

**INGECON**



**Solutions for Instantaneous  
Self-consumption**

***Ingeteam***

# SOLUTIONS FOR INSTANTANEOUS SELF-CONSUMPTION

LOWER ELECTRICITY CONSUMPTION WITH NO INJECTION OF EXCESS ELECTRICITY INTO THE POWER GRID.

Self-consumption allows consumers to be self-sufficient in terms of electricity, through the installation of a renewable-based energy system on their property (photovoltaic or wind power). Instantaneous self-consumption systems mean that all the energy generated is consumed by the actual system loads, with no electricity injected into the power grid. This “non injection” can be achieved in one of two ways:

1. By sizing the PV system so that it is less than the minimum expected consumption.
2. By using management systems to limit the power generated by the PV inverters.

For the first option, conventional inverters can be used. However, there are certain shortcomings: the system load profile must be known beforehand; there are limitations on the installed power; and the self-consumption ratio is lower.

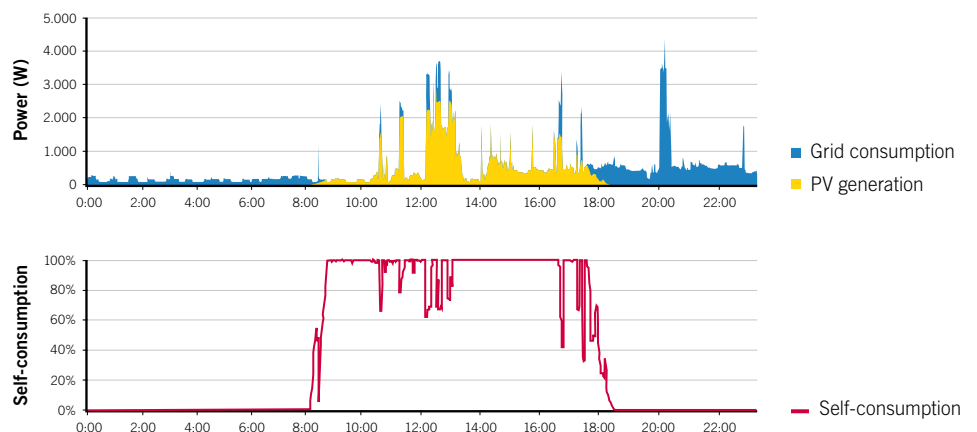
The second option makes it possible to achieve self-consumption levels of up to 100% whilst the non-injection of electricity into the power grid is guaranteed at all times.



