reddot design award

smartflower-the world's first all-in-one solar system

smartflower™

SIMPLY SET-UP, CONNECT
AND PRODUCE CLEAN ELECTRICITY

The **next generation** of inverter technology

THE SMARTFLOWER IS INTEGRATED WITH VICTRON'S TOP-OF-THE-LINE QUATTRO INVERTERS. TRADITIONAL INVERTERS CAN ONLY CONVERT THE DC OUTPUT OF THE SOLAR PANELS INTO AC OUTPUT THAT THE HOUSEHOLD CAN USE TO POWER APPLIANCES. THE QUATTRO IS A BI-DIRECTIONAL INVERTER/CHARGER THAT CAN CHARGE THE INTEGRATED LITHIUM BATTERIES IF THERE IS SURPLUS SOLAR ENERGY PRODUCTION AND ALSO EXTRACT THE ENERGY STORED IN THOSE BATTERIES TO SUPPLEMENT THE PV PANELS POWERING THE HOUSEHOLD LOAD.

BATTERY BACK-UP POWER

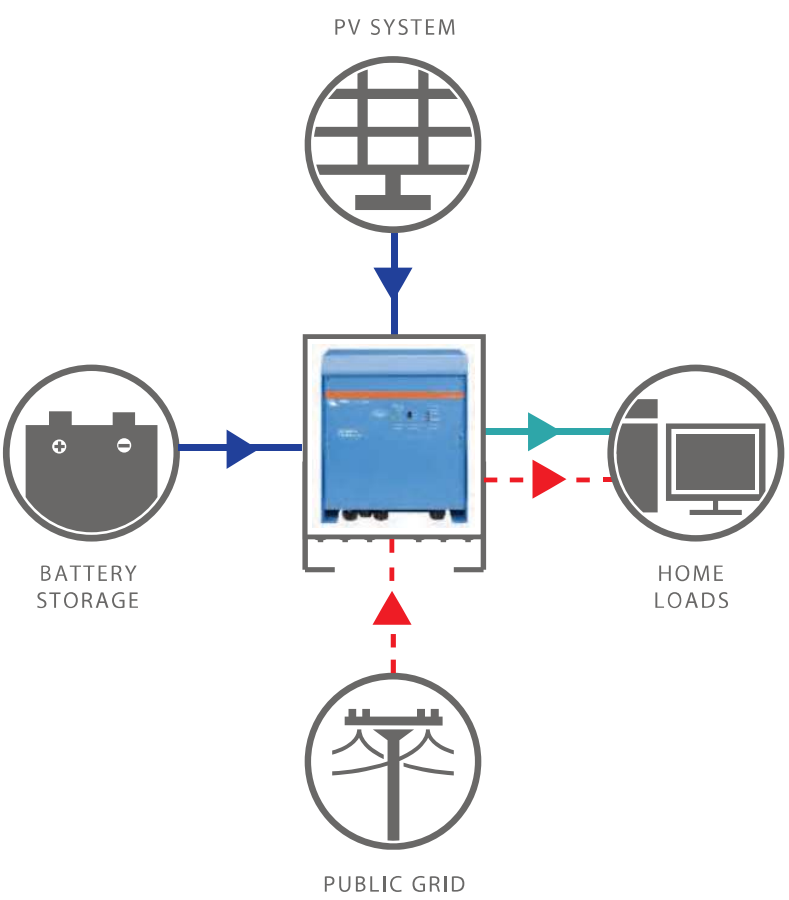
With the Victron Quattro inverters, power is available even during a grid failure. The Quattro takes over the supply to the connected loads in the event of a grid failure. This happens so fast (less than 20 milliseconds) that computers and other electronic equipment will continue to operate without disruption.

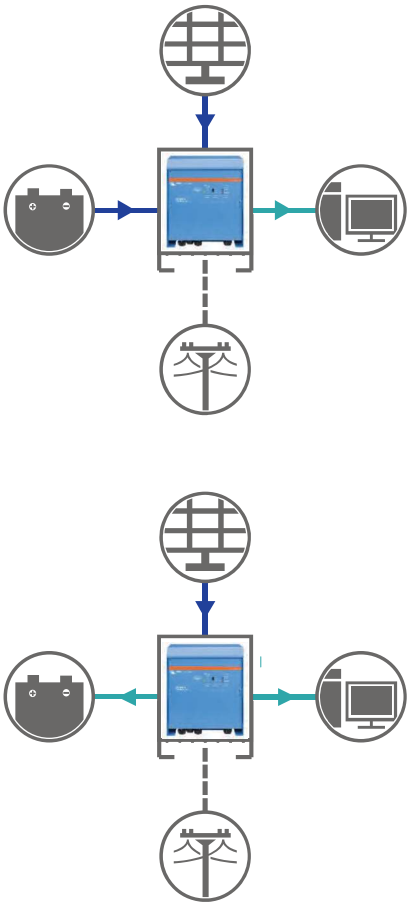
POWERASSIST TECHNOLOGY

The Quattro can supplement the capacity of the PV panels. Where peak power is so often required only for a limited period, the Quattro will make sure that insufficient PV power generation is immediately compensated for by power from the battery. When the load reduces, the spare power is used to charge the batteries.

