



EPISODE 52

# The Benefits of PV + Energy Storage Systems

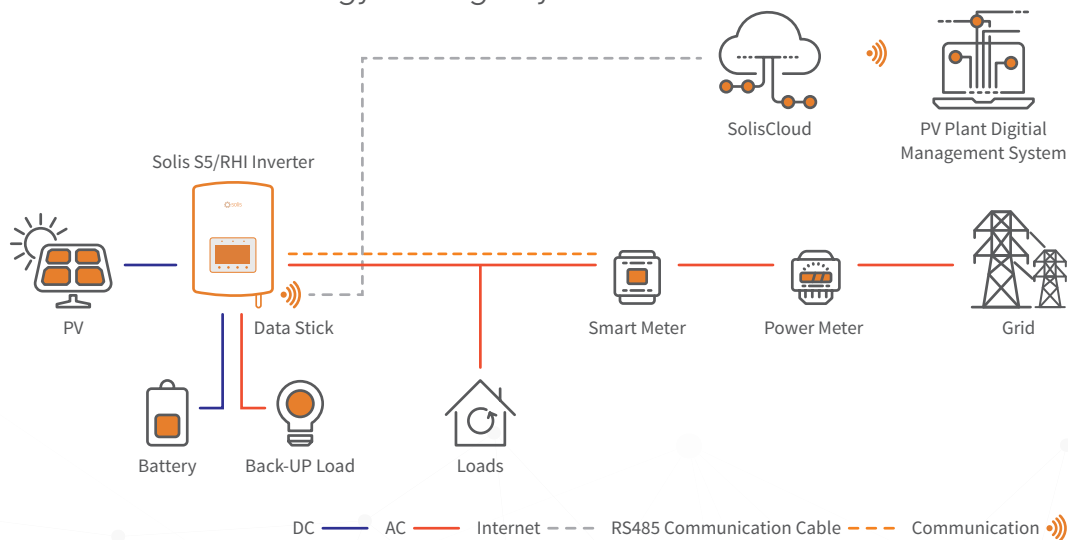
**Bankable. Reliable. Local.**

# The Benefits of PV + Energy Storage Systems

## >> Background

PV systems have become a reliable source of clean energy by utilizing energy storage units. In many countries and regions, PV + storage systems have become the preferred source of energy for a variety of reasons.

What are the main structures of PV + energy storage systems? What are their benefits? This Solis workshop gives you a brief introduction to residential PV + energy storage systems.

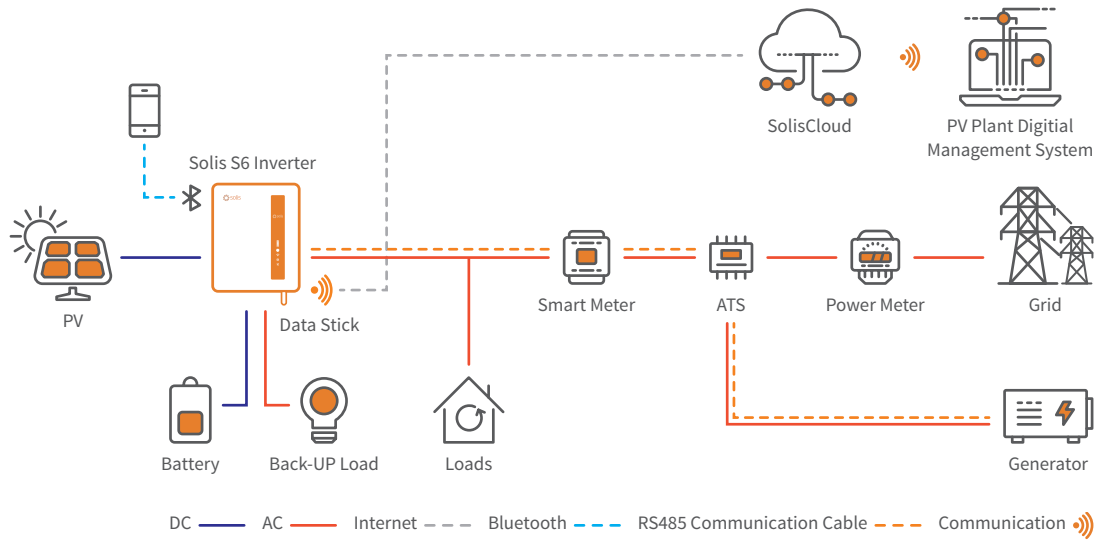


## Main Types of Household PV Energy Storage Systems

Household PV energy storage can fall into one of three categories: hybrid, DC/AC coupled, and off-grid:

### 1. Hybrid energy storage system

This system generally consists of lithium batteries, hybrid inverters, smart meters, CT's, power grids, grid-connected loads, and off-grid loads. The hybrid inverter provides bidirectional DC-AC conversion for battery charging and discharging, as well as grid feeding and load power supply.