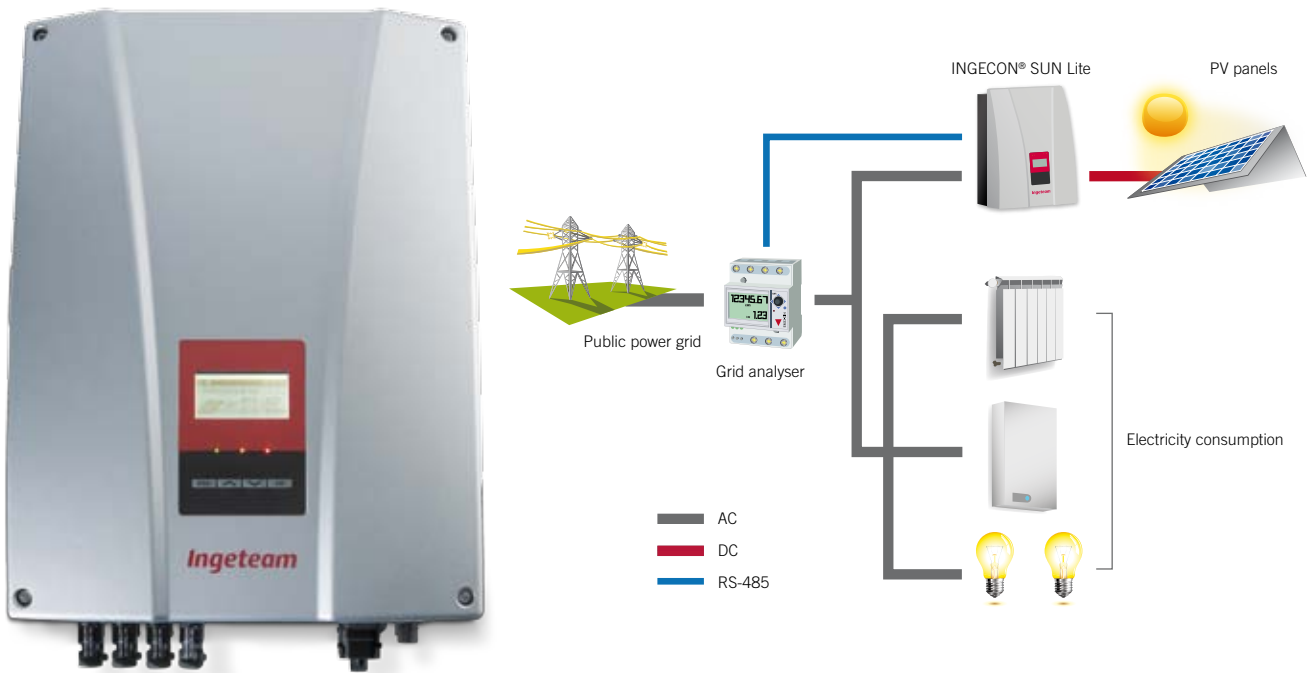


This new energy management solution is called the INGECON<sup>®</sup> EMS Manager. Thanks to this management system, self-consumption can reach 100% at midday.

The following two graphs show the consumption profile for a real home with a 3.3 kW PV system for instantaneous self-consumption.



## SINGLE PHASE SYSTEMS



The INGECON® EMS Manager is needed to monitor the installation.

## INGECON® SUN Lite Self-consumption Kit

Control integrated into the photovoltaic inverter

### What is it?

The Instantaneous Self-Consumption Kit for INGECON® SUN Lite single phase inverters is a simple, inexpensive, easy-to-install alternative, making it possible to ensure that no energy is injected into the power grid.

### Component parts

The kit comprises an INGECON® SUN Lite on-grid PV inverter, a simple grid analyser and the communications connection.

### How does it work?

The PV inverter can be configured to “self-consumption” mode, directly from the user display.

In this configuration, the inverter analyses the power flow at the system connection point, so that:

- The inverter only produces the energy required by the loads, thereby avoiding the need to inject any excess power into the electricity grid.
- To guarantee this “non injection”, a minimum current is maintained from the grid to the loads.
- In the event of insufficient PV production, the grid will provide the energy required to meet demand.

### Other operating modes

The INGECON® SUN Lite can also be configured for other self-consumption modes.

### Standard inverter warranty

5 years, extendible up to 25 years.



**INGECON EMS Manager**



Control through the INGECON® EMS Manager

Another alternative for managing the energy produced by the single-phase system is to use the INGECON® EMS Manager. In this case, the INGECON® EMS Manager should be added to the INGECON® EMS Lite Self-Consumption Kit.

**When do I need it?**

The INGECON® EMS Manager is required in any of the following circumstances: for monitoring the system; whenever an energy storage unit is coupled to the system; for load management; for three-phase systems; and whenever there is a combination of various

energy-generating sources (PV and micro-wind power).

**How does it work?**

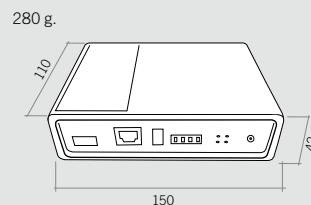
This device uses a wattmeter to analyse the power flow at the system connection point in order to determine the power setpoint for the PV inverter operation. As this setpoint is linear and is between 0 to 100% of the inverter rated power, the Manager is able to accurately adjust production to the setpoint received.

**Warranty**

The INGECON® EMS Manager is supplied with a standard three-year warranty.

