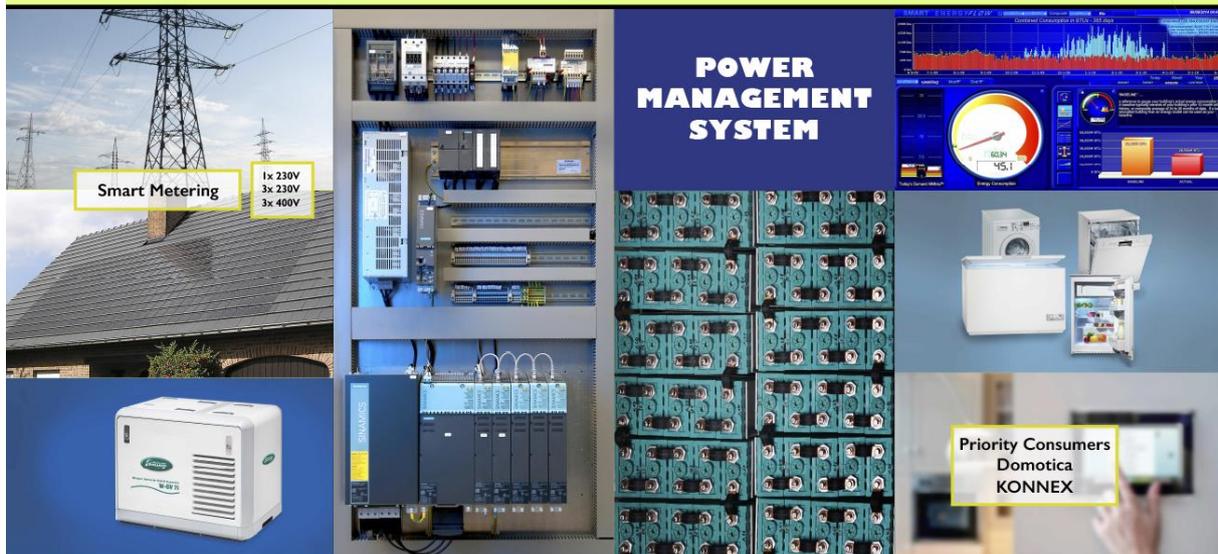


SMART INDEPENDENT ENERGY SOLUTIONS



Smart Metering
1x 230V
3x 230V
3x 400V

POWER MANAGEMENT SYSTEM

Priority Consumers
Domotica
KONNEX

Easy to install **Working ON/OFF grid** **Maintenance free**

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Electrical power from the Grid, power generated by the sun and/or wind and actual power consumption never match. The result is feedback of power into the grid when excess power is generated, and power needed from the grid when local power generation is insufficient. Intermediate power storage is rapidly becoming an essential tool to keep grid power fluctuations and eventual power cuts within manageable limits. Therefore Smart Energy developed **Smart Independent Energy Solutions (SIES)**.

- **Power Management system**

The Power Management System is the core of the SIES and consists of Siemens Hardware and professional software. In case of a utility power outage, the SIES will automatically disconnect from the grid and continue to operate as an independent/standalone system. Depending on the available solar/wind power and battery storage capacity, all loads or essential loads only, can be powered for hours or even days when utility power is not available. A generator makes the independent unit complete! Power peak's, which can occur after a power cut, will be flattened by the systems to avoid damage to appliances. The SIES will "iron out" peak demand from the grid, by discharging the battery. Grid connection can be 1 x 230 V, 3x 230 V or 3x400V+N. The SIES can deliver either in monophasic or three phase and can communicate with a Smart metering! The time and price that you want to pay for your electricity from the grid can be programmed, so you can optimize your electricity cost.

