ENERGY
THAT
CHANGES

SMA SMART HOME

Our System Solution for Your Independence

JOIN THE CLEAN ENERGY TRANSITION

Energy management from SMA

It's an unprecedented success story – in only a few short years renewable energy sources have become an affordable and reliable clean electricity supply. PV systems alone produce several billion kilowatt hours of CO_2-neutral electric current every year, and in many countries the cost of generating PV power is already lower than household electricity prices. Yet the issue of grid parity raises new questions: What can help PV system owners to consume more of the power they generate? How can solar power make the utility grid more reliable? In short, what is the most optimal and profitable way to use solar power? The key to these questions lies in the self-consumption of solar power. The use of intelligent energy management systems that optimise power generation and consumption in an easy and automated way, thus increasing the rate of self-consumption considerably. Fortunately, the trend toward networked household appliances that are easier than ever to use as well as the development of storage technologies that offer higher performance at a lower cost is arriving at just the right time.

Besides offering great financial benefits, improved energy efficiency and greater independence from rising electricity rates, a Smart Home also provides PV system owners with a completely transparent energy budget. This transparency also facilitates the more conscientious use of energy and helps to reduce total energy consumption. To ensure the success of the energy transition, even utility grids will soon intelligently combine loads, renewable power sources and storage systems. This smart grid will be able to harness synergies with the same level of supply reliability as the conventional utility grid. The ideal basis for a smart grid lies in generating electricity locally and with the SMA Smart Home. On the following pages, we will introduce you to the most important building blocks of the Smart Home. Now anyone can begin to shape their own personal energy transition.

Benefits of the SMA Smart Home at a glance:

» Planning reliability and cost saving through solar energy at consistently cheap rates

» Maximum utilisation of an environmentally friendly energy supply through use of self-generated solar power

» More independence without compromising comfort or energy supply security

» Custom-tailored automatic optimisations

» Greater independence from rising electricity prices

» Economic potential is made visible through complete transparency via the electricity energy budget

» Prepared for the future by taking into account variable electricity prices and the upcoming smart grid business models

ENERGY GENERATION

INTELLIGENT PLANNING AND CONTROL

INTERMEDIATE ENERGY STORAGE

CONSUMPTION

TRANSPARENCY

E-MOBILITY

SMART GRID CONNECTION

THIS IS HOW YOU CAN MAKE YOUR HOME SMART

Intelligent functions for intelligent energy management

Each Smart Home is unique. The basic principle may always be the same, as various electric components in the home are controlled and switched on and off automatically to some extent. However, a Smart Home makes the most sense when it comes to a self-sufficient energy supply. This is why SMA worked hard to become the first manufacturer to develop a comprehensive system solution for intelligent energy management. In concrete terms this means that the SMA Smart Home continually coordinates PV generation and consumption in such a way as to facilitate optimal use of self-generated solar power. The system uses intelligent planning and control – and includes storage systems for optimal load distribution. It also visualises the entire energy budget, allowing PV system operators to have a detailed overview of their installation. The result: increased transparency, greater independence, reduced power consumption and lower electricity costs.

Energy generation

Environmentally friendly energy generation in the home is a fundamental attribute of the SMA Smart Home. The easy installation of PV systems makes them ideal in this case, and in many countries, self-generated solar power has already become cheaper for private households than power from the utility grid. Other alternative energy sources such as micro combined heat and power plants will also be easy to integrate into the SMA Smart Home in the future.

Intelligent planning and control

Intelligent planning and control of energy flows is the core element of the SMA Smart Home. It knows all meter data, learns typical energy consumption patterns and forecasts power generation with the help of the local weather forecast. Household appliances can be switched on at the ideal time based on this PV generation forecast, allowing a large portion of the solar energy generated to be consumed directly. Furthermore, if storage systems are integrated into the Smart Home, they also factor into planning.

Intermediate energy storage

Achieving an increase in self-consumption and self-sufficiency can also be done using intermediate storage systems. Batteries store surplus power during the day and make it available for consumption at a later time, for example, in the evening or when PV generation is low at times during the day. Even small, intelligently controlled storage systems can make a significant contribution to this end. For example, thermal energy storage systems can also be used. They are already available in most homes and generally have enough capacity to store large amounts of solar electricity as usable heat.

Consumption

The ideal situation is when the sun is shining – and both the washing machine and the dishwasher are running directly on self-generated electricity. The SMA Smart Home can make recommendations about when these devices should be switched on to ensure that your self-generated PV power is consumed directly. In addition, these devices can convert surplus electricity into thermal energy and store it as a heater element or a heat pump. Therefore, power consumption used to generate heat is naturally more flexible, allowing the rate of self-consumption to be maximised.