YOUR OWN MICROGRID

The Quattro inverters gives your household its own microgrid. The normal operation of the Quattro is for the inverter and loads to be disconnected from the grid and power the loads with PV power and/or stored energy from the battery. Grid power is not blended with PV power and only connects to the grid when the batteries are depleted. As long as there is adequate active PV power and stored PV power in the batteries to power the loads, then the Quattro will never connect to the grid. This new generation of inverter technology allows the energy flows within a storage system to be intelligently controlled in parallel from array to batteries, to loads and to the grid or from batteries to loads or to the grid–all simultaneously.


PV SYSTEM
BATTERY STORAGE
HOME LOADS
PUBLIC GRID




- NOW -
classic roof top system
PV PANELS
CABLES
INVERTER
PROFESSIONAL INSTALLATION TEAM
PV BATTERY
MOUNTING RAILS


- FUTURE -
smartflower all-in-one solar system
265 CM

Remarkable, powerful and efficient. Up to 40% more output, thanks to the innovative smart features.

MADE FOR THE FUTURE

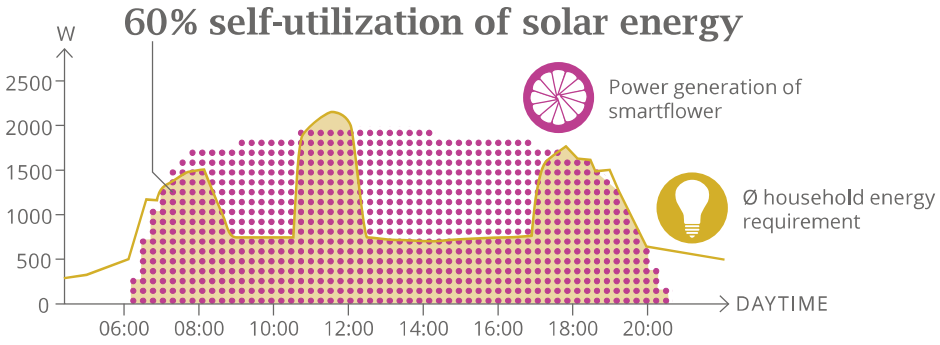
First time ever that a complete residential solar system with integrated lithium battery storage is portable and mobile, and still generate enough electricity to power a house.

NOW YOU CAN HAVE AN INSTANT POWER PLANT AT CONSTRUCTION SITES, OUTDOOR CONCERTS, SURFING COMPETITIONS, POLITICAL AND OUTDOOR EVENTS. NO MORE DIESEL GENERATORS WITH THEIR LOUD NOISES, NOXIOUS FUMES, AND NEED TO CONSTANTLY BUY AND TRANSPORT EXPENSIVE DIESEL FUEL.

Astronomically controlled and movable across two axes: the circular solar modular fan constantly tracks the sun and always sets itself at an exact 90-degree angle to it, even when the sun is hidden behind clouds. The astounding result: up to 40% more output as compared to a conventional rooftop system, which receives optimum sunlight only for a few hours a day.

Simply smart. Simply efficient. For triple the self-utilization of solar energy produced.

PHOTOVOLTAIC TECHNOLOGY, AS IT SHOULD BE



Wouldn't it be wonderful if each of us could produce all clean energy we need right in our backyards? And wouldn't it be cherry on top if the same photovoltaic system could simply be plug-&-play like any other normal home appliance? At smartflower, we have stopped asking such questions. Instead, we have answered them – with smartflower, the world's first all-in-one solar system.

Thanks to its extraordinary construction and the perfectly synchronized components, the system delivers, on an average, approx. 6,200 kWh per year.

Smartflower represents changing times. The size of the system alone is no longer the measure of all things. What counts is a fairly constant production rate during the course of the day in order to enable a more effective use of the produced energy. Smartflower achieves self-utilization of around 60% – a significant improvement over a comparable rooftop unit, which averages just around 20%. Now that is what we call smart!