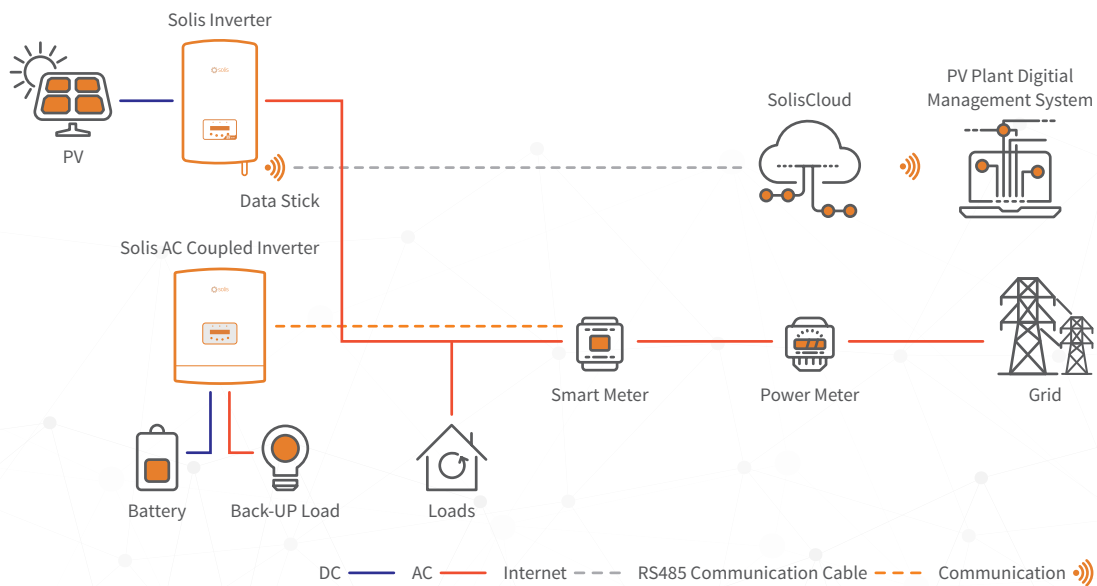


The benefits of a hybrid storage system are as follows:

- The high integration effectively reduces the system installation time and cost.
- Intelligent control can switch working modes according to the situation to meet the demand of users- self-consumption, power backup, TOU
- The hybrid energy storage system provides homeowners with a safe power guarantee in case of grid power failure.

## 2. DC/AC coupled PV energy storage system

The second type of PV energy storage systems is mainly composed of the on-grid inverter, lithium battery, DC/AC coupled energy storage inverter, smart meter, power grid, grid-connected load, and off-grid load. The system is mainly used in the application scenario of expanding the energy storage system of existing PV projects.