EMS Manager	
<b>Power supply</b>	
Input voltage	100 - 240 Vac
Nominal frequency	50 / 60 Hz
Power consumption	5 - 8 W
<b>Connectivity</b>	
Ethernet	1
RS-485	1
USB	1
Potential free outputs	2 x (250 V, 6 A)
<b>Communication interface with other equipment</b>	
Ingeteam inverters	RS-485, Ethernet, Bluetooth
Monitoring systems	Ethernet, GPRS
INGECON® EMS Power Meter	RS-485
INGECON® EMS Load Control	Bluetooth

**Size and weight (mm)**



## THREE PHASE SYSTEMS

### Three phase systems based on a three-phase inverter

For three-phase systems of this type, the INGECON® EMS Manager sends the same power setpoint to the three phases, taking the lowest amperage as a reference in order to ensure that no power is delivered to the grid.

#### Communication

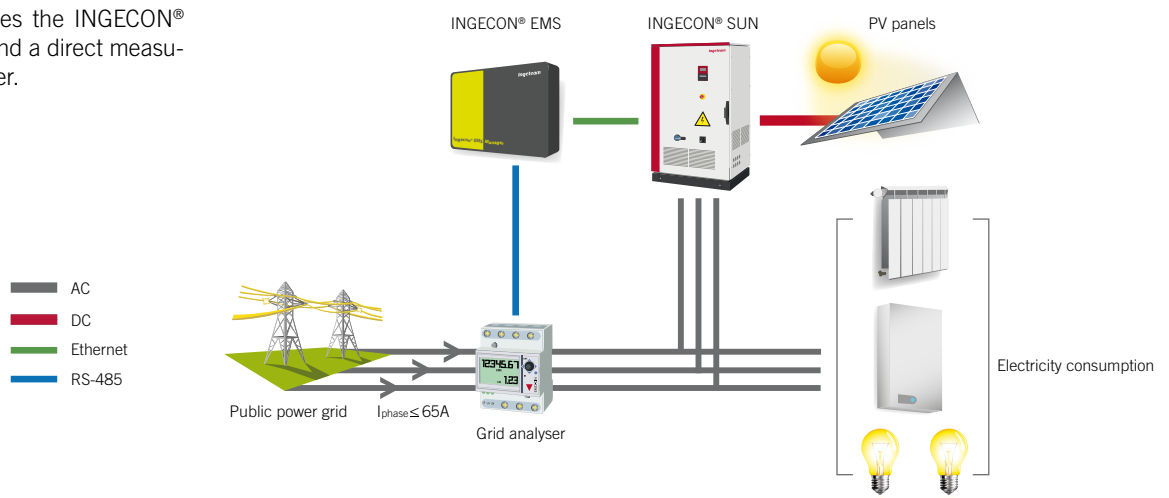
There is direct communication between the INGECON® EMS inverters and the INGECON® EMS Manager.

#### Component parts

Ingeteam proposes two different self-consumption kits, based on the total power of the system (not the power generated by the inverter):

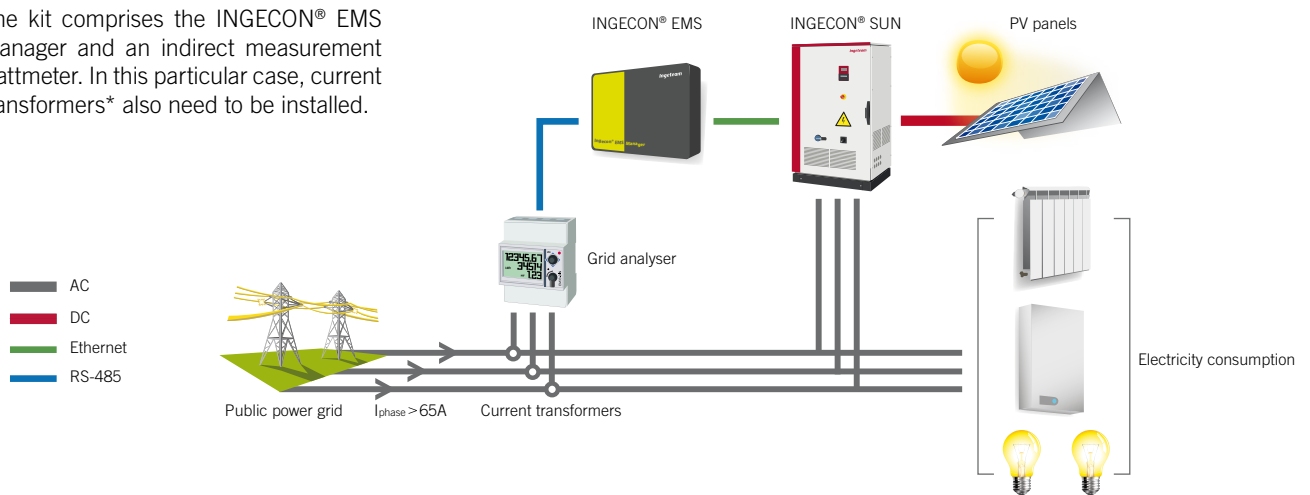
Three-phase Self-Consumption Kit for up to 15 kW per phase  
(maximum current of 65 A per phase)

