



# SUNNY ISLAND System Guide



System Solutions for Your Island Power Supply



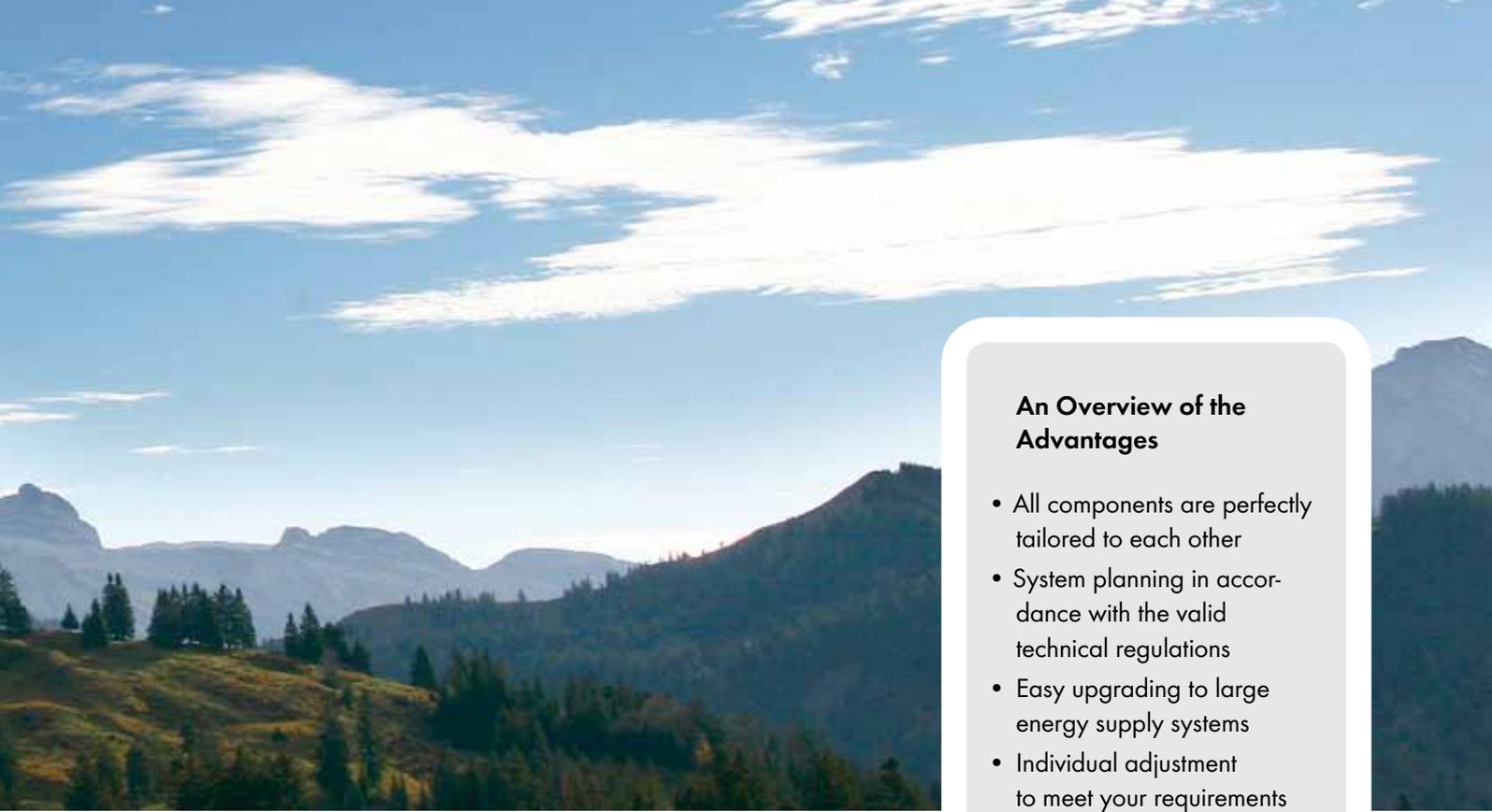
# Supplying Off-Grid Areas with Electricity

## **Simple System Planning with System Solutions from SMA**

Stand-alone power systems are easy to set up using the Sunny Island battery inverters developed by SMA. These enable a reliable energy supply even for off-grid areas.