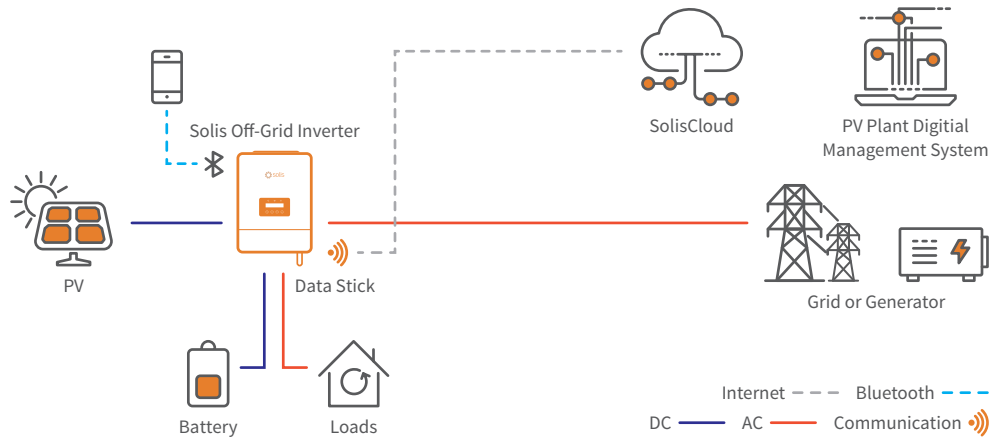


**The benefits of the DC/AC coupled PV + energy storage system are as follows:**

- It allows for the expansion of an existing grid-connected PV system into an energy storage system at a low cost.
- The PV + energy storage system provides users homeowners with a safe power guarantee in case of grid power failure.
- Strong compatibility with on-grid PV systems from different manufacturers.

**3. The off-grid PV energy storage system**

The final type of PV energy storage system is composed of the battery, off-grid inverter, load, and generator. The system is mainly used in remote areas, isolated islands, etc.



**The benefits of combining this system are as follows:**

- It is suitable for the daily demand of electricity in areas lacking connection to a central power grid.
- It can be integrated with generators to form a stable, comprehensive power supply system.

**Benefits of residential PV energy storage systems**

**1. Avoid Power Outages**

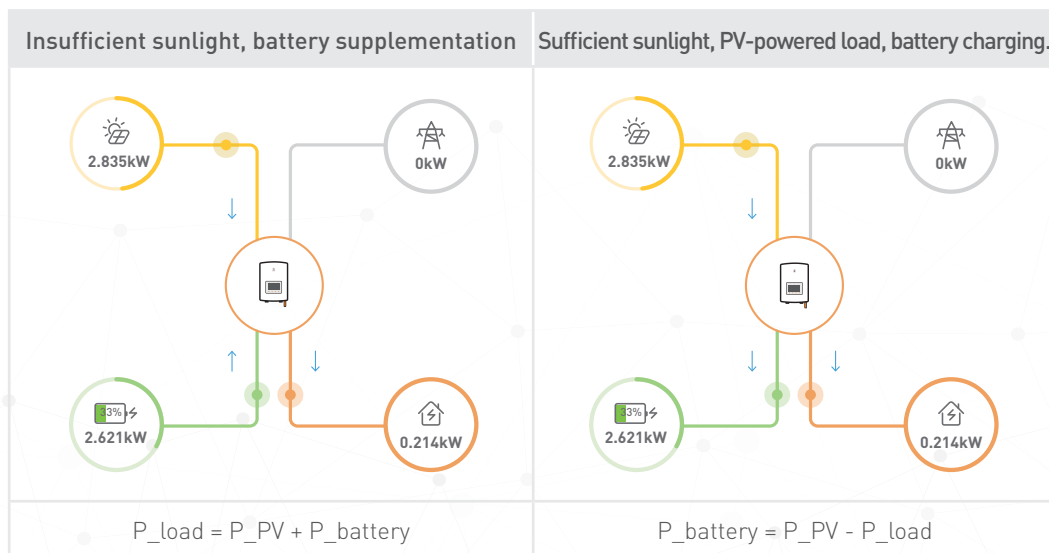
As technology advances, household appliances and their electrical demands have increased, such as air conditioning, electric heating, new energy vehicles, installation of charging piles \*I'm not sure what this refers to-maybe different name in the US, etc., which makes electricity consumption surge.