At 6:00 am, smartflower starts automatically and cleans itself

Awake when you are. Energy from the first to the last rays of the sun.

A SYSTEM THAT FITS YOUR NEEDS

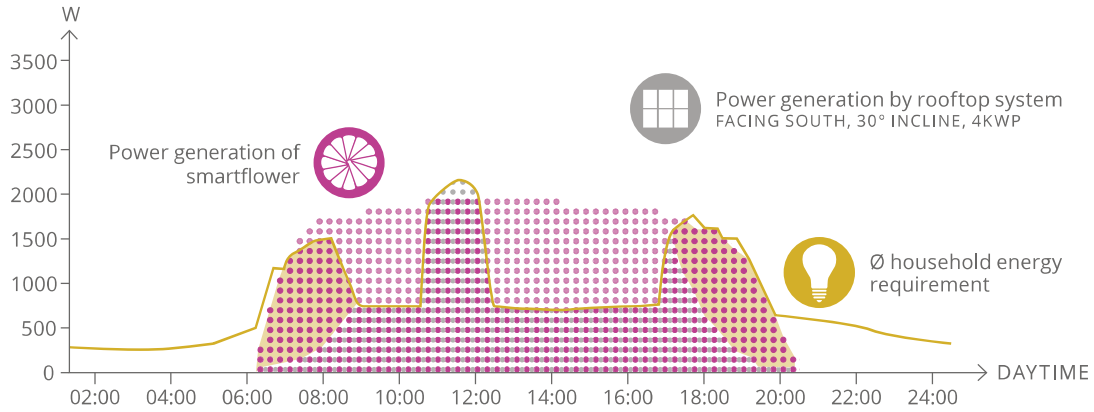
As the sun rises in the morning, smartflower unfolds itself completely automatically. It directs its solar modular fan (with a surface area of 18 m^2) towards the sun and begins producing electricity for you – for your hot shower, your fresh coffee, or the breakfast radio. Thanks to dual-axis sun tracking, the fan moves reliably along with the sun throughout the day.

The result: in comparison with the static rooftop system, the unit starts earlier in order to produce the exact amount of electricity you need. It consistently maintains the electricity supply and even uses the energy from the last sunrays efficiently enough to cover your early evening electricity requirements. Only then, does it close up to its secure position, which is also completely automatic.

At 12:00 noon, smartflower follows the sun

At 8:00 pm, smartflower ends the operation and cleans itself

SMART FOLLOWS THE SUN:
SMARTFLOWER POP COMPARED WITH A STATIC ROOFTOP SYSTEM*



The image clearly demonstrates how smartflower functions more efficiently than conventional systems. It has a considerably longer peak phase and produces energy even in the fringe hours of the day, which a rooftop system cannot achieve because of its static alignment to the sun. These produce maximum electricity when you are not at home – valuable energy which is lost.

*Basis of calculation: a typical July day in Madrid

Plug & Play - and that is a promise! smartflower functions autonomously and automatically

SMART FEATURES FOR MORE EFFICIENCY AND A CARE-FREE USE

SMART USE

smartflower is delivered as an all-in-one complete system and is operational within an hour. No complex assembly is required: the system is firmly bolted to the ground (or concrete foundation) at the location of your choice. It is designed for maximum performance (see also smart tracking, smart cleaning and smart cooling), and it is easy to use and maintain. It reliably provides electricity throughout the day.

SMART TRACKING

Thanks to the GPS control system, the solar modular fan moves horizontally and vertically along with the sun's position, even when it's cloudy. This guarantees optimum alignment with the sun – an exact 90° angle – during the entire course of the day, even when the sun is low on horizon in the winter. The result: despite the lower space requirement, up to 40% more output as compared to that of a conventional rooftop system, which is only ideally positioned towards the sun for a few hours per year.

SMART CLEANING

smartflower easily rids itself of dust deposits or snow by folding and unfolding itself. Thus, common losses in energy production (up to 5%) are minimized.

SMART COOLING

Hot modules deliver less electricity than cool modules. 50°F more means 5% less output. The modules of smartflower are always rear-ventilated – hot air cannot accumulate due to their construction. This means they are 50°-68°F cooler and deliver 5–10% more output as compared to rooftop systems.

SMART MOBILITY

A significant advantage over fixed rooftop systems: smartflower is mobile! When you move out, simply take your private solar plant with you. Disassembling the smartflower is just as simple as assembling it: just unscrew the four anchoring bolts and cart it away. And naturally the ground can be easily restored to its original state.

