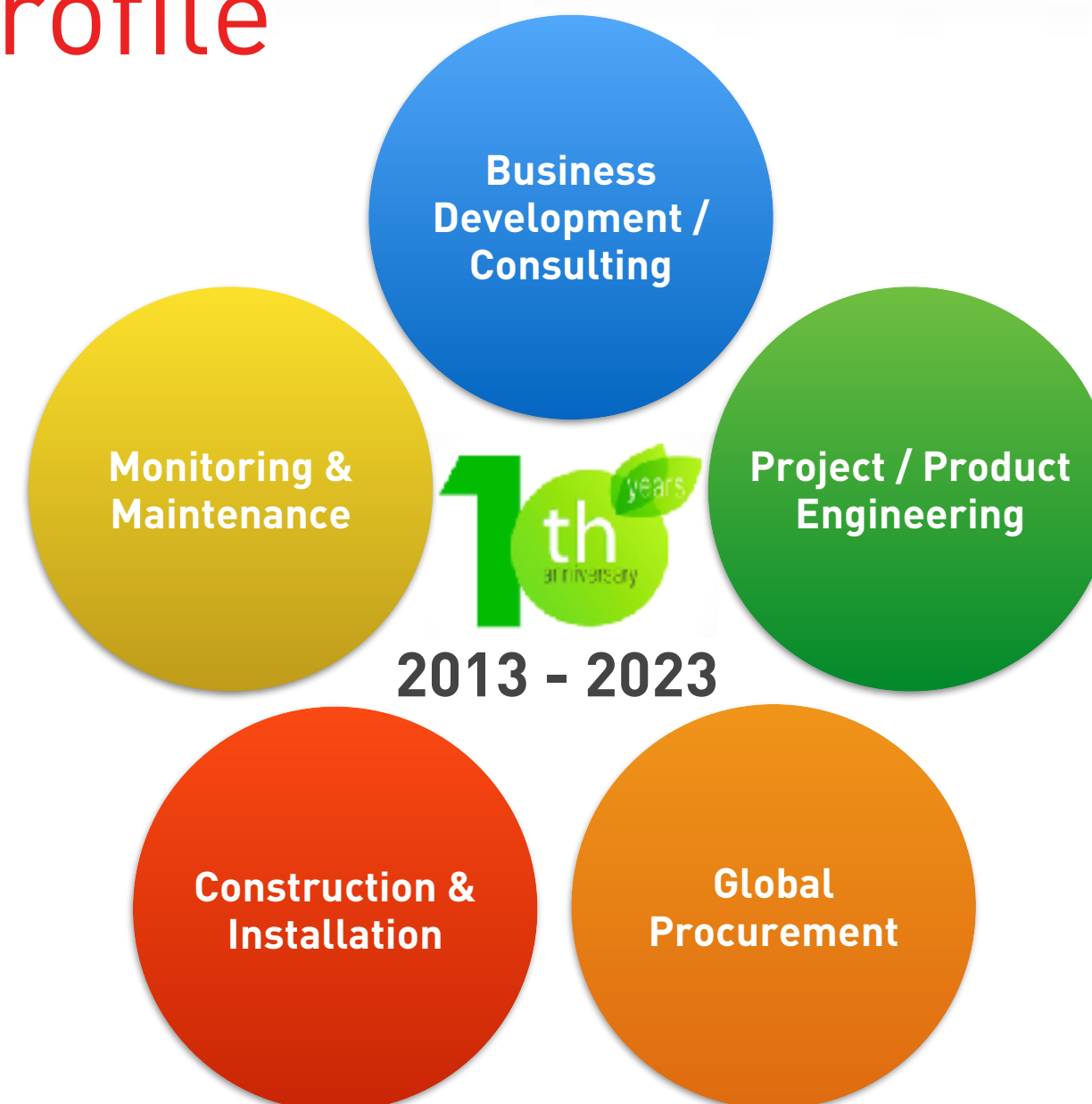
Solar, hybrid & back-up power

SwissSolar Lda is a competence centre for **photovoltaics** and **renewable energy**.

Our core business is to implement **reliable** and **clean energy solutions** for our clients!

We act as your one stop **EPC partner** (engineering, procurement and construction) for **off-grid, hybrid** and **back-up power**.

Depending on energy sources available, we combine **solar, hydro** and **wind power** - including diesel generators and gas turbines.



For selected projects, we also **offer fully financed power solutions**.

We also offer **consulting** and **engineering services** for **rural solar applications** and support clients for BiPV and rooftop projects for **GREEN BUILDINGS**.





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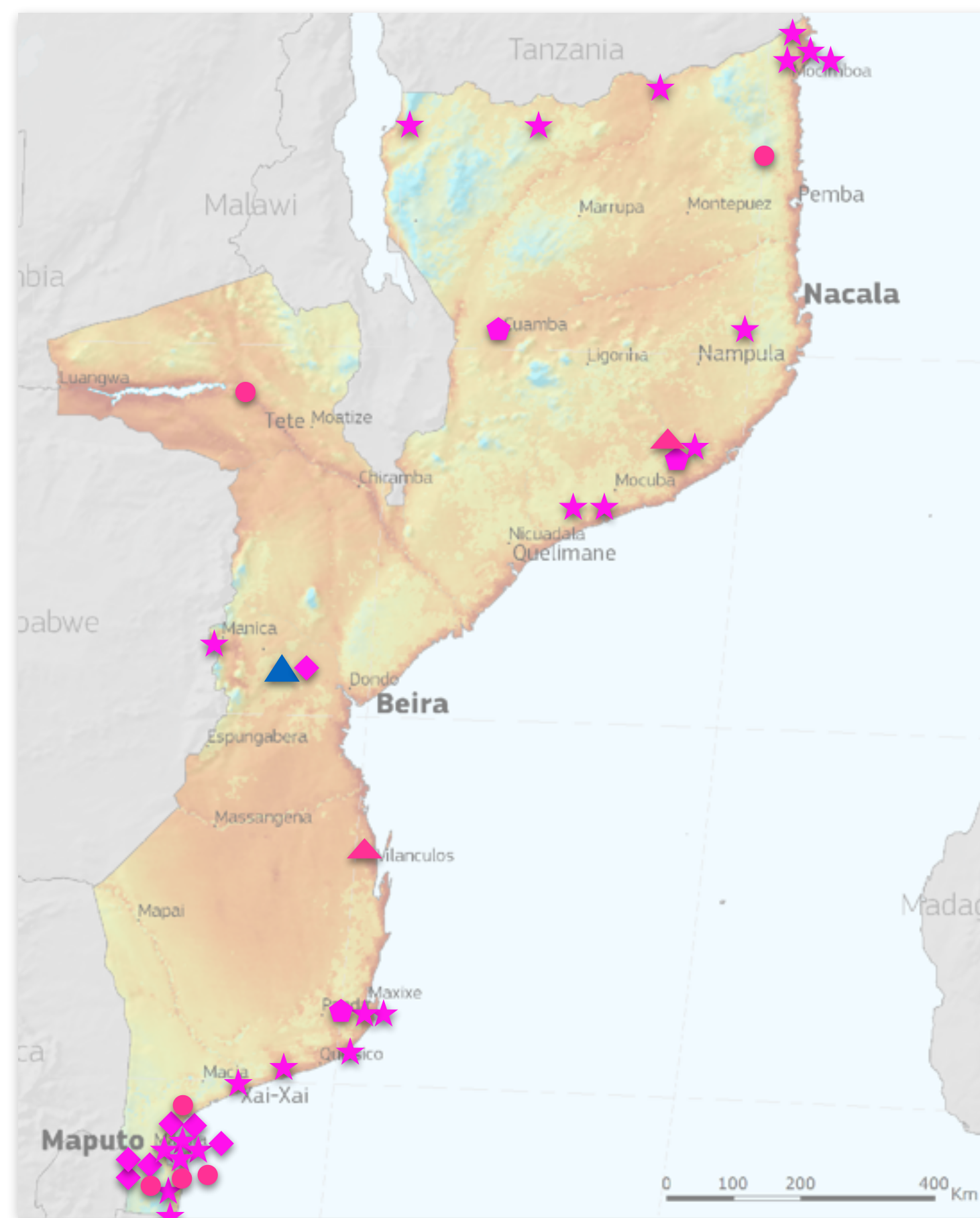
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SwissSolar Lda - project footprint



