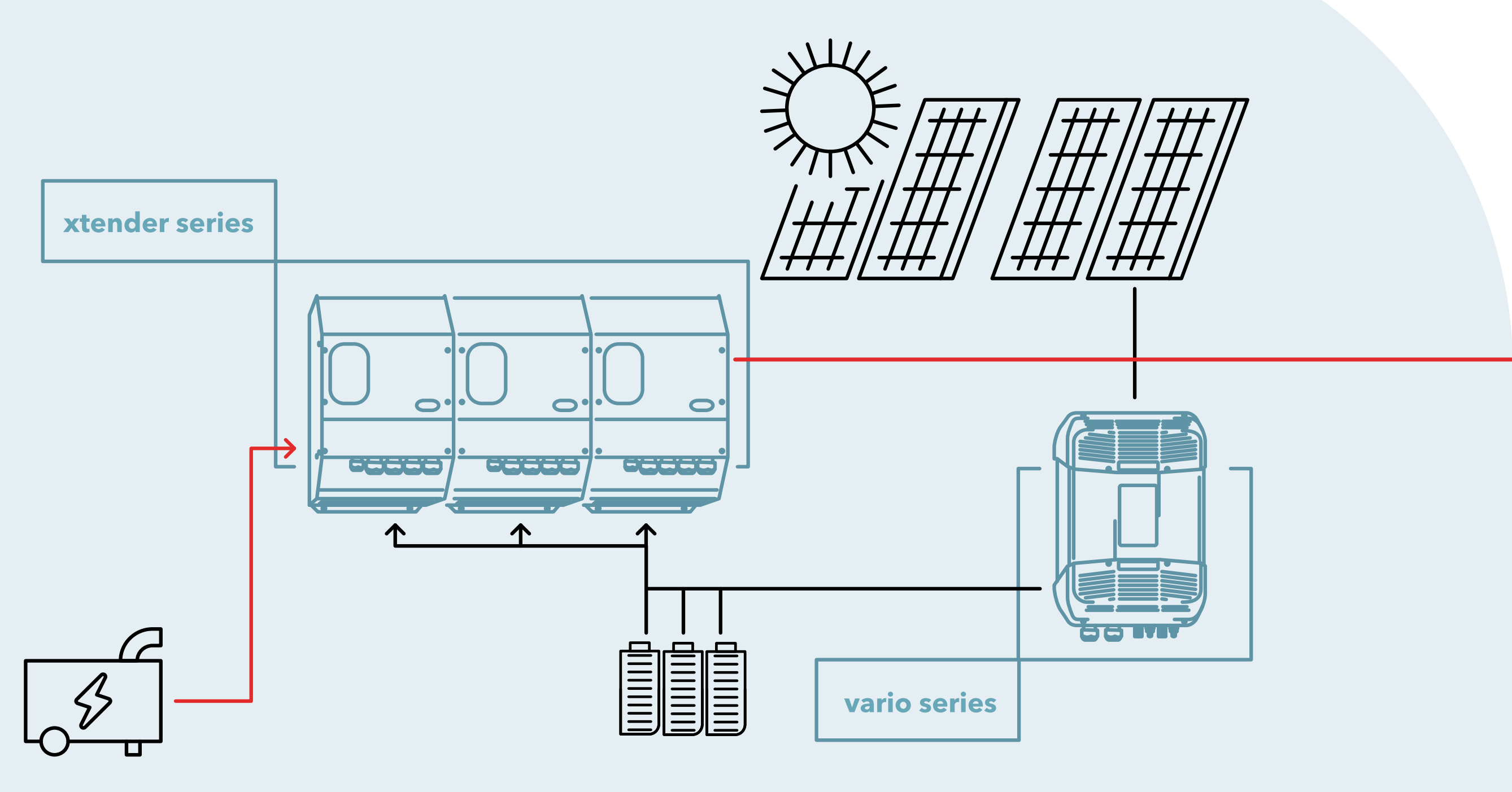


Minigrid solutions

Central system



Diesel generator / Mains

AC sources like diesel generators can recharge the batteries during weak renewable production time or peak power consumption in the Minigrid to secure the system. Automatic handling of the Start and Stop by the central **xtender**.