At first look, stand-alone power systems are as diverse as the landscapes in which they can be set up. This is because the ambient conditions determine which renewable energy source can be best applied on a case by case basis. Nevertheless, experience gained from installing more than 5,000 stand-alone power systems worldwide has taught us that certain combinations of components can be adapted especially well to form a solid basis for more complex systems.

Taking into consideration the size of each individual system as well as the specific ambient conditions, we have prepared a summary of the typical fields of application for solar energy, battery banks and diesel generators. With these system solutions we would not only like to facilitate your introduction into the area of stand-alone power supply, but also to offer you concrete support for the planning of your stand-alone systems.



### **An Overview of the Advantages**

- All components are perfectly tailored to each other
- System planning in accordance with the valid technical regulations
- Easy upgrading to large energy supply systems
- Individual adjustment to meet your requirements
- Worldwide SMA Service for power supply systems

### **The Easy Way to the Stand-Alone System**

The system solutions presented in this brochure offer you the basis for constructing stand-alone power systems of a diverse range of power classes. Whether for free-standing vacation homes, remote farms or entire villages, the proposed configurations ensure a simple system design and straightforward system installation.

### **Perfect Adjustment**

The individual components are optimally tailored to one another and, together with the Sunny Island battery inverter, ensure a reliable power supply. Of course, the combinations can

also be individually adjusted in accordance with your local conditions.

### **A Solid Basis**

Additionally, the configuration proposals form a solid basis for more complex systems. Additional components can be integrated into the system at any time, step by step with energy demand.

# SUNNY ISLAND – The Island Manager

## The Main Component of Your Stand-Alone Power Supply

The Sunny Island stand-alone inverter is the main component of each Sunny Island system. Together with a battery unit, the Sunny Island stand-alone inverter creates an AC voltage grid which allows the integration of all components from electrical appliances to power generators. As the manager of this AC coupled system, the Sunny Island handles all regulation processes and ensures a continual power supply.

You can apply the Sunny Island in both one and three-phase stand-alone grids as well as upgrade the systems at any time. Modern and economical battery management ensures the maximum service life of the batteries. Due to their temperature management and excellent overload characteristics, the devices have proven especially resistant to extreme climatic conditions.

### A Smart Device

All Sunny Island inverters can be easily combined with components for renewable energy and diesel power plants used for emergency power supply. For this purpose, Sunny Boy and Sunny Mini Central solar inverters would be your best choice: let their high efficiency and reliability speak for themselves. Consequently, they have received numerous awards.





### Sunny Island Advantages

- Stand-alone systems from 2 kW to 300 kW
- AC and DC coupling of energy sources
- Single- and three-phase parallel connections
- Modular and extendible
- Excellent overload characteristics
- Low energy consumption
- Maximum battery life-span with intelligent stand-alone management
- Simple commissioning

# SUNNY ISLAND

## Using the Sun's Energy

Because solar energy is available all over the world, all Sunny Island system solutions are primarily based on the use of photovoltaics. Moreover, PV systems are highly adjustable and wear-resistant.

### Examples of Individual Systems

More than simply offer you some standard solution, we would like to provide you with a sensible basis for planning your system with the eight basic systems described here. All systems can be expanded and adjusted to meet your individual needs.

### The Basis: 25 Years of Experience

We have incorporated our vast knowledge, gained from over 25 years of experience, into compiling system solutions, both in terms of developing the grid-connected PV systems and more than 5,000 installed stand-alone systems. All examples are based on comprehensive research in the specific fields of application as well as the respective energy consumption.

### Which System Configuration is the Most Appropriate?

The best configuration for you primarily depends on the existing connection

power as well as the required amount of energy. Whether it is for a one or three-phase connection, the construction of your system plays an important role. Make the most of our experience with modern energy supply systems and talk to us first!