Type of project

- ★ Solar Hybrid System projects
- ◆ SHS projects
- ◆ Back-up System
- Street-light projects
- ▲ Micro-grid project
- ▲ Grid-tied AC coupled project

Right - our Swiss roots **energiebüro Zürich**:

- Largest solar power plant in Switzerland on top of a distribution center - 6'710 kWp
- Stade solar power plant; Stade de Suisse, Berne - 1'350 kWp

A selection of our clients





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SwissSolar approach - how to plan a project

Maximum power in kW

- make pics of main distribution
- check size of main fuse

Daily consumption - day and night

- Get energy / credilec meter readings 06:00 to 18:00 for a couple of days - that would give a clear picture of energy use
- If off-grid - we really need detailed consumption - planned daily use for day & night to define battery size

Energy sources available

- do they want a curly grid-tied PV system reducing consumption from grid (grid-tied system) ?
- or do they want to store energy in a BSS (battery storage system) for back-up and peak-shaving of energy consumption (hybrid system)
- do they have a diesel genset for back.up - if yes size / age

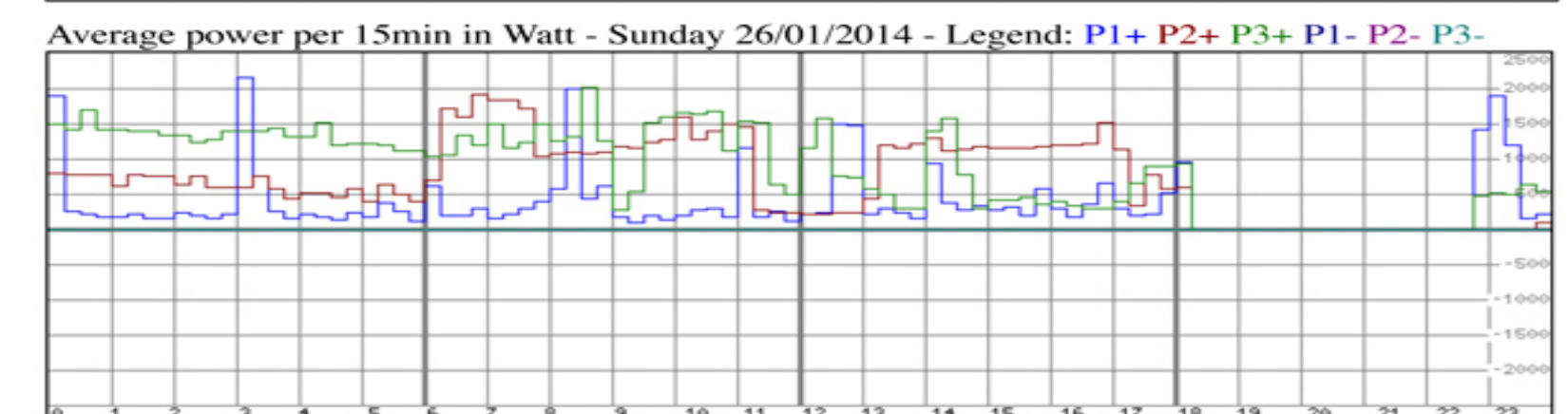
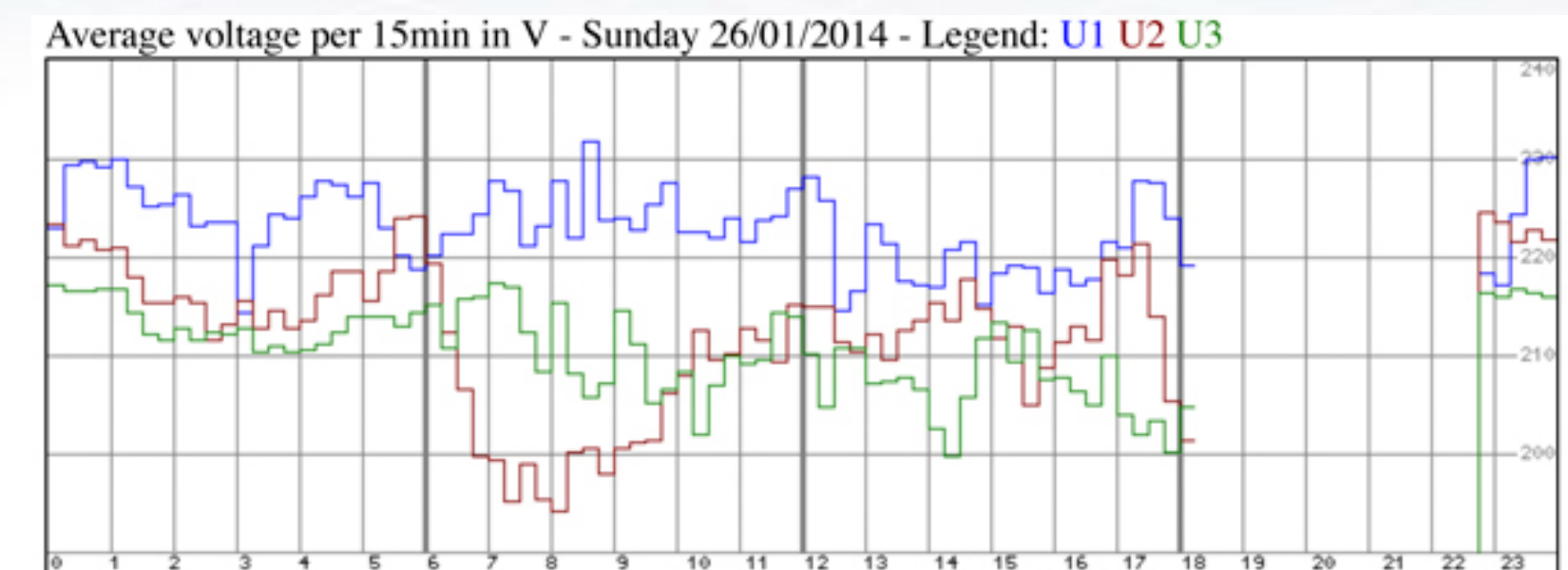
Mounting structures - ground-or roof-mounted

- need place for modules orientation N if possible without shade of trees
- otherwise ground mounting - e.g. carport
- if roofs, we need size and condition - lifespan of more than 10 years, otherwise we need renovation first !