The system may be connected to a future public grid by this point.

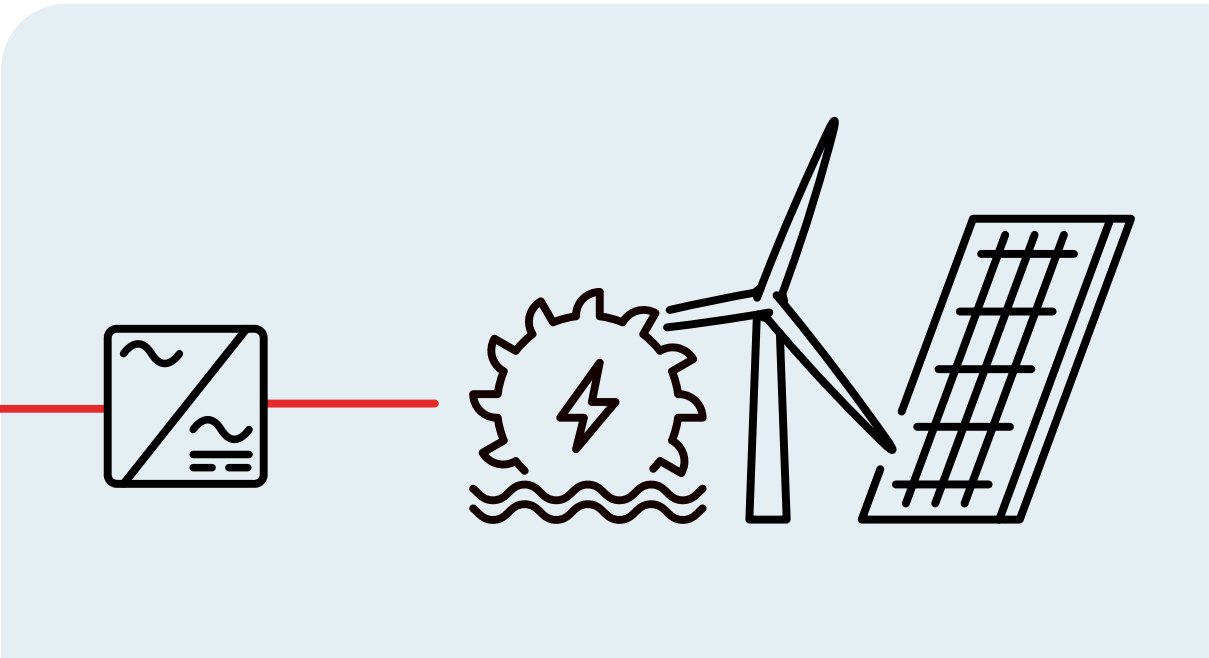
Battery

The advanced battery management system of the **xtender** and **vario series** allows to use most types of battery technologies like: AGM, Gel, Flooded Lead-acid, NiCad, NiFe, Redox Flow or Lithium.