- The kit comprises the INGECON® EMS Manager and a direct measurement wattmeter.



Three-phase Self-Consumption Kit for more than 15 kW per phase  
(maximum current of more than 65 A per phase)

- The kit comprises the INGECON® EMS Manager and an indirect measurement wattmeter. In this particular case, current transformers\* also need to be installed.



\*Ingeteam does not supply current transformers.

## Three phase systems based on three or more single-phase inverters

For three-phase systems of this type, the INGECON® EMS Manager is able to send separate power setpoints to each phase. This is particularly important in highly unbalanced systems.

### Communication

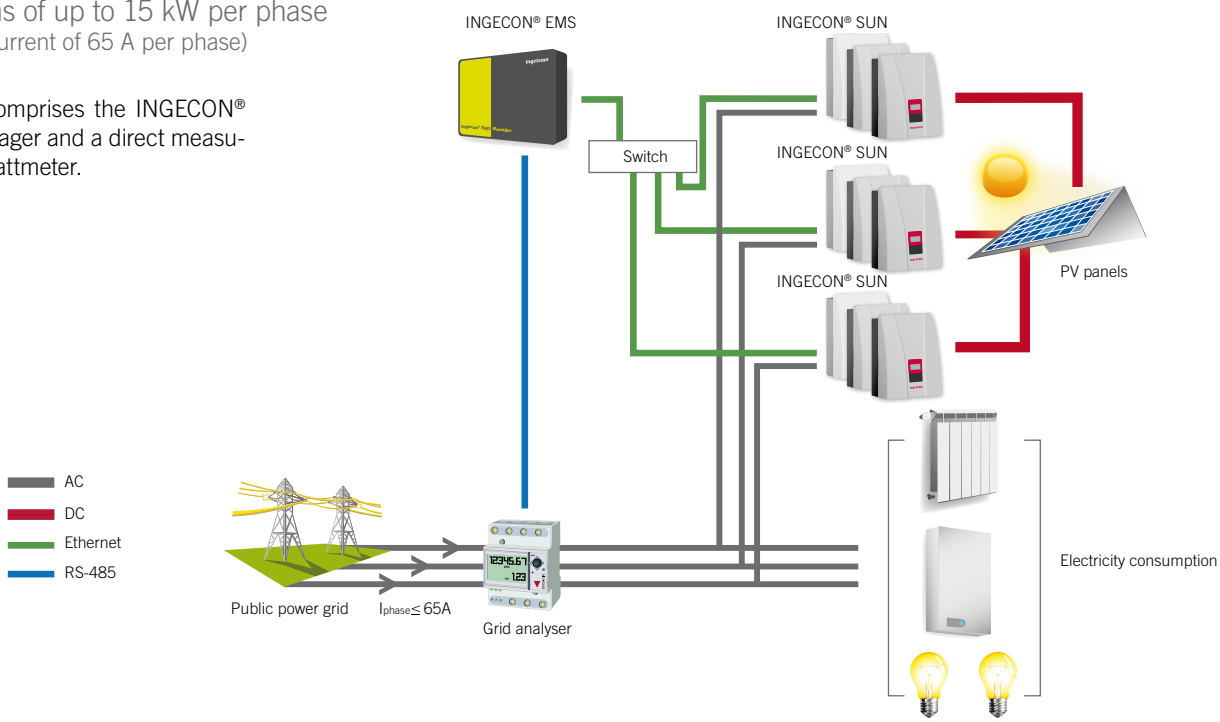
Communication between the INGECON® SUN inverters and the INGECON® EMS Manager is made over the Ethernet through a communications switch.