Location

- send location
- send pics of site

The graphs on the **right** show a typical energy profile:
- power failure from 18:00 to 22:30
- voltage oscillations of the grid between 180V to 235V



Establishing accurate Load Profiles

Every renewable energy project starts with a in-depth analyses of energy needs and possible energy sources available to create a solid energy solution!

Measuring existing loads to establish a load profile

We collect data of all existing loads for project development and check the quality of your grid connection; we offer a recording of network events according to norm EN 50160.





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SUNSYNK Hybrid Inverters - mono- and three-phase hybrid inverters from 5kW to 500kW



The Sunsynk mono and three-phase Hybrid Inverters are highly efficient power management tools for mono and three-phase applications. These inverters allow the user to control power production from multiple sources such as solar, battery banks, electrical grids and allow a full integration of generators.

We offer mono-phase Sunsynk hybrid inverters from 5kW to a maximum output power of 16kW with a battery charge current of 300A and 3 MPPT solar chargers to connect up to 6 PV strings.

Our amazing 12kW three-phase inverters have a unique feature; they can operate and balance the load, which means you can have 20% connected to one phase, 20% to another, and 60% to the third phase, and it still gives perfect phase rotation. No other inverter in their class can offer this feature. Maximum charging/discharging current of up to 250A - with up to 16 units which can work in parallel, offering fully scalable hybrid solutions.

And our 50kW SUNSYNK hybrid inverters are made for high-voltage battery banks - offering hybrid solutions from 50kW to 500kW - possible to implement as fully redundant systems, each having its own PV array and battery bank.

SwissSolar Lda external AC & DC Combiner Boxes are providing all necessary elements to for a secure integration and safe operation:

- AC Combiner Box with by-pass switch, 32A fuses AC in / AC out, SPDs (surge protection device) on all connections including electrical distribution according client request
- DC Combiner Box offers main and string breakers incl. SPDs to protect SUNSYNK hybrid inverters from incoming surges



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SUNSYNK Hybrid Inverters - mono- and three-phase hybrid inverters from 5kW to 500kW

Basic System Architecture of our SUNSYNK hybrid systems

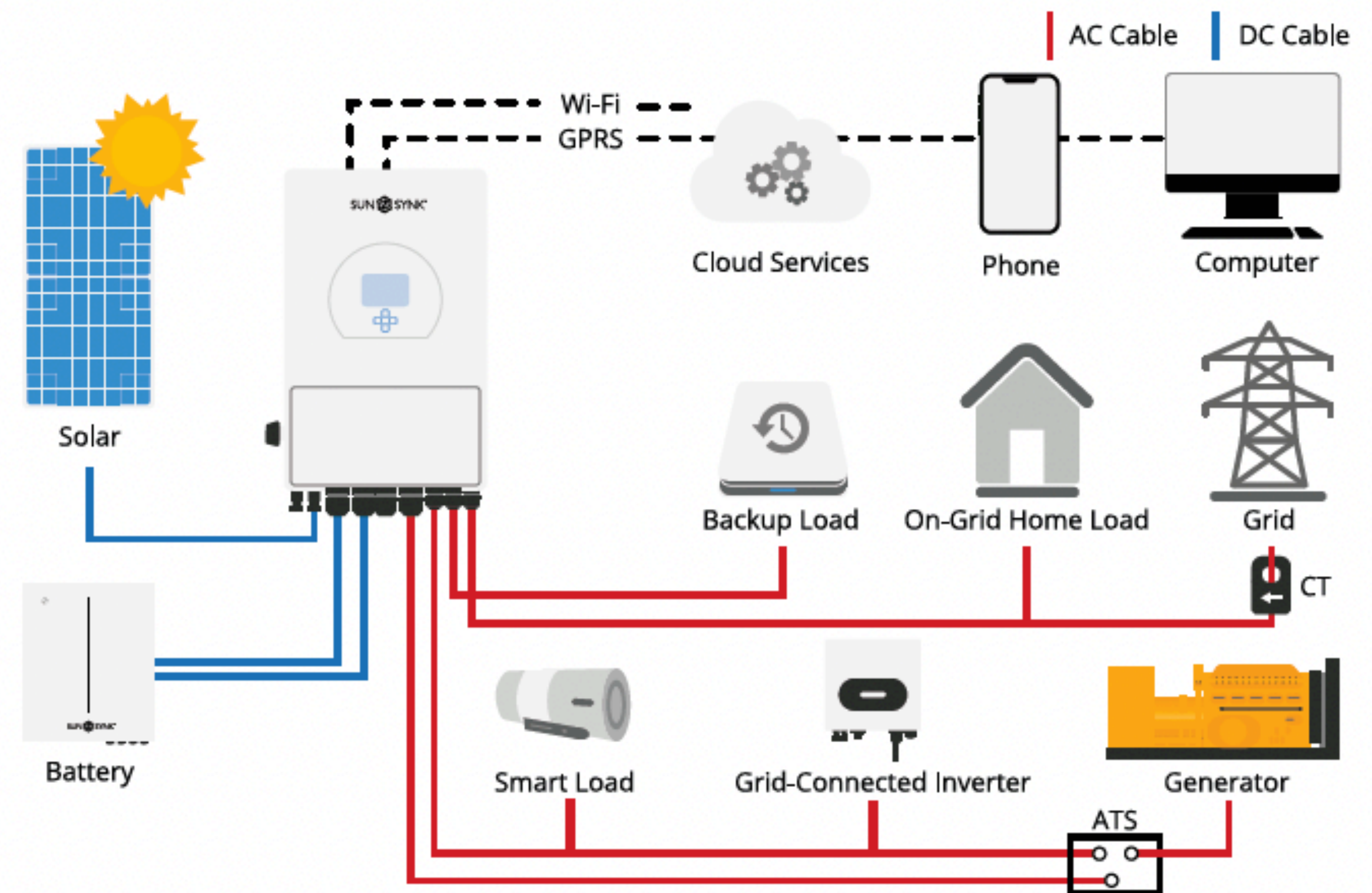
The following diagram explains the basic application and architecture of the hybrid inverter - allowing to connect to multiple power sources.

It also includes the following devices to have a complete running system:

- Generator or Utility
- PV modules
- Batteries
- Normal and smart loads
- Monitoring system

We can power grid-parallel connected loads (with no back-up) with solar power as well as loads with full back-up (limited to the hybrid inverter capacity).

This inverter can power all kinds of appliances in the home, businesses or one environment, including motor-type appliances such as refrigerators and air conditioners.





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SUNSYNK 12kW three-phase hybrid inverter powering a private home



Client	Private Residence in Sommerschild Maputo
Solar array	Two solar arrays of 9kWp and 3kWp , consisting of JASolar 500Wp modules
Inverter system	SUNSYNK 12kW three-phase hybrid inverter including Wifi monitoring - underneath main AC distribution including by-pass switch and over-voltage/spike protection
Battery bank	Freedom Won eTower – LiFePo4 battery bank 5x5kWh = 25kWh
Electrification	Entire house including back-up power on all three phases





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SUNSYNK 16kW mono-phase hybrid inverter powering Dunes de Dovela



Client	Lodge & restaurant Dunes de Dovela
Solar array	Solar array of total 18 kWp, consisting of three solar arrays of 3x12 modules JASolar 505Wp modules
Inverter system	SUNSYNK 16kW mono-phase hybrid inverter including Wifi monitoring - underneath main AC distribution including by-pass switch for stand-by generator and over-voltage/spike protection
Battery bank	Freedom Won eTower – LiFePo4 battery bank 2 x 15kWh
Electrification	Powering the entire lodge & restaurant including construction work on site





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LiFePo4 storage systems from FreedomWon

Efficient & environmental-friendly: The typical energy efficiency (energy that can be taken out of the battery compared to energy required to re-charge) for lead acid batteries is ~ 70%. For a LiFePo4 battery it is ~ 92% and can be fully charged more quickly and using less energy. And the batteries are environmental-friendly due to their non-toxic composition.