Monitoring

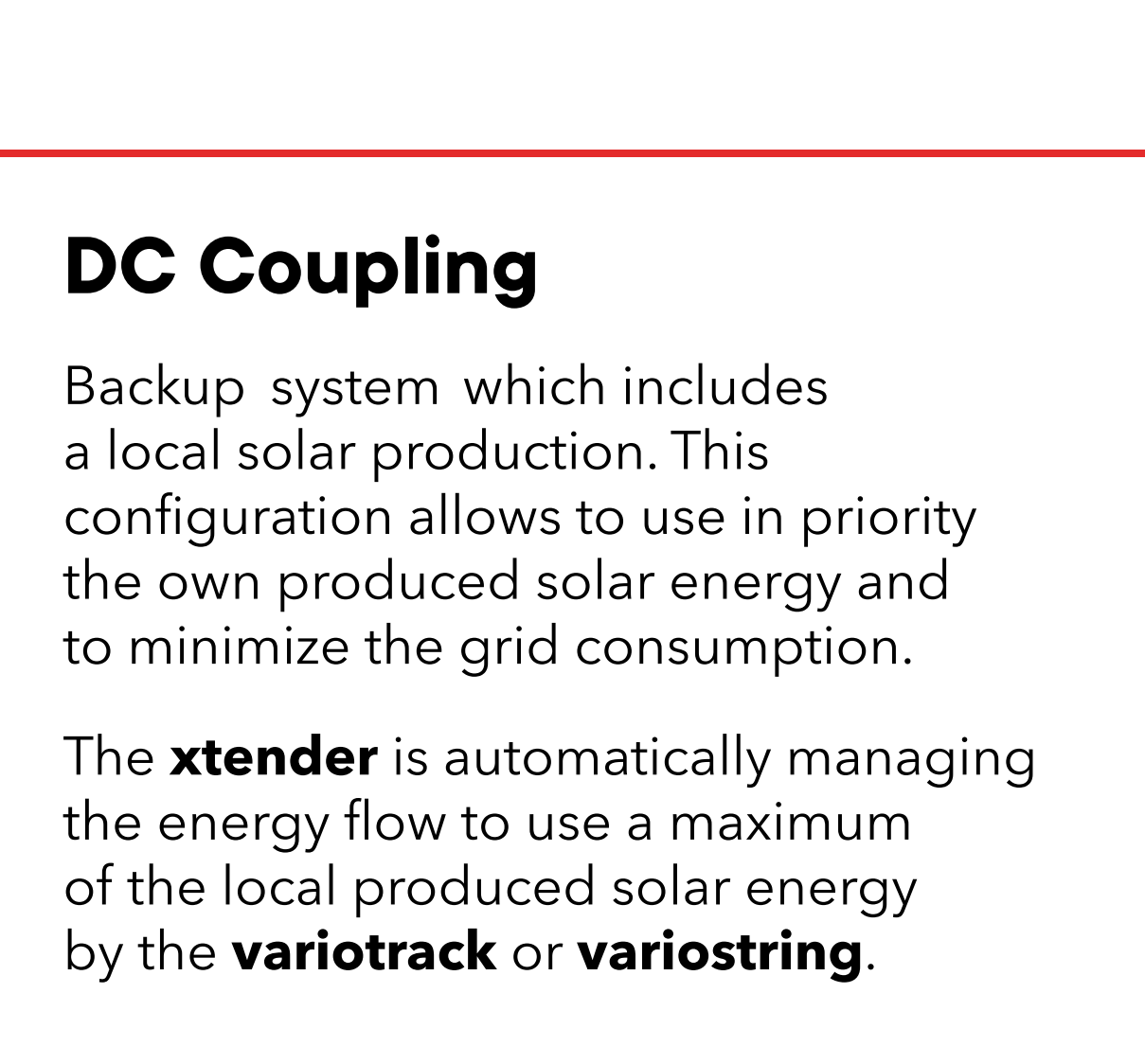
Different types of monitoring are possible:

- **rcc 02/03** remote control unit for local on-site monitoring including datalogging and programming.
- **xcom LAN/GSM** for monitoring and datalogging with internet access.
- **xcom 232i/CAN** for a communication with an external monitoring device.