- **Li-ion batteries**

Next to the Power Management System, the SIES consists also of Lithium-iron-phosphate (Li-ion FePO₄) batteries, which can be charged during the night (low cost) or in case of excess solar/wind power and discharged when local consumption exceeds own power production. It is not only small size and less weight that makes Li-ion compared to lead-acid or Gel batteries so much more attractive in grid connected or off grid systems, the main advantage is **efficiency and total cost**. Li-ion batteries also features a much higher charge/discharge efficiency, over 3000 cycle times with a Depth of Discharge(DOD) of 80 % and over 15.000 cycles with a DOD of 50%, reliability and are maintenance free. Energy stored in the batteries can be used to provide power to essential equipment during a power outage. With sufficient battery capacity and, if needed, a back-up generator, complete independence from the grid can be achieved. The battery capacity can be modular expendable by 10 KWh increase and starting with 10 KWh as a minimum.

- **Suntiles**

The Smartroof Suntiles are tiles with and integrated photovoltaic element. The Suntiles are esthetically pleasing , functional , storm resistant and easy to install. The further finishing of the roof can be done with different ceramic tiles. The Smartroof Suntiles have an efficiency 125 Wp/m².The DC electrical power generated by the solar tiles is converted to AC by a solar inverter. The AC output of the solar inverter is connected to the load and other consumers. In case of insufficient solar power, the Power Management System will supply additional power from the batteries or from the grid when the batteries are fully discharged or to programmed appliances.

In case of excess solar/wind production the Power Management System will use the excess power to recharge the batteries, or feed back into the grid when the batteries are fully charged or to start programmed consumers like a washing machine, heat pump boiler, ... In a system without a Power Management System, all surplus of solar/wind power will be fed back into the grid. Be aware that a solar inverter cannot function without an external AC power source. In case of a power outage and no Power Management System, the solar inverter will therefore shut down even if there's a lot of sun!

- **Generator**

The generator can be started automatically by the Power Management system in case that the batteries are fully discharged and when no grid or Solar / wind power is sufficient to feed the appliances. The diesel engine , one cylinder - 10 HP , is connected to a three phase generator with permanent magnets. Variable speed is possible for charging the batteries or to feed the appliances and can be done gradually up to 7 KVA.

- **Flexible and Field upgradable**

All elements of a SIES can be chosen to your specific requirements. We can offer different configurations, each of which can be tailored to your particular requirements. The basic system consist of the Power Management System with Li-ion batteries. Additional solar power , wind power, a generator and upgraded battery storage can be installed at a later stage. Dimensions of the unit : Depth 60 cm, width 80 cm and height 220 cm. Total weight with 10 KWh Li-ion batteries included is around 265 kg and standard color is white.

Power consumption at home

A short list of the most common home appliances and the amount of electricity they use will help to size the SIES.

<u>Appliance</u>	<u>Power</u>	<u>On-time</u>	<u>Energy/day</u>	<u>Summertime base load</u>
Large tropical aquarium with water heater	100 W	24 h	2400 Wh	
High efficiency refrigerator	30 W	24 h	720 Wh	720 Wh
High efficiency freezer	30 W	24 h	720 Wh	720 Wh
Central heating circulation pump (during winter time only)	30 W	24 h	720 Wh	
High efficiency lighting	100 W total	6 h (winter) 3 h (summer)	600 Wh 300 Wh	300 Wh
For comparison: One 100W traditional light bulb	100 W	6 h (winter) 3 h (summer)	600 Wh 300 Wh	
Electric floor heating in the bathroom	1000 W	3 h	3000 Wh	
TV	50 W	3 h	150 Wh	150 Wh
Radio	30 W	3 h	90 Wh	90 Wh
Personal Computer	50 W	3 h	150 Wh	150 Wh
Laptop	20 W	3 h	60 Wh	<u>60 Wh</u>
			Total	2190 Wh
Vacuum cleaner	1000 W	30 m	500 Wh	
Electric stove, peak power	8000 W			
average power during cooking session	2000 W	1 h	2000 Wh	
Electric oven	4000 W	30 m	2000 Wh	
Clothes washer, when heating the water	3000 W	10 m	500 Wh	
Clothes washer, when washing	50 W	1 h	50 Wh	
Clothes drier	3000 W	1 h	3000 Wh	
Dish washer, when heating the water	3000 W	10 m	500 Wh	
Dish washer, when washing	50 W	1 h	50 Wh	
Microwave	2000 W	15 m	50 Wh	
Water heater	2000 W	15 m	50 Wh	
Other kitchen appliances			100 Wh	