Size & Weight: **LiFePo4 batteries save up to 70% in space and weight compared to lead-acid.**

Service Life: The expected life in off-grid systems is more than 10 years, and as much as 20 years in grid tied back up installations with occasional cycling. 15 years (5'000 cycles) expected life at 70% DoD, 20 years (7'000 cycles) at 50% DoD.



eTower 3 modules @ 5kWh = 15kWh

Warranty: 10 years or 4'000 cycles warranty for average 80% DoD to max. 90% DoD.

Service Life: 16 years (5'500 cycles) expected life at 80% DoD, 20 years (7'500 cycles) at 50% DoD

Freedom Won LiTE Home & Business

Freedom Won LiTE Home & Business range of 52V lithium iron phosphate batteries manufactured by Freedom Won coming with capacities of Home10kWh, Home15kWh, Home 20kWh, Home 30kWh, Business 40kWh, Business 60kWh & Business 80kWh



Freedom Won Home10kWh

eTower modular LiFePO4 energy storage

Freedom Won eTower modular stackable battery @ 5kWh per module. Designed for smaller residential and light commercial applications with options of 1,2,3, 4, 5 or 6 modules in a tower per system.



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EasySolar - all-in-one 5kVA *plug&power* hybrid solution

EasySolar solutions combine a MPPT solar charge controller, an inverter/charger and AC distribution in one enclosure. All our **EasySolar solutions** are pre-wired and possibly pre-assembled in a system rack; each system is tested and delivered ready to **plug & power**.

PowerAssist

Unique PowerAssist technology protects the utility or generator supply from being overloaded by adding extra inverter power when needed.

Color Control panel inclusive two outstanding functions:

- Prioritises battery charging by the MPPT charge controller
- Connects to the internet, enabling remote monitoring (VRM website) and remote control

AC distribution inclusive

The AC distribution consists of a RCD (30 mA / 63 A) and four AC outputs protected by two 10 A and two 16 A circuits breakers.

A second 16 A output is controlled by the AC input and is programmable - **making it also a perfect product for urban areas with frequent power failures.**



Above: Easy Solar 5kVA / 10kWh Freedom Won / 3.6kWp PV connection

Right: Easy Solar 3kVA / 10kWh Freedom Won with GSM router and rack





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EasySolar - the *plug&power* hybrid solution powering rural schools



Client	Rural schools in Ronda and Mazoão (Namacurra Zambezia), client UNHabitat, financed by Energias de Portugal
Solar array	Solar generator consisting of 6 modules JA Solar Mono PERC 315Wp, total PV installed 1,890Wp, connected to solar charge controller MPPT 150/70
Inverter system	Racked version of EasySolar 3kVA inverter/charger including MPPT solar charge controller and AC distribution, CCGX with GSM router for online monitoring & internet hotspot
Battery bank	Freedom Won Lite 10/7 – LiFePo4 battery bank 10kWh; guaranteed daily power use of 8kWh @ 4000 cycles
Electrification	6 class rooms & administration, total 38 dust-proof lamps fitted with 20W LED tubes





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EasySolar - the *plug&power* hybrid solution powering resettlement houses



Client	Total Energies LNG resettlement project Quitunda
Solar array	Solar generator consisting of 4 modules JA Solar Mono PERC 450Wp , total PV installed 1,800Wp , connected to solar charge controller MPPT 250/100
Inverter system	EasySolar II 5kVA inverter/charger including MPPT solar charge controller and AC distribution, GX with GSM router for online monitoring & internet hotspot
Battery bank	Freedom Won Lite 10/7 – LiFePo4 battery bank 10kWh ; guaranteed daily power use of 8kWh @ 4000 cycles
Electrification	Prototype installation of two houses of the chief of Quitunda / Afungi resettlement





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NEW EasySolar II - 3kVA & 5kVA hybrid solutions for private homes, commercial & productive energy applications