Grid feeding

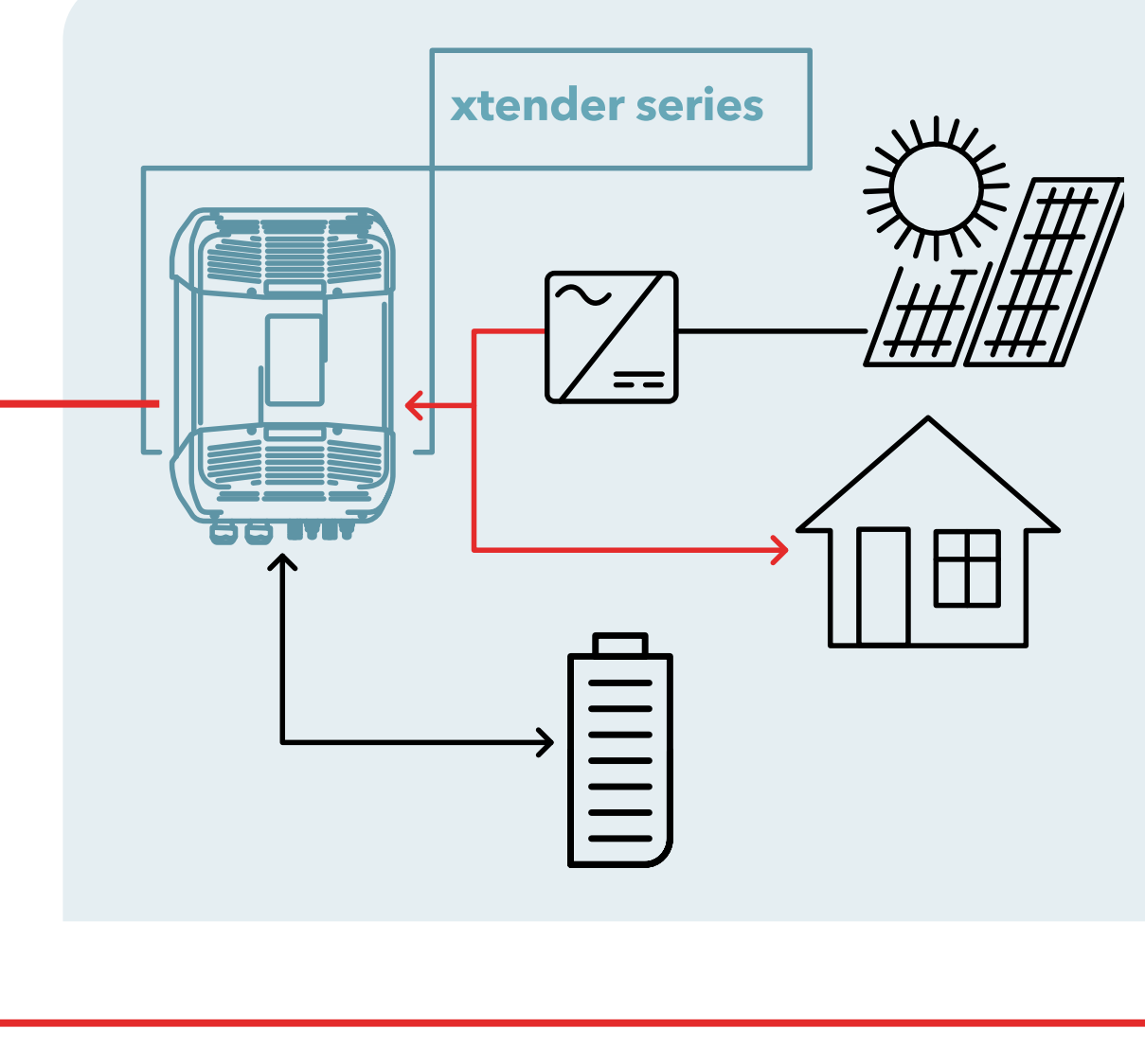
Renewable energy feeding back to the minigrid. Most of grid-tied inverter brands are compatible for this application.



DC Coupling

Backup system which includes a local solar production. This configuration allows to use in priority the own produced solar energy and to minimize the grid consumption.