### Component parts

Ingeteam proposes two different self-consumption kits, based on the total power of the system (not the power generated by the inverter):

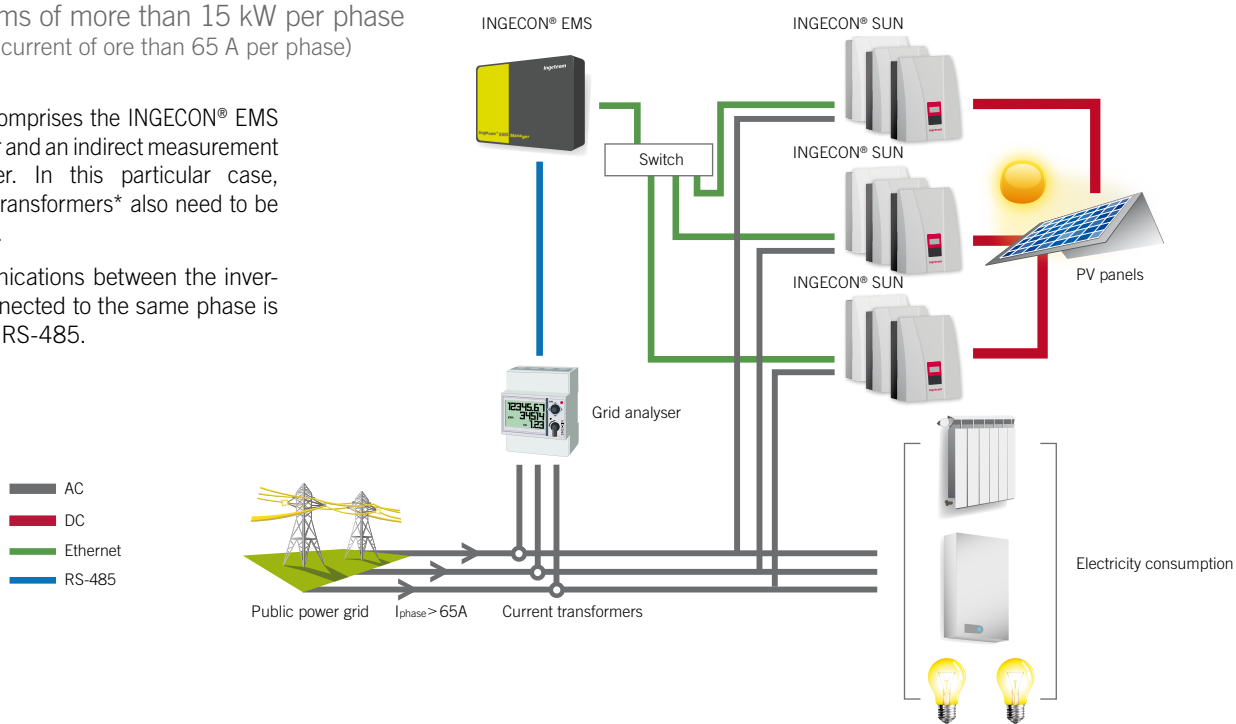
For systems of up to 15 kW per phase (maximum current of 65 A per phase)

- The kit comprises the INGECON® EMS Manager and a direct measurement wattmeter.



For systems of more than 15 kW per phase (maximum current of more than 65 A per phase)

- the kit comprises the INGECON® EMS Manager and an indirect measurement wattmeter. In this particular case, current transformers\* also need to be installed.
- Communications between the inverters connected to the same phase is through RS-485.



\*Ingeteam does not supply current transformers.