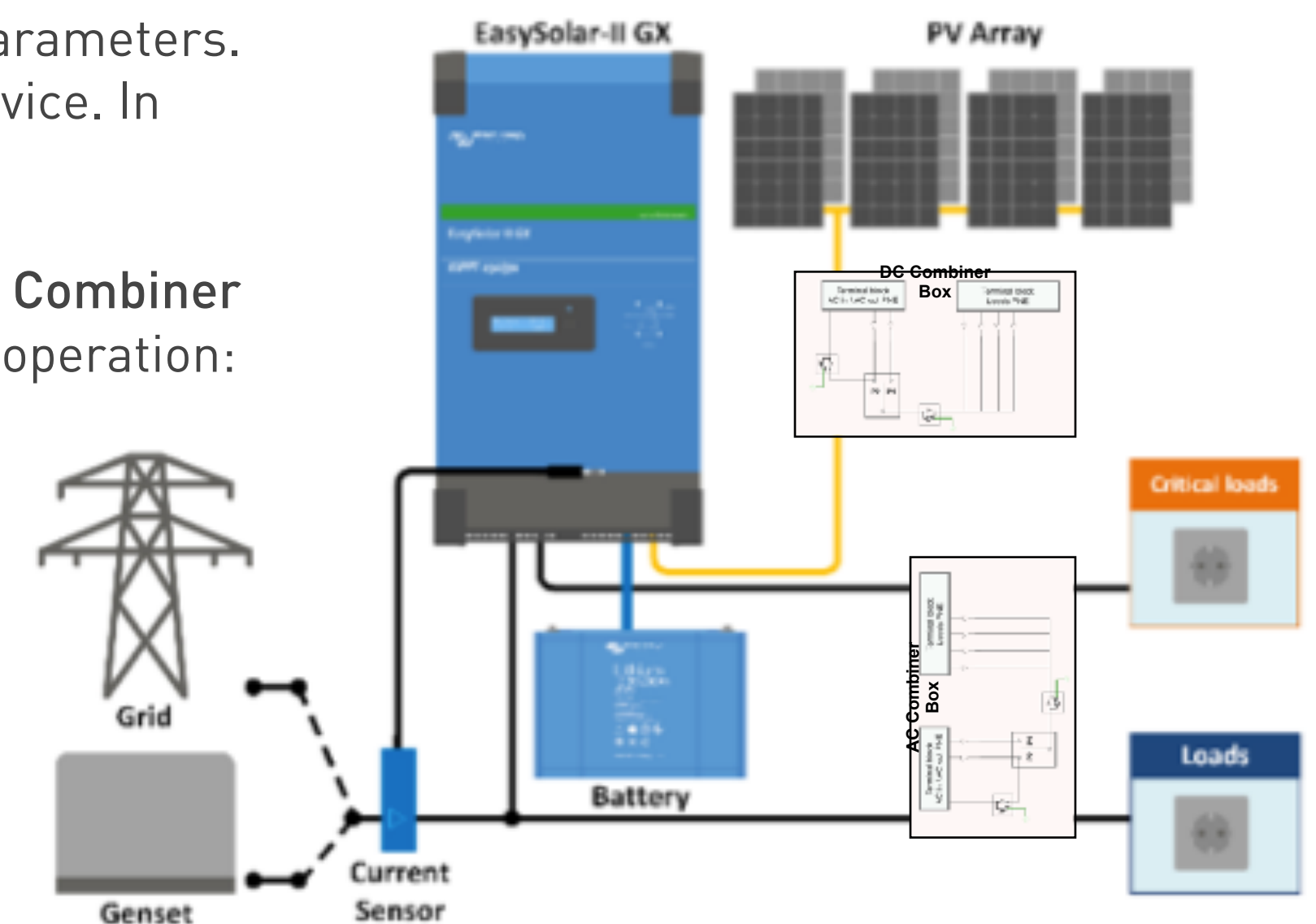


Our NEW all-in-one hybrid power solution is based on the new Victron EasySolar-II GX, combining a Multiplus II inverter/charger, SmartSolar MPPT solar charge controller with a GX device - all in one enclosure.

The integrated GX device displays the battery, inverter and solar charge controller parameters. The same parameters can be accessed with a smartphone or other Wi-Fi enabled device. In addition, Wi-Fi can be used to set up the system and to change settings.

SwissSolar Lda developed a product up-grade for this device. Our external AC & DC Combiner Boxes are providing all necessary elements to provide a secure integration and safe operation:

- AC Combiner Box with by-pass switch, 32A fuses AC in / AC out, 2 x SPD (surge protection device) with electrical distribution 2x16A & 2x10A or according client request
An additional 16A output can be programmed to manage second priority loads to optimise solar use
- DC Combiner Box offers main and string breakers incl. SPD to protect the EasySolar II from incoming surges
- Component warranty: 5 years



Therefore, our product is really easy to install, requiring a minimum of wiring and comes tested and ready to **plug&power** connected to the latest battery technology available on the market.



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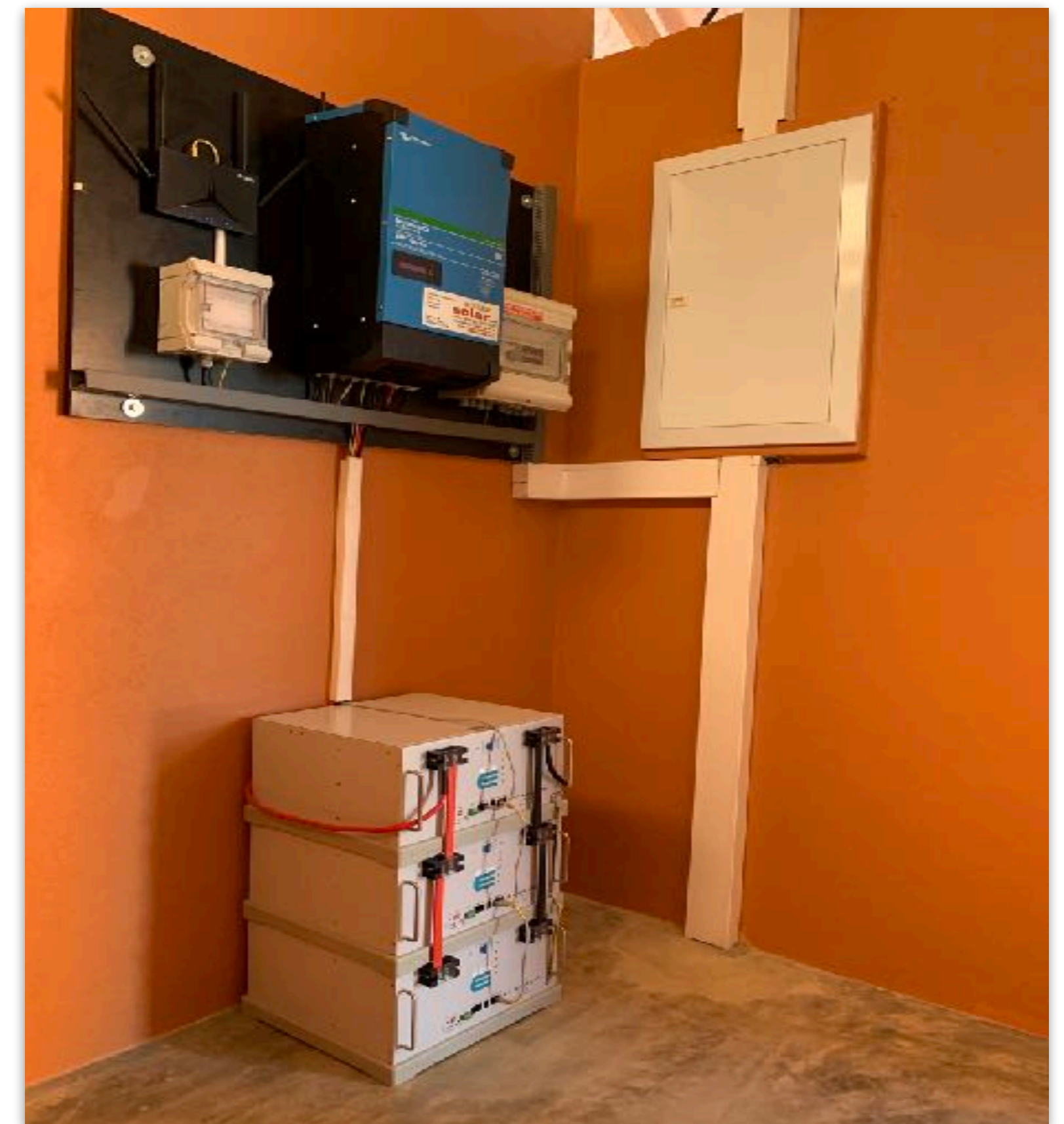
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EasySolar II - the *plug&power* hybrid solution powering a rural school



Client	Client EPC Senga financed by Total Energies LNG
Solar array	Solar generator of 7.2 kWp , consisting 16 modules Canadian Mono PERC 450Wp , connected to Victron EasySolar II MPPT 250V/100A
Inverter system	Victron EasySolar II 5kVA inverter/charger with GX monitoring with Wifi connection, including over-voltage/spike protection
Battery bank	Freedom Won eTower – LiFePo4 battery bank 3x5kWh
Electrification	Entire school with six classrooms and a public water point is running off-the-grid





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EasySolar II - the *plug&power* hybrid solution powering off-grid camps

Client	Client LUWIRE conservation area financed by various donors
Solar array	4 systems with solar generators between 6 and 10 modules LONGI Mono PERC 435Wp , connected to Victron EasySolar II MPPT 250V/70A
Inverter system	4 Victron EasySolar II 3kVA inverter/charger systems with GX monitoring with Wifi connection, including over-voltage/spike protection
Battery bank	Freedom Won eTower – LiFePo4 battery bank 2x5kWh
Electrification	Off-the-grid safari and ranger camps





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AC/DC-coupled hybrid container solutions for reliable off-grid & mini-grid power solutions

To offer **smart solutions** for **power supply** and to **rapidly implement projects** in **remote locations**, while offering **highest quality standards** to our clients, all our **Multi & Quattro Power solutions** come pre-wired and/or pre-assembled; tested and delivered to **plug & power**.