SMART SAFETY

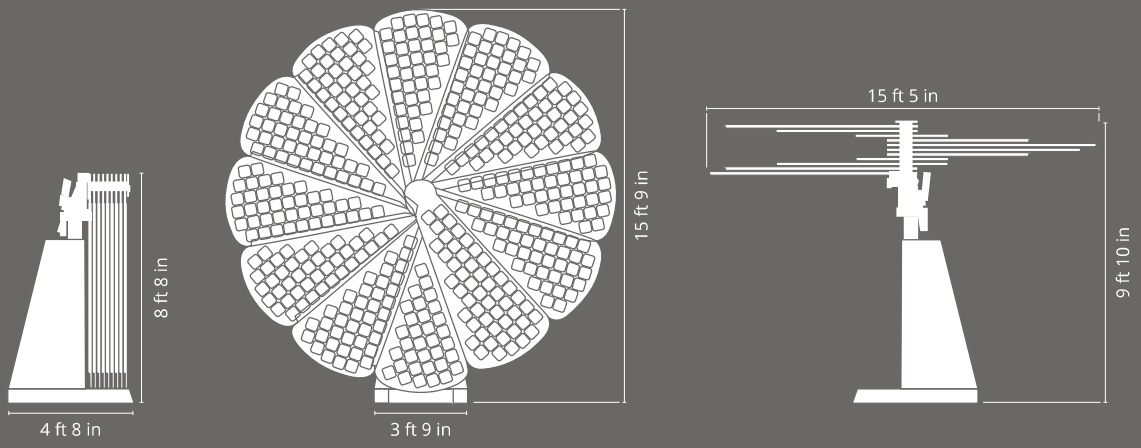
In continuous operation, the sensors permanently monitor the wind speed. In winds above 34 mph, smartflower automatically folds into its secure position in order to avoid damages. If the wind increases further, 39 mph or more, it takes up the secondary security position (same as night position). The sensors continue to function and when the wind decreases, the system folds out completely and returns to its electricity-producing tracking position.

SMART OPTIONS

When it comes to solar energy, smartflower lets you show your colors! It is available in eight colors – from the trendy Berry to the classic Pearl. Either way, the glossy, finely-structured surface gives the base an appealing, modern design.

At a glance. The essential details about smartflower.

DIMENSIONS



EFFICIENCY GA IN THROUGH SMART FEATURES

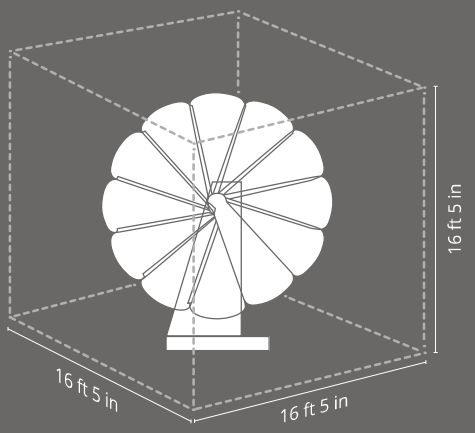
	SMARTFLOWER 2.51 KWP	ROOFTOP SYSTEM 4KWP
POWER OUTPUT AS PER PV GIS[1], LOCATION HONOLULU	6,200 kWh	6,250 kWh
LOWER YIELDS		
Deviation from facing south and roof slope (possible up to 12%	smart tracking	-3%
Higher module temperature, low dissipation of heat, heat build-up	smart cooling	-5%
Contamination (e.g. by sand, salt, dust, snow)	smart cleaning	-3%
REVISED OUTPUT	5,100kWh	5,563 kWh
DEGREE OF SELF-UTILIZATION[2]	60 %	20 %
Energy consumed by owner	3,060kWh	1,669 kWh
Efficiency gain by personal consumption	183%	

Explanation: For rooftop systems, static alignment to the sun, heat build-up and decontamination to lead to a lower output than the one stated as theoretically possible at the location. Furthermore, the system does not constantly produce electricity throughout the day, for example in the afternoon when it is not required. This leads to the distinctly lower degree of self-utilization of a rooftop system and/or to the stated efficiency gain of smartflower.