# Ingeteam Smart House

Complete self-consumption and energy management solutions for homes and businesses

## SYSTEM HIGHLIGHTS

- Savings in energy consumption.
- Optimisation of own production.
- Shorter pay-back times for the investment in the renewable system.
- Personalised consumption strategy adapted to the specific circumstances of each system.
- Easy to install.

## MINIMUM ITEMS REQUIRED FOR THE CONNECTION DIAGRAM

- INGECON® EMS Manager.
- INGECON® EMS Power Meter.
- Renewable generation (INGECON® SUN and/or INGECON® μWIND).

## ADDITIONAL ITEMS

- INGECON® EMS Home, if off-grid operation is required.
- INGECON® EMS Load Control, for load management.

- 1 PV panel
  - 2 Wind turbine
  - 3 Public power grid
  - 4 Monitoring software INGECON® SUN Manager
  - 5 Energy manager INGECON® EMS Manager
  - 6 Loads
  - 7 Radiator
  - 8 Boilers
  - 9 Battery inverter INGECON® EMS Home
  - 10 Wind converter INGECON® μWIND
  - 11 Protection system INGECON® μWIND Interface
  - 12 PV inverter INGECON® SUN 1Play
  - 13 Charging station INGEREV® GARAGE
  - 14 Two-way meter INGECON® EMS Power Meter
  - 15 Electric vehicle
  - 16 Batteries
- DC  
— AC



### Load control

For those systems in which generation is not in line with demand, the self-consumption ratio can be increased by including load control in order to allow for consumption at times of peak production. The INGECON® EMS Manager manages the connection and disconnection of controllable loads and the energy produced, based on the generation data obtained from the power converters and the total system consumption.

### Consumption management

The INGECON® EMS Load Control allows you to select the times for the connection and disconnection of the various loads coupled to the system, such as electric boilers, radiators, pumps, electric vehicles, etc., adjusting the total system consumption to the renewable energy production.

### Maximum energy control

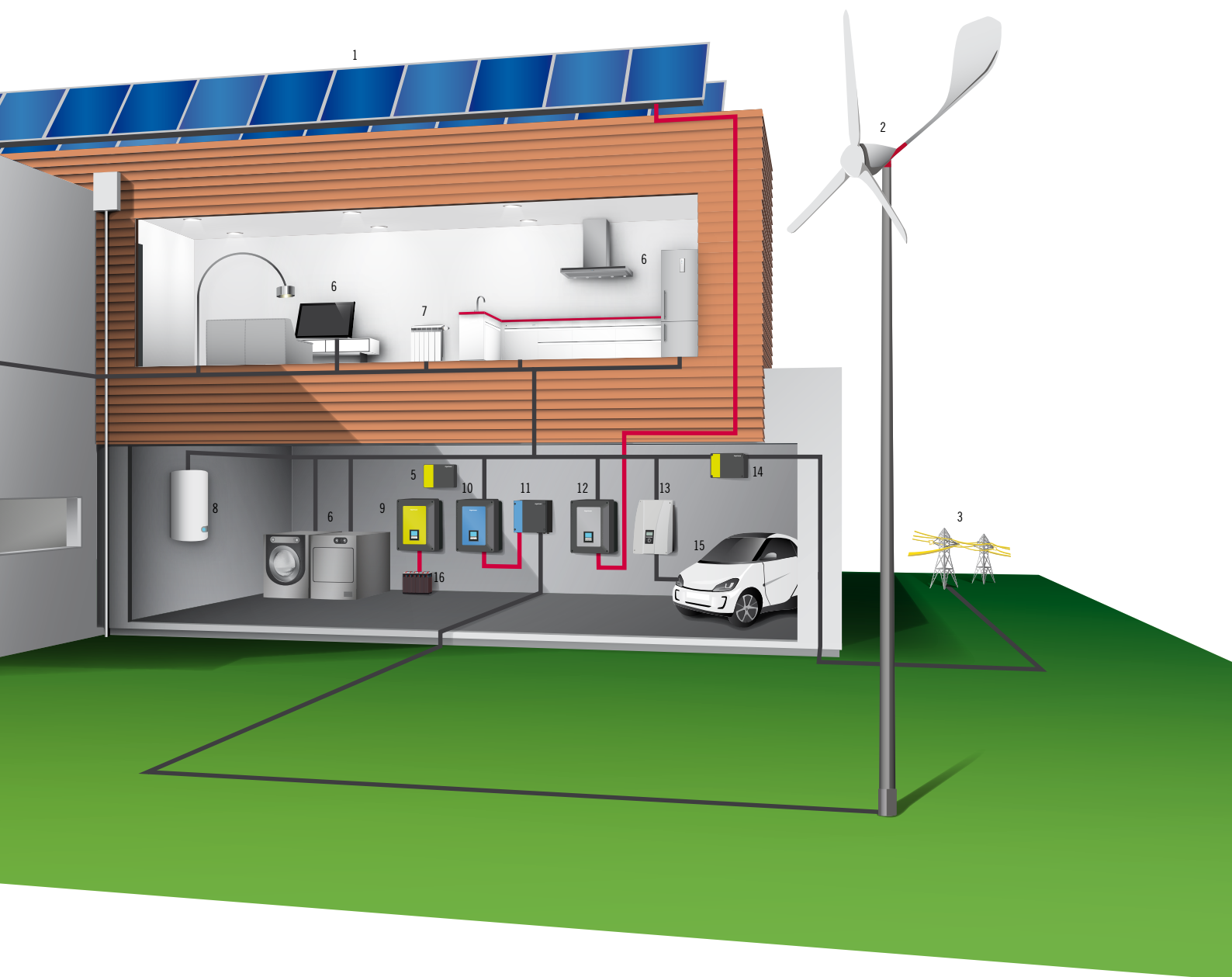
Thanks to the INGECON® EMS Power-Meter, the system continuously measures the two-way power flow between the public grid and the internal system. In addition, this advanced wattmeter