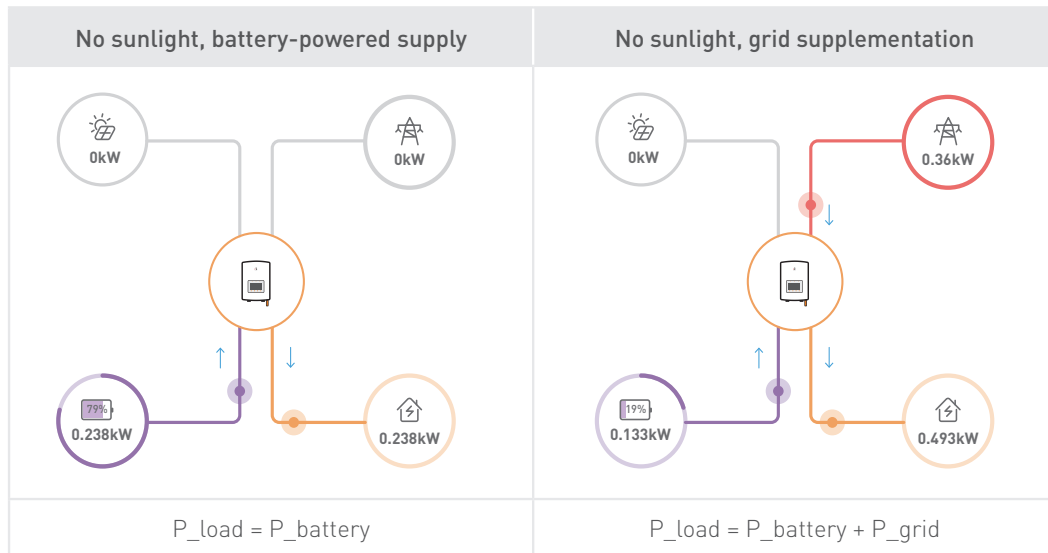
This surge of electricity consumption in a large area may lead to grid power outages at times of high demand. extreme weather events such as heat waves, thunderstorms, hurricanes, and blizzards, also increase the chance of power outages, the installation of residential PV systems can provide emergency power backup during grid power outages caused by surges in electricity consumption or extreme weather events.



## Maximize PV self-consumption

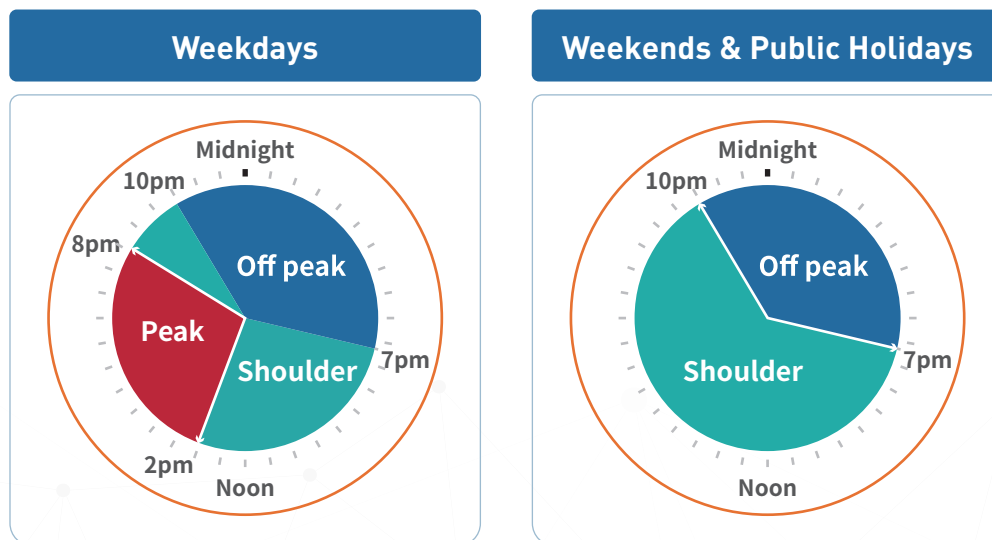
The system preferentially supplies PV power to the home loads, and the excess power is stored in the battery. When the PV power is insufficient or it is night time, the battery can discharge to power the home. In this way, the self-consumption of energy produced by the PV system is increased, energy self-sufficiency can be realized, and electricity costs can be saved. Its working logic is as follows:





## 2. Lower electricity bills by offsetting TOU costs

At present, many countries and regions in the world implement TOU tariffs, which often results in a huge increase in costs when electricity from the grid is used at on-peak times. When a homeowner introduces a PV + energy storage system, they are able to use their own PV energy during peak TOU rate hours and electricity costs can be effectively reduced.