Transparency

Universal access to consumption data and current PV system generation: System operators can use a smartphone or computer to keep a constant eye on energy flows in the home. An easy-to-read display and analysis of all energy data make consumption patterns transparent. This alone can reduce energy consumption. Damaged devices or hidden electricity guzzlers also become especially easy to spot.

E-mobility

Here, the SMA Smart Home is also prepared for the future. As electric vehicles become more and more important, it is also becoming attractive to power them with self-generated PV energy. An electric car can also be used as an additional, and large, storage option in the future.

Smart grid connection

Data exchange via the utility grid, selling electricity to your neighbour, actively participating in "smart markets": All of these things will be possible with the intelligent utility grid of the future – just like connecting several PV systems together to create virtual power plants. Equipped with all these functions, the SMA Smart Home is ready for the "smart grid."

SELF-GENERATION, SELF-CONSUMPTION

From inverters to intelligent energy management

Thanks to the modular design of the SMA Smart Home, system operators can individually determine to which extent they want to meet their own energy demand with self-generated PV power. This is true for both new and existing systems and for small and large power classes. For flexible storage solutions. SMA offers three system solutions to individually meet these needs.

The basic Sunny Home Manager solution – compact and intelligent

After the PV inverter, the Sunny Home Manager is the core element of this basic solution. As the SMA Smart Home control centre, it plans and controls the use of solar power. The energy manager combines typical consumption patterns with the predicted PV power generation intelligently and dynamically. It ensures optimal use of available energy throughout the entire home.

SMA recommends supplementing this solution with a storage system. This will make even more efficient energy management possible and facilitate greater independence from rising electricity prices and an energy supply from the utility grid.

The SMA Flexible Storage System – adaptable and powerful

With the SMA Flexible Storage System, the plant operator's personal preferences know almost no boundaries. In addition to the Sunny Home Manager, the most important components of this flexible storage solution for new and existing PV systems are the Sunny Island battery inverter and the proven SMA PV inverter. The last component is a freely selectable external battery.

The SMA Flexible Storage System allows for individual dimensioning in terms of storage capacity, battery type, battery capacity and PV system type and performance. Depending on the combination, considerably high self-consumption and self-sufficiency quotas are possible.

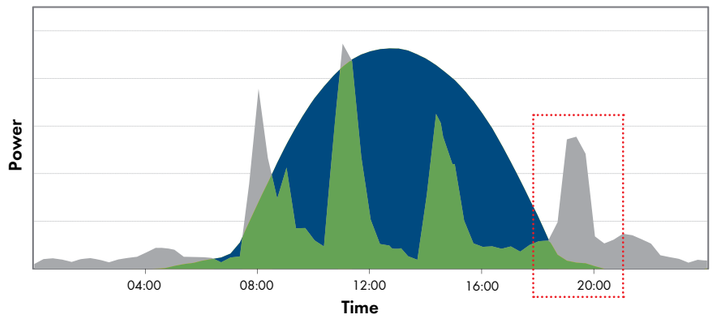
Future-proof

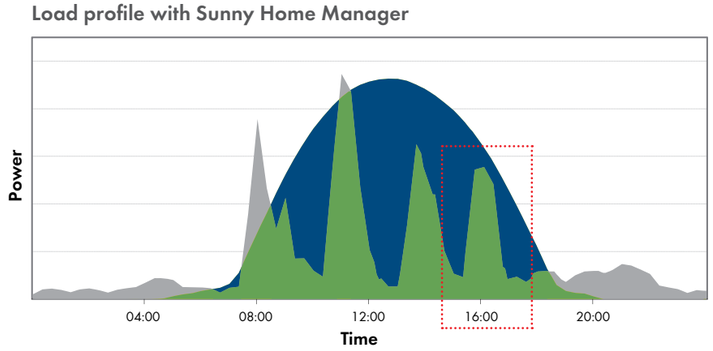
To ensure that all product and system solutions for home energy management meet the highest quality standards, SMA works with leading manufacturers in the fields of storage technology, smart metering, home appliances, electric mobility, heating, air conditioning and ventilation systems.

Our Product Solutions at a Glance:

Sunny Home Manager
The solution to smart energy management

SMA Flexible Storage System
The versatile solution for new and retrofit PV systems





The Sunny Home Manager is able to make recommendation on the activation of electrical loads which greatly increases the rate of self-consumption. If time-of-use electricity tariffs are available, shifting loads can also reduce grid electricity costs.