# Remote, Unattended Installations

German Lifeguard Association station, Graal-Müritz

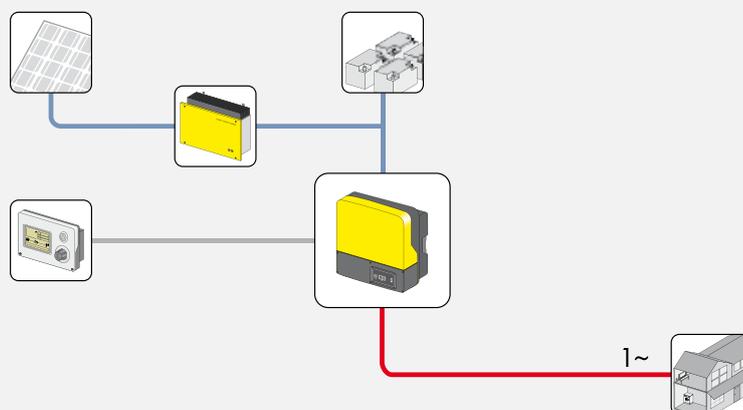


<b>Sunny Island:</b>	<b>SI 2224</b>
<b>Sunny Island Charger:</b>	<b>SIC-40</b>
<b>Maximum solar power:</b>	<b>1.2 kWp</b>
<b>Battery inverter power:</b>	<b>2.2 kW</b>
<b>Available energy per annum:</b>	<b>800 kWh</b>
<b>Battery storage:</b>	<b>6.72 kWh</b>
<b>The amount of autonomous time:</b>	<b>3 days</b>

According to our experience, stand-alone systems with a performance range between 2 and 3 kW are required for remote installations or those which are left unattended for a longer period of time. In such cases, the system must not only be reliable but also be resistant to extreme climatic conditions.

Temperature variations, high levels of humidity and a high salt content of the air are all reasons for taking great care when selecting the appropriate components.

Typical applications of this power class, include telecommunication stations which rarely require maintenance work.



# Family Home in Southern Europe

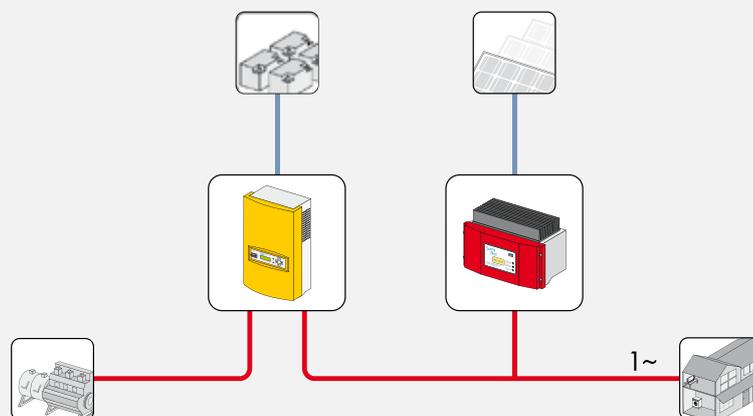
Family home, Spain



<b>Sunny Island:</b>	<b>SI 3324</b>
<b>Sunny Boy:</b>	<b>SB 1700</b>
<b>Maximum solar power:</b>	<b>1.9 kWp</b>
<b>Battery inverter power:</b>	<b>3.3 kW</b>
<b>Available energy per annum:</b>	<b>2,500 kWh</b>
<b>Battery storage:</b>	<b>14.4 kWh</b>
<b>The amount of autonomous time:</b>	<b>2 days</b>
<b>Diesel generator:</b>	<b>3 kW</b>

The system presented here is located on a private property on the island of Tenerife.

Sunny Island is ideal for providing energy to remote family homes in Southern Europe. Because the amount of sunlight remains relatively high throughout the entire year, the PV plant can thus ensure a sufficient energy yield. Additionally, even in the event of severe storms, the stand-alone system guarantees an exceptionally reliable power supply.