These systems are available either in **single** or **3-phase versions** from **3kVA** to **45kVA**; **container solutions** as from **30kVA** to **300kVA**.

SwissSolar offers a broad range of high-quality components for **hybrid systems** from leading suppliers in the field of **solar, wind, hydropower** as well as **diesel** and **gas generators**.

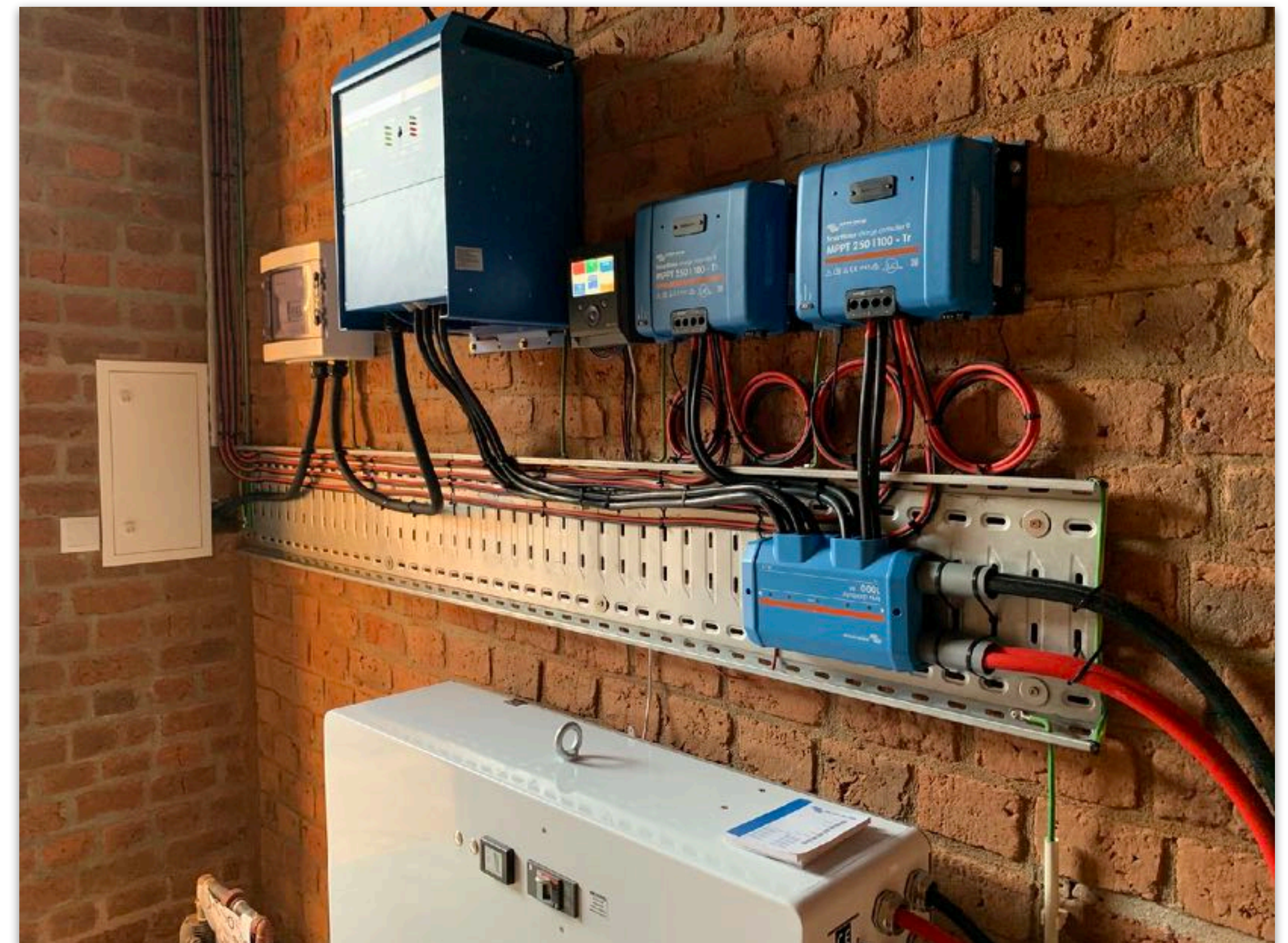
Swiss engineering and the **use of high-grade components guarantee a superior quality standard** (Victron 5 or 10 years).

Right:

Off-grid hybrid solution with PV and battery bank; including grid connection for back-up (normally the building is operated in off-grid mode)

Configuration of this **Victron Quattro** kit:

- **10kVA Victron Quattro** inverter/charger
- **CCGX** monitoring with Wifi connection
- Two solar charge controllers **Victron SmartSolar 250V/100A** with 6.3kWp solar each; total **PV installed 12.6kWp** → 55kWh production/day
- **Lynx 48DCV bus bar** with DC fuses
- **Freedom Won LiFePo4** battery bank **30kWh/24kWh**