SUNNY HOME MANAGER

The solution to smart energy management

The Sunny Home Manager is the control center for the all SMA Smart Home Solutions. Combined with a PV inverter, the Sunny Home Manager guarantees comprehensive monitoring as well as analysis and visualisation of all relevant electric energy flows in the home.

In addition, this solution can estimate PV generation and consumption by intelligently planning and also integrating storage systems. And its use of local weather forecasts to predict solar power generation is unparalleled.

Another unique feature of the Sunny Home Manager is its ability to consider time-of-use electricity rates providing comprehensive load management for the first time ever. As a result, the device is able to adjust power consumption in the house so it is in line with both the current power of the PV system and current electricity rates.

Easy-to-use

Using the Sunny Home Manager via an Internet browser is easy as child's play. The device can be accessed on a PC or smartphone, whether at home or on the move, users can benefit from a range of convenient automatic functions and preset evaluation charts.

Installation is equally straightforward. Once the data link to the energy meter has been established, Internet access is all that is required as the connection to the Sunny Portal is made automatically.

Precise

The Sunny Home Manager analyses data from up to three energy meters and uses that data to precisely record all relevant electric energy flows.

Offering both analog and digital meter interfaces, it is able to process energy flow data with accuracy down to the second, which is crucial for effective load control.

Comprehensive

The Sunny Home Manager provides visual tips regarding the best operating times for electric appliances and controls appropriate devices automatically, if needed. The device ensures that grid feed-in is limited to a specified percentage of nominal generator power.

Products are available either separately or as a package.

Advantages at a glance:

» Use less electricity from utility companies

» Self-consumption rate boosted

» Recommends best operating times for household appliances

» Transparency of household energy flows and a live display of power values

» Free online monitoring of the PV system via Sunny Portal (basic function)

» Greater planning reliability and independence from costs related to developments in the energy market

SMA SMART HOME

With SMA Flexible Storage System

1. **Sunny Boy 5000TL**
   The PV inverter converts the direct current produced by PV modules into alternating current. The electricity is then primarily used by the loads in the household, only excess power is fed into the utility grid.

2. **Sunny Home Manager**
   As the central energy manager, this device analyses a wide range of input parameters and uses an intelligent planning algorithm to harmonise power generation, consumption and intermediate storage schedules.

3. **Sunny Portal**
   The Sunny Portal is used to operate and configure the Sunny Home Manager. These functions are available via any Internet browser and can be accessed using a PC or smartphone. The live display of all power and energy values provides further incentive to conscious power consumption.

4. **Sunny Island 6.0H/8.0H-11**
   In combination with the batteries, this system facilitates the intermediate storage of solar power and also offers an uninterruptible, grid-quality power supply.

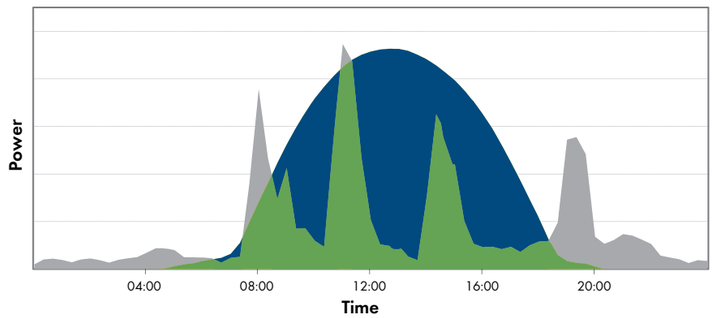
5. **SMA Energy Meter**
   The SMA Energy Meter takes electrical measured values and communicates the data on PV generation, purchased electricity and grid feed-in via Speedwire to the Sunny Home Manager, in high temporal resolution.

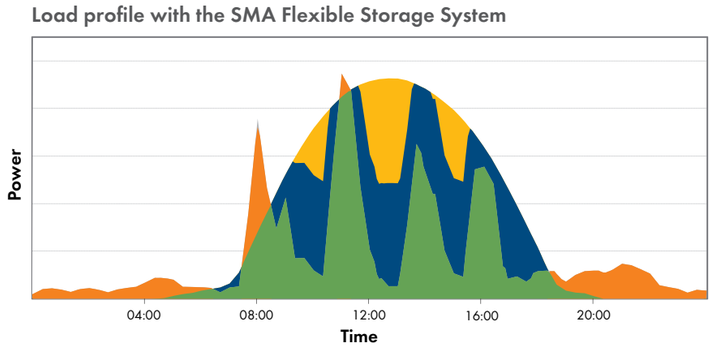
6. **Energy meter**
   In addition to SMA Energy Meter, up to three energy meters equipped with D0 interfaces can be connected to the Sunny Home Manager. Once connected, the device monitors all relevant energy flows in the home.