# Family Home in Central Europe

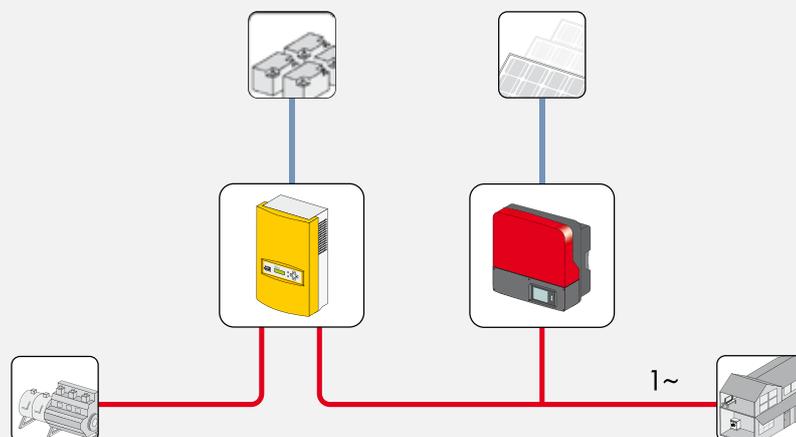
Roof-top system, Germany



<b>Sunny Island:</b>	<b>SI 4248</b>
<b>Sunny Boy:</b>	<b>1 x SB3000TL-20</b>
<b>Maximum solar power:</b>	<b>3.5 kWp</b>
<b>Battery inverter power:</b>	<b>4.2 kW</b>
<b>Available energy per annum:</b>	<b>4,500 kWh</b>
<b>Battery storage:</b>	<b>28.8 kWh</b>
<b>Diesel generator:</b>	<b>4 kW</b>
<b>The amount of autonomous time:</b>	<b>2 days</b>

The sun is a great source of energy, even in Central Europe. Here, average annual solar irradiation is approximately 1,000 kWh/m<sup>2</sup>. This is equivalent to approximately 50 % of the radiation intensity of the Sahara.

Using statistics, it is very simple to calculate the average energy consumption of a family home in Central Europe. Consequently, it is very easy to put together the appropriate system which includes a backup diesel set. In Germany, the average annual energy consumption of a family of four is between 4,000 and 5,000 kWh. Depending on the location and the orientation, a stand-alone system operator will need a solar module surface of approximately 30 square meters.



# Villa

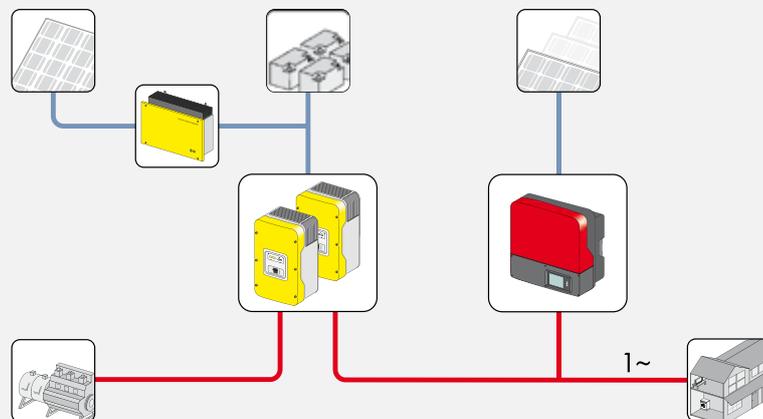
Mallorca, Spain



<b>Sunny Island:</b>	<b>2 x SI 5048</b>
<b>Sunny Boy:</b>	<b>1 x SB5000TL-20</b>
<b>Sunny Island Charger:</b>	<b>1 x SIC-40</b>
<b>Maximum solar power:</b>	<b>7.5 kWp</b>
<b>Battery inverter power:</b>	<b>10 kW</b>
<b>Available energy per annum:</b>	<b>10,000 kWh</b>
<b>Battery storage:</b>	<b>38.4 kWh</b>
<b>Diesel generator:</b>	<b>8 kW</b>
<b>The amount of autonomous time:</b>	<b>1.5 days</b>

More than anything else, a typical Spanish vacation villa requires one thing: a lot of energy. This energy is primarily required for lighting, air-conditioning systems and electronic devices. Yet, especially when on holiday, no-one should be required to forego certain luxuries such as heated swimming pools.

Average annual energy consumption for such loads is often between 6,000 and 15,000 kWh a year. As a result, a high-performance solution with two Sunny Island SI 5048 connected in parallel is necessary.