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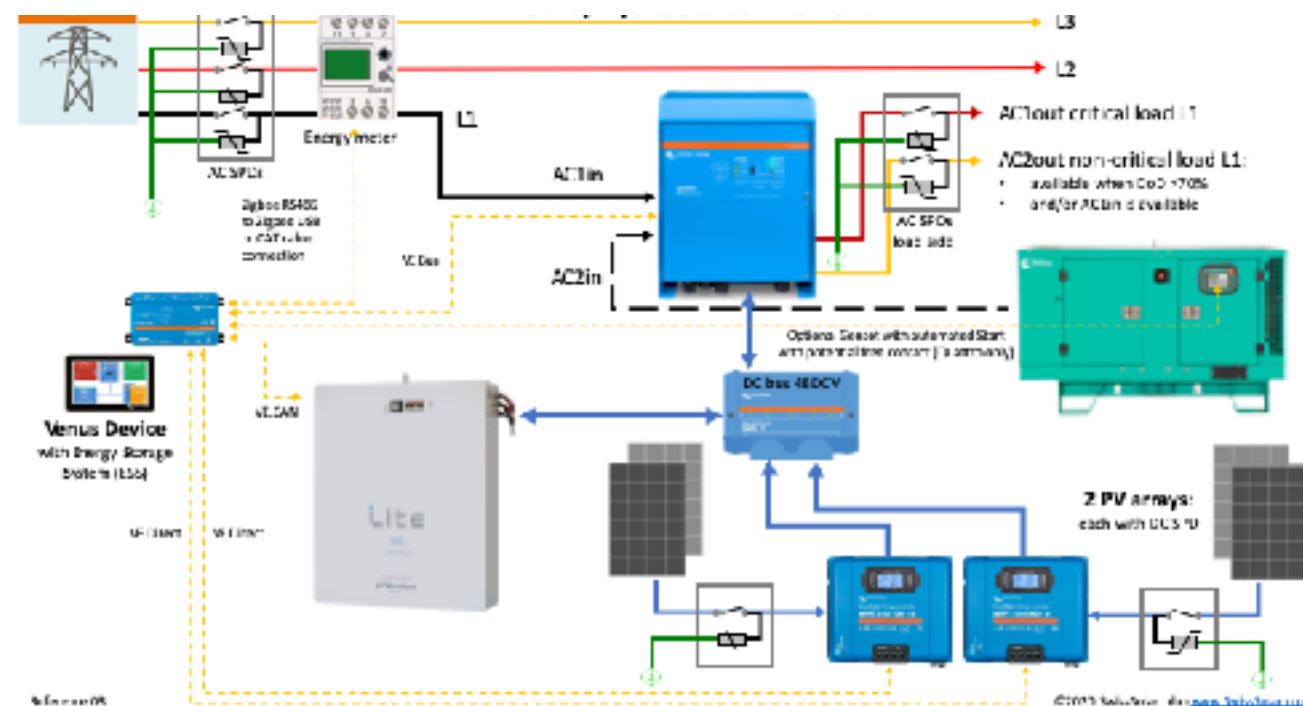
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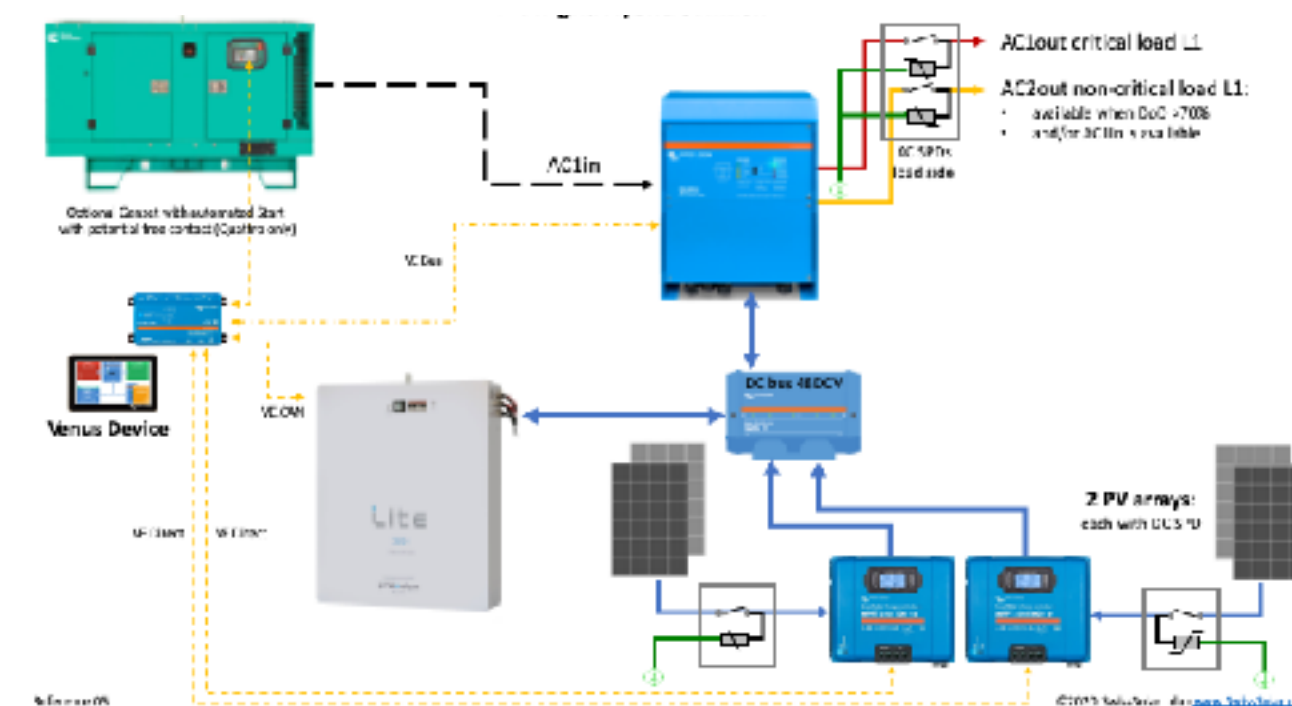
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AC/DC-coupled hybrid container solutions for reliable off-grid & mini-grid power solutions



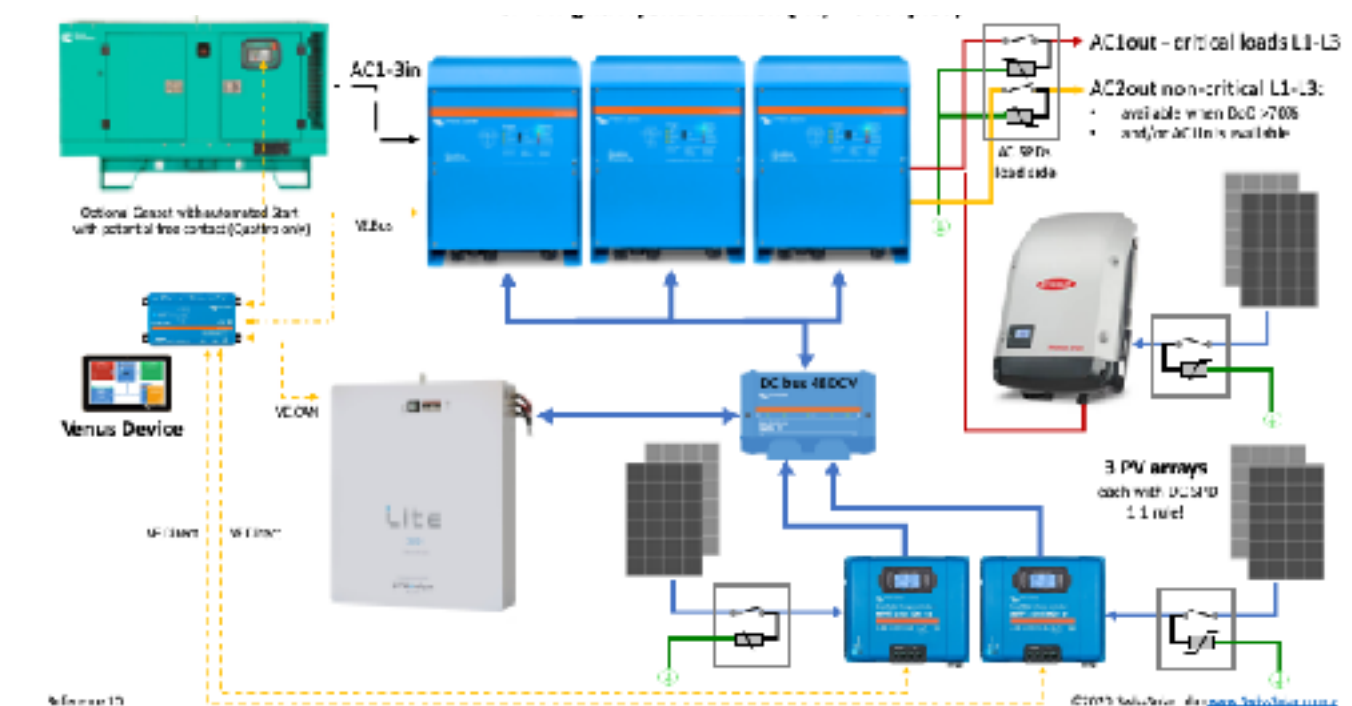
Typical **one phase back-up hybrid configuration** including generator for back-up, in a three phase grid set-up; used in situations where no reliable grid is present.

ESS (Energy Storage System) is used to manage all power needs with priority of solar power use for self-consumption while assuring back-up power from battery for critical loads at all times.



Typical **1P off-grid hybrid configuration** without grid connection including generator integration; used in situations where no grid is available or client want to get grid-independent.