allows the system to be decoupled from the grid in order to operate as a stand-alone system. For this purpose, a battery storage unit needs to be coupled to the system.

### Energy storage unit

This system supports the inclusion of a battery storage unit, controlled through the INGECON® EMS Home two-way inverter, making it possible to operate in back-up mode, in the event of a power outage. Furthermore, this system offers a wider range of possibilities for a more efficient management of own energy production.





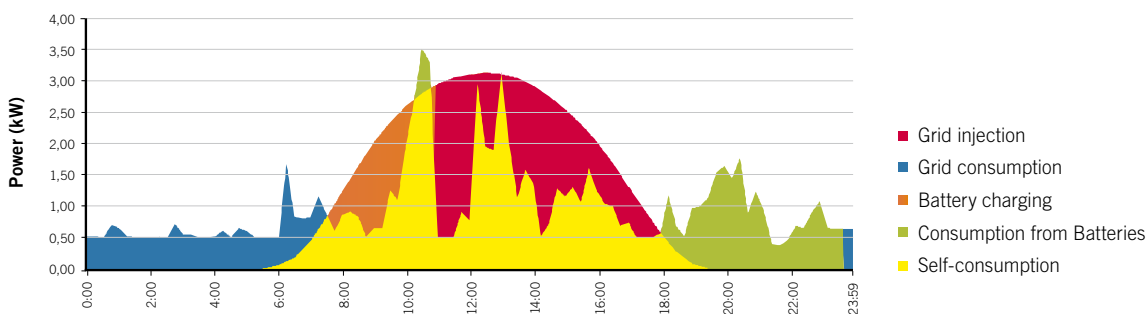
**Maximum self-consumption**

As can be seen in the graph, the implementation of a system of this type makes it possible to achieve high levels of self-consumption, as the energy

produced can be stored for use at peak consumption times. The INGECON® EMS Manager always seeks to minimize grid consumption, for lower electricity bills.