# Alpine Hut/Guest House

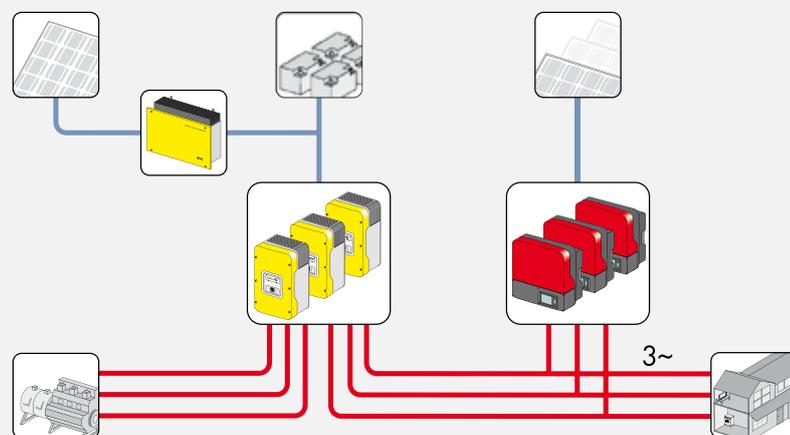
Veneto region, Italy



<b>Sunny Island:</b>	<b>3 x SI 5048</b>
<b>Sunny Mini Central:</b>	<b>3 x SB4000TL-20 1 x SIC-40</b>
<b>Maximum solar power:</b>	<b>15 kWp</b>
<b>Battery inverter power:</b>	<b>15 kW</b>
<b>Available energy per annum:</b>	<b>25,000 kWh</b>
<b>Battery storage:</b>	<b>72 kWh</b>
<b>Diesel generator:</b>	<b>8 kW</b>
<b>Autonomous time:</b>	<b>1 day</b>

Each year, an increasing number of hikers enjoy the beauty of the mountains. Subsequently, a large number of small alpine huts have been transformed into real guest houses over the last few decades. During the main season, these can house up to 400 guests; quite a challenge for an energy supply system.

Alongside diesel sets, an increasing number of diverse renewable energy sources have been used more recently in mountain resorts. Beneficial for both man and nature, they are clean and make little noise. Furthermore, they are perfect for supplying reliable lighting and heating or for operating electronic devices in off-grid areas.



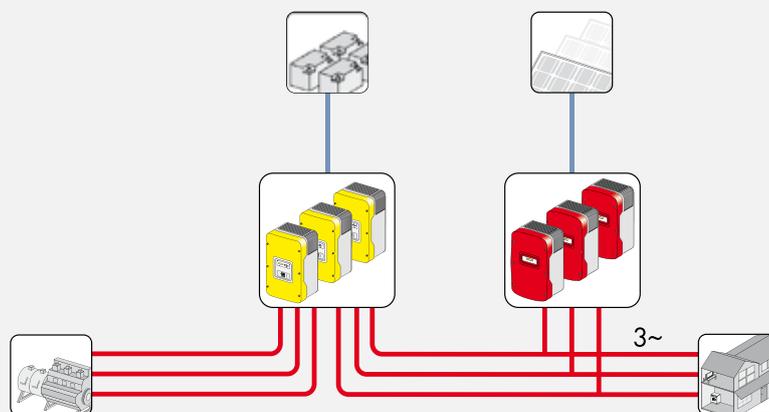
# Farm

Turkey stall in Leofels, Germany



<b>Sunny Island:</b>	<b>3 x SI 5048</b>
<b>Sunny Mini Central:</b>	<b>3 x SMC 6000TL</b>
<b>Maximum solar power:</b>	<b>20 kWp</b>
<b>Battery inverter power:</b>	<b>15 kW</b>
<b>Available energy per annum:</b>	<b>30,000 kWh</b>
<b>Battery storage:</b>	<b>120 kWh</b>
<b>Diesel generator:</b>	<b>20 kW</b>
<b>The amount of autonomous time:</b>	<b>1.5 days</b>

The Sunny Island system offers remote farms an economical alternative to a power supply line. Depending on the location, integration into the power distribution grid is often linked to high costs or is not even possible in the first place. For example, a hog-feeding-in farm in the northern German town of Hardeggen was equipped with a stand-alone power system. Here, too, in the southern German town of Leofels, solar energy is used to supply energy to the turkey stall shown above.