7. **Loads**
   The Sunny Home Manager memorises the typical load profile of the building and takes it into account when making consumption recommendations.

8. **Utility grid**
   The load on the utility grid is reduced through self-consumption because the household consumes less power from the grid and at the same time feeds less PV power into it.

9. **Router**





Thanks to its largely scalable battery, the SMA Flexible Storage System can store large amounts of solar energy for greatly increased independence from power companies. The battery inverter has an extremely high overload capacity and can supply almost all power needed during grid failures.

SMA FLEXIBLE STORAGE SYSTEM

The versatile solution for new and retrofit PV systems

Storage systems are used around the world for different reasons. They provide additional energy supply security and greater self-sufficiency, and can also make PV systems more economical by increasing the rate of self-consumption Battery requirements are therefore equally diverse.

A relatively large battery capacity is needed to bridge prolonged grid failures but has a significant impact on the economic viability of the system. If independence is a priority, then at least a medium-sized battery is required. However, an additional energy source is needed during periods of low solar irradiation. The minimum initial investment costs are top priority if the battery is smaller. System requirements also vary depending on the individual goals that PV system owners want to reach.

SMA offers an adaptable storage solution that can be adjusted for all needs: the SMA Flexible Storage System. It consists of a Sunny Island battery inverter, Speedwire Data Module, Sunny Remote Control, SMA Energy Meter and Sunny Home Manager. These can be combined with an SMA PV inverter and an individually customised number of batteries.

For retrofitting

The SMA Flexible Storage System can be added as an upgrade to almost any PV system. The Sunny Island makes it possible to integrate different storage systems, and by sizing the battery capacity is it especially variable. In this way, all the advantages of an intelligent energy management system are available.

Flexible

Along with storage power and battery capacity, the battery type and brand are chosen by the customer. The SMA Flexible Storage System can work with almost any lead acid or lithium-ion battery from important manufacturers such as LG Chem, Sony, Samsung, SAFT, Dispatch Energy, Akasol and Leclanché.

Reliability

If the utility grid fails, the backup power supply guarantees a secure electricity supply. The inverter technology used in this system has an extremely high overload capacity ensuring that critical loads can be operated reliably. In the field of lithium-ion technology, SMA works closely with major companies who offer proven safety concepts for batteries. And thanks to a special data link between the battery and the inverter, the system can ensure optimal battery management and component interplay.

Advantages at a glance:

» Less electricity from utility companies

» Self-consumption rate boosted

» Use of solar power possible 24 hours a day

» All PV power generated annually is used, even when the active power is limited

» Can be used to upgrade almost any existing PV system

» Maximum flexibility in terms of storage, battery type and battery capacity

» Future-oriented with smart grid compatibility

TECHNOLOGY FOR THE HOME OF TOMORROW

SMA Smart Home as a system component for the energy transition

Systems providing intelligent and automatic energy management in the home are key to a comprehensive renewable energy supply, and they are becoming increasingly important with the progression of the energy transition.

These are the only systems that can enable you to reliably and inexpensively generate solar power as well as relieve the utility grid at the same time. They can provide the photovoltaic market with properties found in power plants such as complete controllability and programmable power output through manual load shifting and decentralised storage systems.

And this only scratches the surface of possible applications of intelligent energy management. With an automatic response to variable prices for power from the grid, a continuous comparison of supply and demand for power will soon also be possible at grid level.

Connecting several small installations into virtual power plants makes it possible to market large quantities of power directly or participate in smart markets providing services for energy and systems.

Intelligent solutions will be the only way for electric mobility to be integrated into the energy supply system. The SMA Smart Home offers the complete range of core functions for intelligent and convenient energy management as an end-to-end modular system that is prepared for the future.

Today, it is possible to control common appliances around the home as easily as it will be to directly communicate with future generations of smart devices.

Heat pumps, combined heat and power plants, heating elements as well as electric vehicles can also be integrated into SMA Smart Home. The Sunny Home Manager completes the picture for a flexible storage system that can be retrofitted and provide user control.

Simply put, the SMA Smart Home makes the technology of tomorrow available – today. PV system operators do contribute significantly to the energy transition while also conveniently supplying renewable energy to their own home, independent of the utility grid.

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