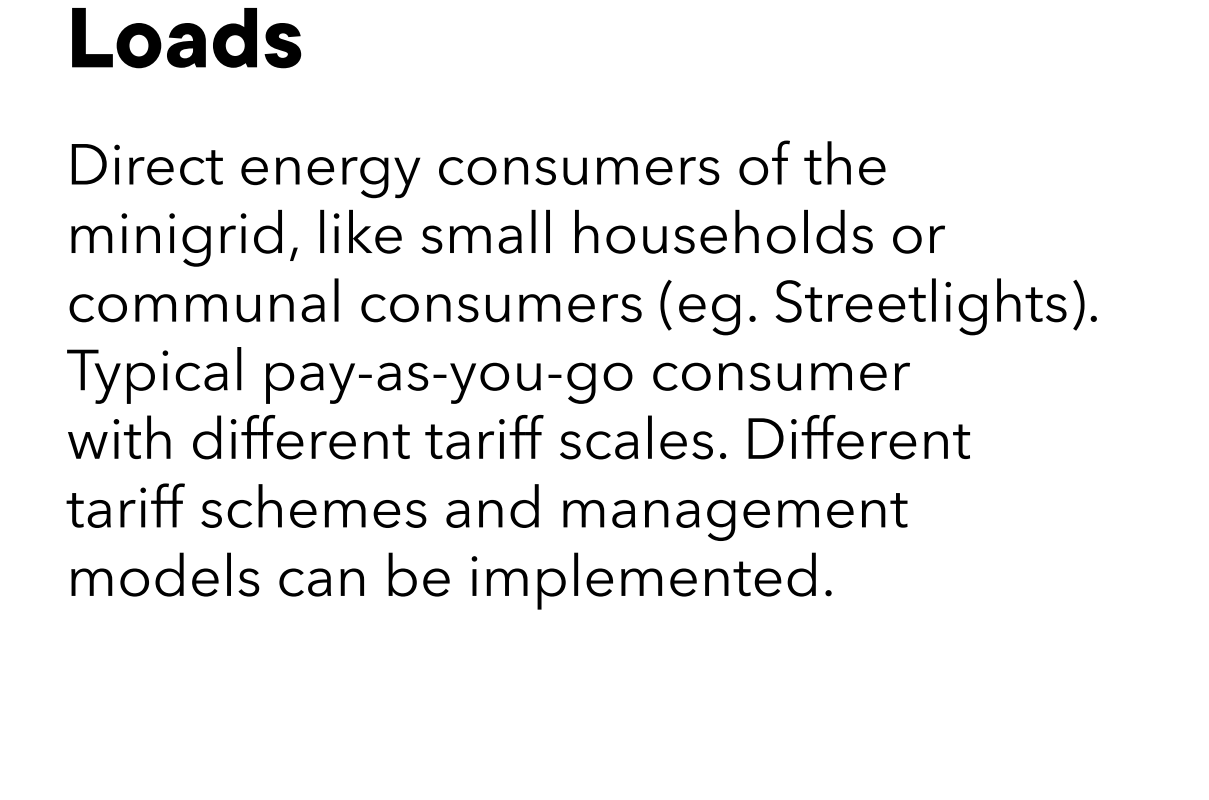
The **xtender** is automatically managing the energy flow to use a maximum of the local produced solar energy by the **variotrack** or **variostring**.



AC Coupling

Local production of solar energy by a grid-tied inverter. This configuration includes a backup function and the solar overproduction is fed back to the minigrid.

The **xtender** is able to control the grid-tied inverter by frequency shifting and thereby manage the battery charge.



Loads

Direct energy consumers of the minigrid, like small households or communal consumers (eg. Streetlights). Typical pay-as-you-go consumer with different tariff scales. Different tariff schemes and management models can be implemented.

Rural electrification with minigrids in Colombia (395kW)

The challenge

The Ancestral Community Council of the Plata Archipelago is located in an area protected by the National Natural Parks Unit of Colombia (PNNC), which does not allow the removal of soil, subsoil and forest areas, making it impossible to implement an energy generation system that would affect the natural landscape.

These communities are developing a forest protection program to avoid indiscriminate logging to protect their environment and increase the production of piangua and exotic fruits of the region under the concept of low carbon economy thanks to the implementation of these 4 minigrids.