# Scientific Research Stations

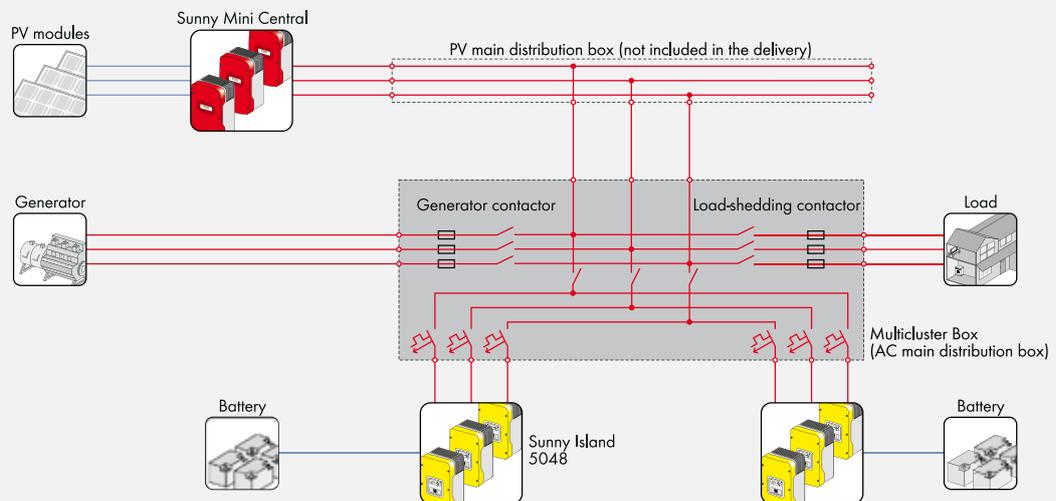
Andes Observatory, on the border between Chile and Argentina



<b>Sunny Island:</b>	<b>6 x SI 5048</b>
<b>Sunny Mini Central:</b>	<b>3 x SMC 10000TL</b>
<b>Maximum solar power:</b>	<b>30 kWp</b>
<b>Battery inverter power:</b>	<b>30 kW</b>
<b>Available energy per annum:</b>	<b>50,000 kWh</b>
<b>Battery storage:</b>	<b>192 kWh</b>
<b>Diesel generator:</b>	<b>24 kW</b>
<b>The amount of autonomous time:</b>	<b>1.5 days</b>

Many scientific research stations are located far away from public grids. A Sunny Island System is the perfect solution, especially when dealing with the observation of flora and fauna. For instance, a chimpanzee observation station in West Africa has been equipped with a PV plant and several Sunny Island systems.

In order to offer the ideal solution for research stations with a high energy demand, we have combined six Sunny Island systems with three Sunny Mini Centrals. In this manner, it is not only possible to ensure a basic supply for the research station but also for large scientific instruments as well, such as those needed to move large telescopes at observatories.