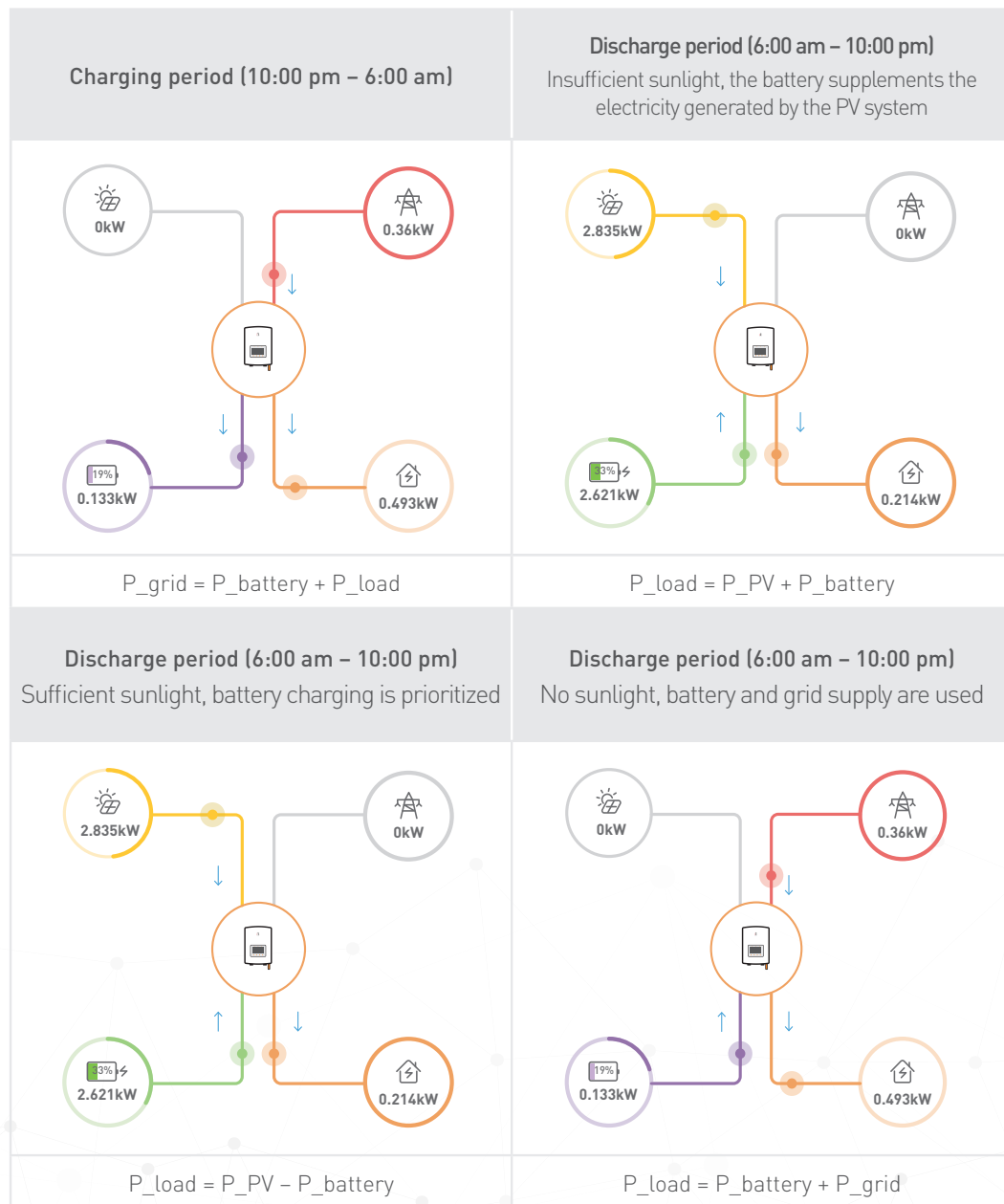


For example, certain areas have the following conditions:

- Off peak hours      10:00 pm to 7:00 am
- Shoulder hours     7:00 am to 2:00 pm, 8:00 pm to 10:00 pm.
- On-peak hours      2:00 pm to 8:00 pm

\*"Shoulder hours" isn't a common term used in the US, but I'm sure this applies to other regions

The inverter can be set to charge the batteries in the off-peak period at night. During on-peak periods, the inverter can discharge the batteries to supply the house with electricity to offset TOU costs. If it's an especially sunny day, the electricity generated supplies the home and any additional output is used to charge the battery. The system can control the charging and discharging time of the battery according to the peak and valley of the grid. The working logic is as follows:



## Conclusion:

>> PV + energy storage systems have many advantages, such as providing emergency backup power maximizing PV self-consumption, optimizing the cost of electricity, and much more. Globally, household energy storage has become the norm in many countries and regions due to energy crises, high electricity costs, and weak power grids. In addition, with the increasing amount of energy vehicles, charging piles and other equipment, and in household electricity consumption, more families will want to protect themselves from power outages and lower their electricity costs by introducing PV + energy storage systems.