All our DC-coupled systems come with two AC out connections; one for 1st priority loads for critical loads and 2nd priority loads to use any surplus energy to increase system efficiency.



Typical **3P off-grid hybrid configuration** without grid connection including generator integration; used in situations where no grid is available or client want to get grid-independent.

We either use pure **DC-coupled system designs** or **AC/DC coupled systems** combining **Victron** and **Fronius** inverters for systems with a high energy use during the day.



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MultiPower - one phase off-grid solution powering rural village



Client	Client Manhure community village financed by edp - Energias de Portugal
Solar array	Solar generator of 7.2 kWp , consisting 16 modules Canadian Mono PERC 450Wp , connected to Victron MPPT 250V/100A
Inverter system	Victron MultiPlus II 5kVA inverter/charger with GX monitoring with Wifi connection, including over-voltage/spike protection
Battery bank	Freedom Won - LiFePo4 battery bank 15kWh
Electrification	Mill, social centre and public school are running off-the-grid





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MultiPower - one phase off-grid solution powering Safari Park



Client	Private conservation
Solar array	Solar generator 7,2kWp, consisting of 16 modules Mono 450Wp , MPPT solar charger 250/100
Inverter system	8kVA Victron MP II inverter/charger with Cerbo monitoring with ethernet connection, over-voltage/spike protection DC & AC including AC distribution
Batter bank	Freedom Won Lite 30/24 - LiFePo4 battery bank 30kWh ; guaranteed daily power use of 24kWh @ 4000 cycles, connected to a Victron Lynx DC bus
Electrification	Private Conservation Area





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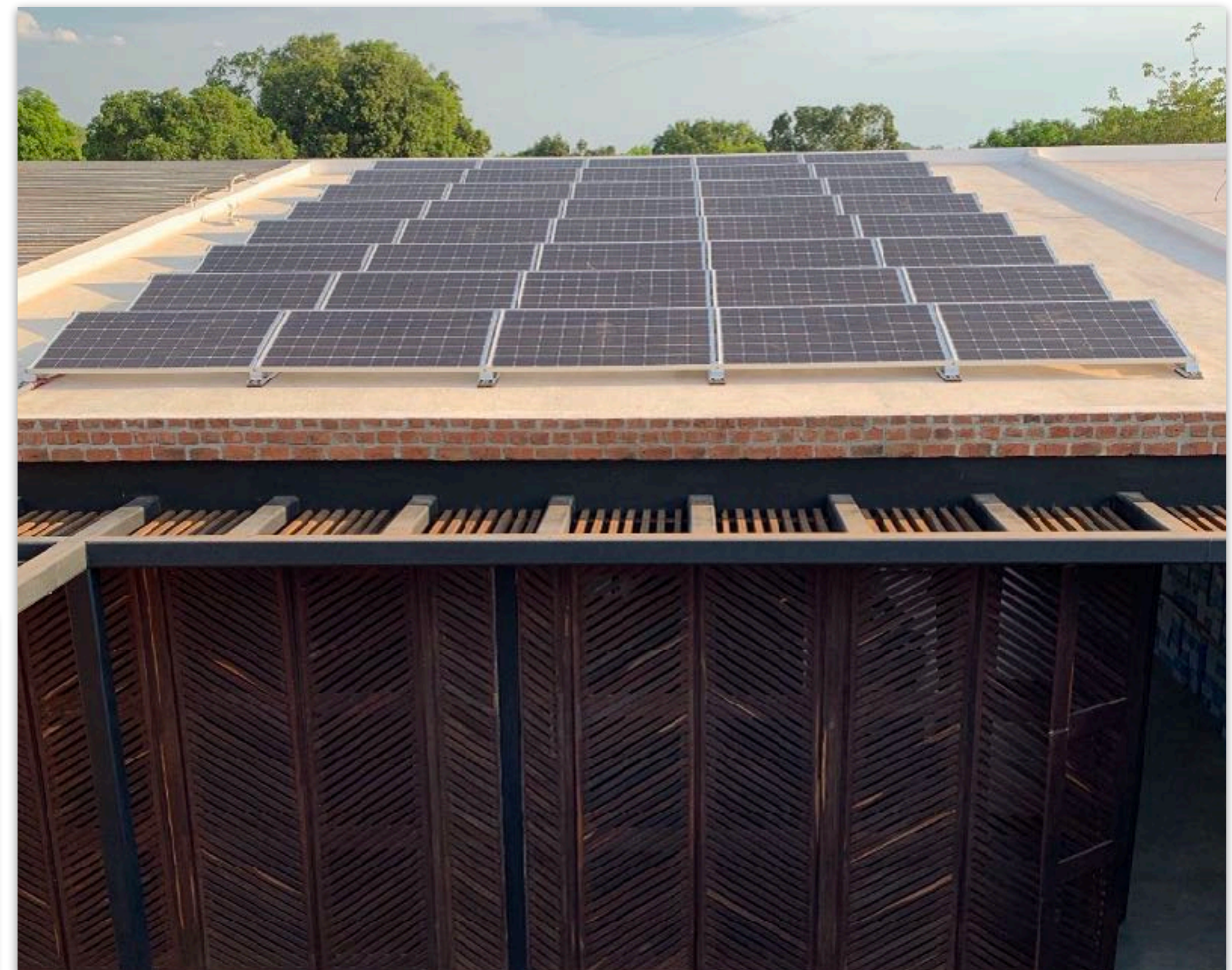
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QuattroPower - off-grid solution (with grid-back-up) powering GirlMove



Client	Client GirlMove (Campus Nampula), financed by Energias de Portugal
Solar array	Solar generator of 12.6 kWp , consisting of 2 arrays of 6.3 kWp with 20 modules JA Solar Mono PERC 315Wp , connected to 2 charge controllers Victron SmartSolar 250V/100A on ballasted mounting structure
Inverter system	10kVA Victron Quattro inverter/charger with CCGX monitoring with Wifi connection, including by-pass switch and over-voltage/spike protection
Battery bank	Freedom Won Lite 30/24 – LiFePo4 battery bank 30kWh ; guaranteed daily power use of 24kWh @ 4000 cycles, connected to a Victron Lynx DC bus
Electrification	Entire academy is running off-the-grid due to high oscillations in the grid; EDM connection is disconnected and only serves as a back-up





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Three-phase QuattroPower off-grid solution powering the mini-grid of the HQ

Client	Mini-grid Sede Administrativa da RESERVA NACIONAL DO GILÉ ; client ANAC , financed by IGF Paris
Solar array	Solar generator of 12.6 kWp , consisting of 3 arrays of 4.2 kWp with 15 modules LX280M each, connected to 3 solar charge controllers VE BlueSolar MPPT 150/85 (255A)
Inverter system	Three-phase cabinet system with 3 x 8 kVA inverters/chargers Quattro 48/8000/110-100 ; 3 phase system of total 24kVA (230V/400V) , over-voltage protection, CCGX with GSM router for online monitoring
Battery bank	Up-grade of battery bank FreedomWon 3 x 20kWh ; daily usable storage 42kWh (2022)
Electrification	Three-phase Mini-Grid with underground cable (1,100 m; 5/3x16mm ²) and rehabilitation of existing grid (200m) interconnecting 25 buildings on site





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Thank you !

Andreas F. Ziegler Mendonça
Founder & Managing Partner

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My NETFLIX documentary recommendation:



Download my article [The Power of the Sun](#)