# Village Power Supply

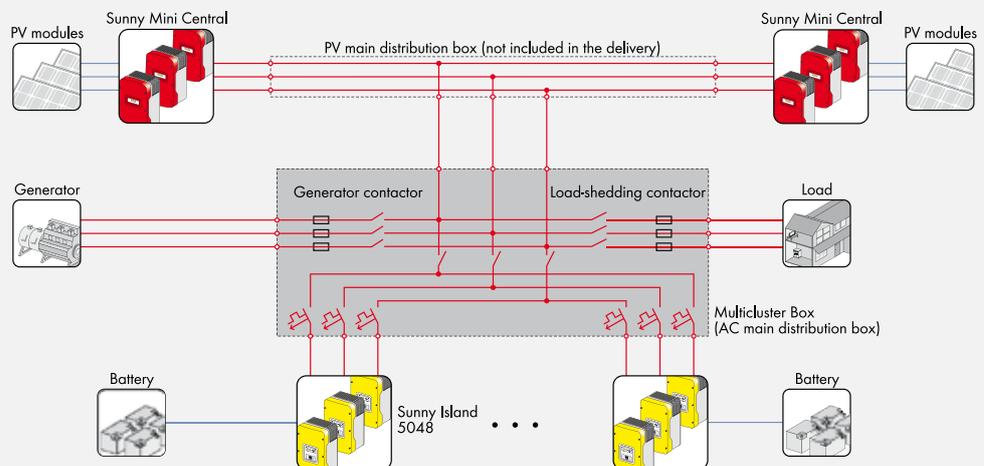
Yunnan Province, China



<b>Sunny Island:</b>	<b>12 x SI 5048</b>
<b>Sunny Mini Central:</b>	<b>6 x SMC 10000TL</b>
<b>Maximum solar power:</b>	<b>60 kWp</b>
<b>Battery inverter power:</b>	<b>60 kW</b>
<b>Available energy per annum:</b>	<b>70,000 kWh</b>
<b>Battery storage:</b>	<b>288 kWh</b>
<b>Diesel generator:</b>	<b>50 kW</b>
<b>The amount of autonomous time:</b>	<b>1.5 days</b>

For many of us, it is simply unimaginable: life without electricity. Yet for 1.6 billion people in the world this is everyday life. These people mostly live in remote areas where a public power supply line is impossible due to the long transmission routes and their associated costs.

Our example shows a Sunny Island system in the Yunnan Province in southwest China. Using twelve Sunny Islands and six Sunny Mini Centrals, the Sunny Island system completely supplies approximately 1,000 people with clean energy each year.



# Extremely Adaptable

## Flexible Incorporation into a Wide Range of Systems

The modular construction of the Sunny Island system provides maximum flexibility in the supply of electricity to off-grid areas. All the components required for the use of solar, wind or hydropower as well as battery banks or fuel cells can be integrated into the system without any difficulty. Subsequently, the systems can be optimally ad-

justed to fit the geographical particularities.

### Always the Right Components

Alongside solar inverters, we also offer a comprehensive range of standard products: the Windy Boy inverter for wind turbine systems, the intelligent dumpload control-

ler Smart Load 6000 as well as the Hydro Boy inverter for fuel cells and low DC voltages. In doing so, we assure you high-quality components for a reliable power supply.



# Everything Under Control

## with SMA PV System Monitoring

If with the issue is data technology, you have found the right partner in SMA. Choose from our wide variety of products for the monitoring of your Sunny Island System: from the Sunny Portal online platform to monitoring and maintenance with our high performance Sunny WebBox data logger, or comprehensive per-

formance analysis with the aid of the Sunny Sensor-Box.

### Monitoring from Anywhere in the World

As the monitoring of stand-alone systems is so important, we are happy to inform you in detail about our wide variety of solutions.

Stand-alone energy supply systems are often located in remote regions and only rarely do system operators have the option of controlling them on site. The duo Sunny WebBox together with the Sunny Portal are your perfect monitoring solution. Together the two allow the operator to check his system from anywhere in

the world, and to react immediately in the case of a fault.

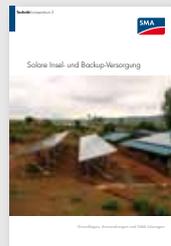
## Additional Information

We have put together the most important SMA brochures to provide you with information on certain topics regarding the Sunny Island Sets. Please feel free to contact our Sunny Island Hotline Team on +49 561 9522-399 if you have any other questions.



### **SUNNY FAMILY 2011/2012 Off-Grid Solutions**

Here you will find all SMA products for stand-alone power supply systems.



### **Stand-Alone and Back-Up Solar Power Supply**

Stand-alone power generators, system management and the sizing process: you will find further information on these and many other subjects in our Technology Compendium 2 about renewable stand-alone systems.



### **Simple and Secure Monitoring**

Whether a private home rooftop system, a commercial PV plant or a large PV farm: this brochure introduces the appropriate monitoring solution for each distinctive case. In addition, this brochure compares wireless and cable connections for data transfer.



### **Animation Film: "Energy Supply for Power-Grid Distant Areas"**

This impressive 8 minute animated film shows the outstanding possibilities available for the configuration of a stand-alone power supply system on the basis of the AC coupling developed by SMA together with the Sunny Island as its system manager.

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