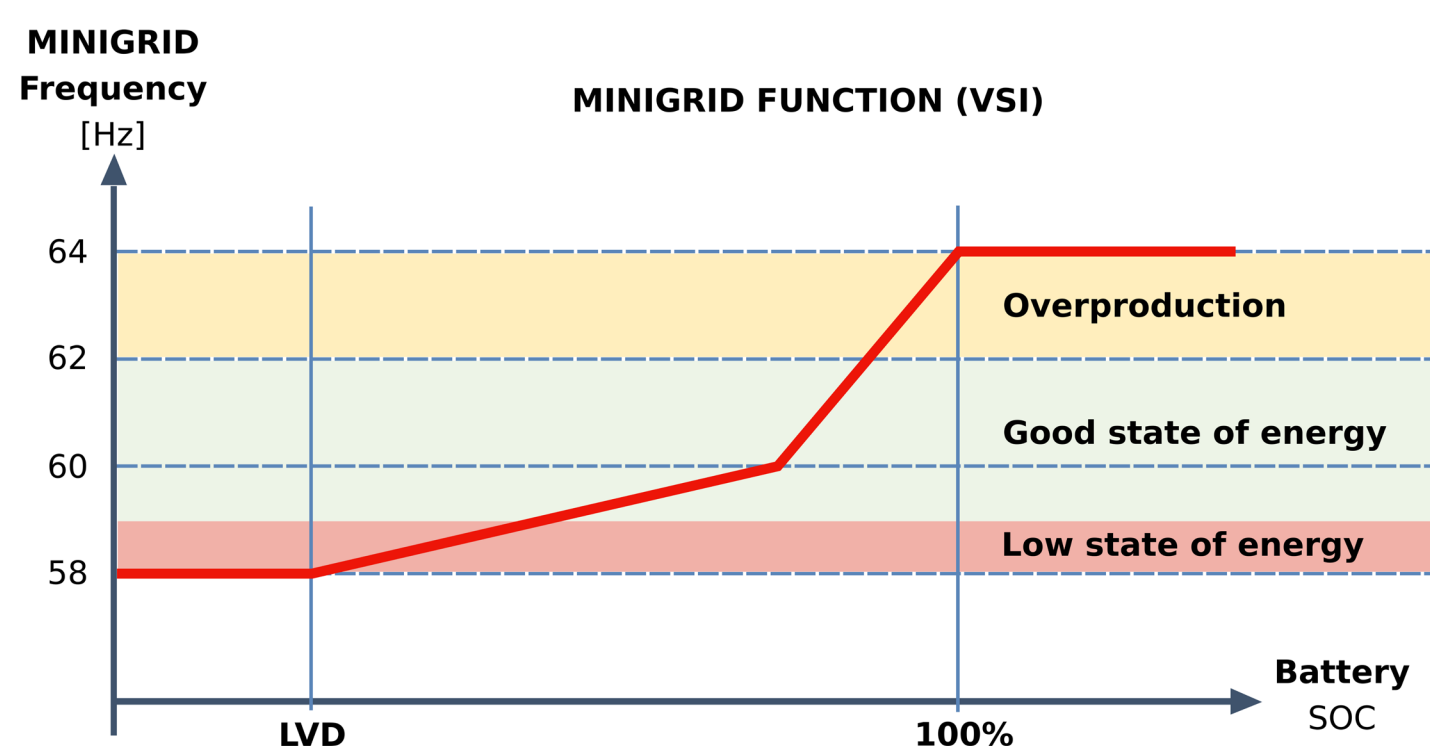
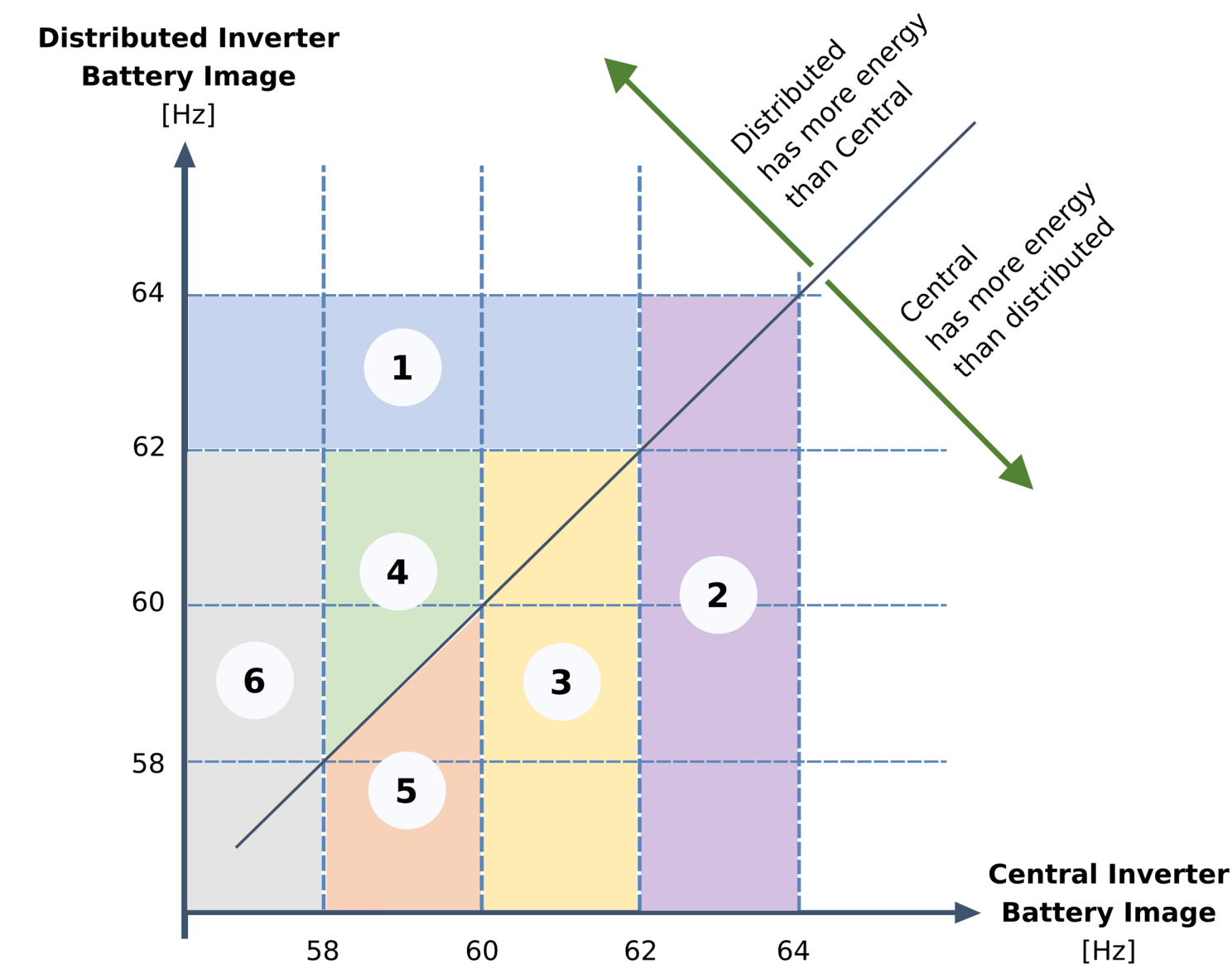
The solution