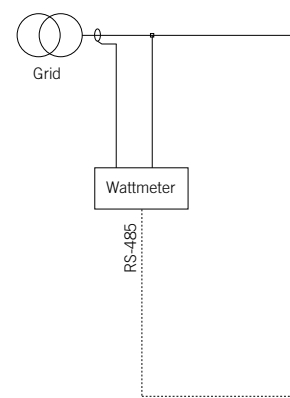
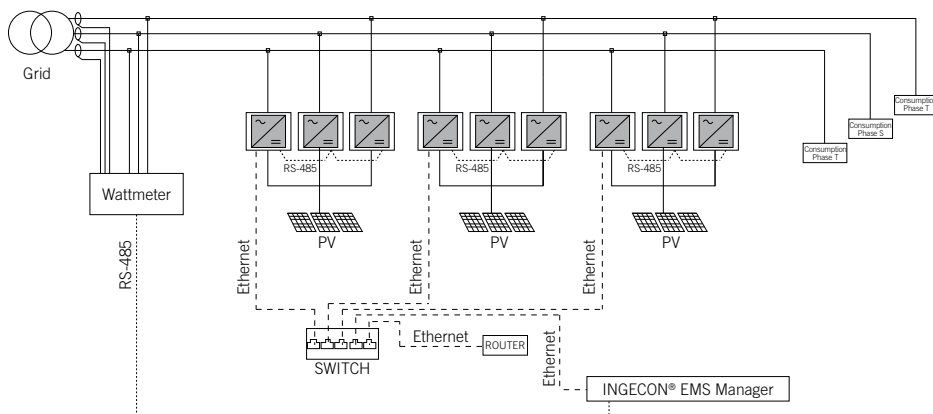
**Fast investment pay-back**

Furthermore, the plant payback period is much shorter, due to the fact that the excess energy produced during the middle of the day (when energy consumption is lower) can be delivered to the grid.

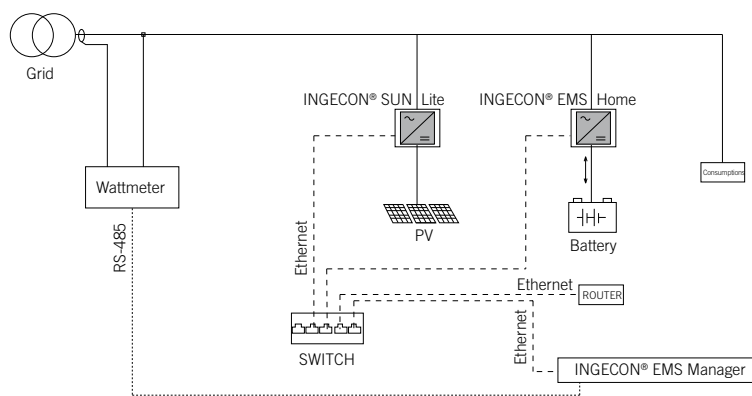
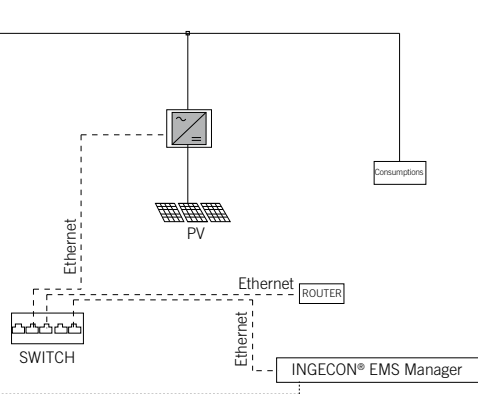


The INGECON® EMS Manager can be configured so that zero energy is delivered to the grid.

# REFERENCES



1. Industrial PV system.  
 Madrid  
 100 kW (12 INGECON® SUN 5TL, 6 INGECON® SUN 4.6TL, 2 INGECON® EMS Manager)



2. Home PV system.  
Zizur Mayor (Navarre - Spain)

3.3 kW (1 INGECON® SUN 3.3TL, 1 INGECON® EMS Manager)

3. PV system with energy storage. Ingeteam's R&D building in Sarriguren.  
Edificio de I+D de Ingeteam en Sarriguren (Navarre - Spain)

5 kW (1 INGECON® SUN 5 TL, 1 INGECON® EMS 5, 1 INGECON® EMS Manager)

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