The four minigrids implemented with funds from the Colombian governmental entity FENOGC in the Ancestral Community Council of the La Plata Archipelago in Bahía Málaga (in the Colombian Pacific), required a different designs and configuration based on the demand surveys and project context. By choosing the Studer solution it was possible to use the same equipment in different configurations (three-phase or single-phase, batteries of different technology, size and configuration, different size of backup diesel generators) all monitored with the same tools and procedures.

The central system forms the grid in terms of voltage and frequency through a low-voltage distribution grid consisting of a three-phase trunk feeder along which consumers, prosumers and producers interact. The street lighting is independent of the power supply system consisting of autonomous solar street lights.

Project outcome

- The four minigrids serve as a demonstration project to representatives from other Latin American and Caribbean countries. This flexible design can be adapted to any configuration required with the following advantages:
- The modularity allows the minigrids to be scaled up or down. In particular, to promote the productive enterprises of Piangua, exotic fruits and other products indigenous to the region, allowing the improvement of income, as well as the financial independence of the women of Piangua.
 - Installation and operational cost are minimized using the same equipment with different configurations.



Studer products

- The four minigrids include:
- +290 **xtender** (different models)
 - 19x **vs 120** solar charger controllers
 - 239x **rcc 03** remote control centre
 - 201x **bsp 500** battery status processor
 - 37x **xcom CAN** communication bridge