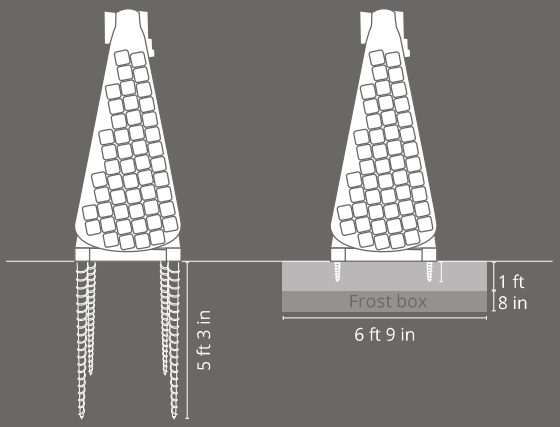
[1] PVGIS: Photovoltaic Geographical Information System, http://re.jrc.ec.europa.eu/pvgis/

[2] Degree of self-utilization: 60% for smartflower, see page 7; 20% for rooftop systems is a statistical empirical value.v

SPACE REQUIREMENT



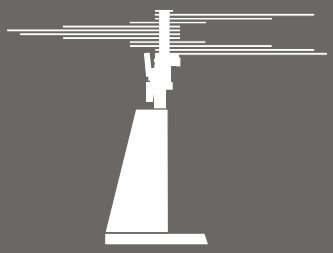
INSTALLATION



Ground bolts

Concrete foundation

SECURITY POSITIONS



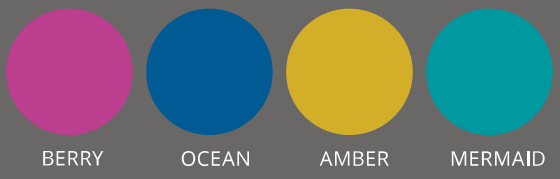
Security position 1

At a wind speed of
34 mph

Security position 2

At a wind speed of
39 mph

COLORS



BERRY OCEAN AMBER MERMAID

PEARL LAVENDER JUNGLE PORCELAIN

TECHNICAL DATA

POWER OUTPUT

Nominal output	2.51 kWp
Power output through bi-axial sun tracking	3,400 - 6,200 kWh/a depending on the region

SYSTEM

Module type	Glass/backsheet
Module product warranty	20 years
Module power output warranty	25 years on 80%
Cell type	Monocrystalline
Inverter module	1-phase, integrated

INSTALLATION

Assembly on earth studs or concrete foundation

AREA

Temperature range	-4°F to +122F°

ELECTRICAL

up to 99 ft	3 x 2.5mm² AWG 14
from 99 ft onwards	local standards must be followed

THE WORLD'S FIRST ALL-IN-ONE PLUG-AND-PLAY PHOTOVOLTAIC AND ENERGY STORAGE SYSTEM

ALL-IN-ONE PLUG-AND-PLAY PHOTOVOLTAIC AND ENERGY STORAGE SYSTEM

Simply forget everything that you have read about the extensive planning, configuration and installation of solar power systems. The smartflower is delivered to any home in its complete form with everything necessary for power generation—photovoltaic modules, controller, inverter—and ready to start in no time. Users simply anchor it in the ground with a concrete or screw foundation and then operate it immediately. In comparison to conventional photovoltaic systems, there is no complicated installation or operation process, which usually needs to be done by a licensed professional. Start generating clean electricity in about an hour. Only one small unit creates up to 6,200 kWh of electricity annually, depending on the installation location.

DUAL-AXIS TRACKING

Thanks to the GPS control system, the solar modular fan moves horizontally and vertically along with the sun's position, even when it's cloudy. This guarantees optimum alignment with the sun—an exact 90° angle—during the entire course of the day, even when the sun is low on the horizon in the winter. The result: despite the lower space requirement, up to 40% more output compared to that of a conventional rooftop system, which receives optimum sunlight for only a few hours. The smartflower starts producing electricity earlier than conventional rooftop systems, consistently maintaining the electricity supply and even uses the energy from the last sun rays efficiently enough to cover your early evening electricity requirements. Only then does it close up to its secure position, which is also completely automatic.

SELF-CLEANING

The smartflower easily rids itself of dust and dirt deposits by folding and unfolding itself. This has the benefit of auto-wiping the panels, preventing them from becoming dirty and inefficient like regular panels. Thus, common losses in energy production are minimized.

SMART COOLING

Hot modules deliver less electricity than cool modules. The modules on the smartflower are always rear-ventilated—hot air cannot accumulate due to their construction. This means they are 50°-68° cooler and deliver 5-10% more output as compared to rooftop systems. Thanks to smart cooling and self-cleaning, common losses in output due to heat and contamination are prevented by up to 15%.

MOBILITY

A significant advantage over fixed rooftop systems: this system is mobile! When you move out, simply take your private solar plant with you. The smartflower can be moved easily to your next home upon relocation. Disassembling the smartflower is just as simple as assembling it: just unscrew the four anchoring bolts and cart it away. And naturally the ground can be easily restored to its original state.

SAFETY

In continuous operation, the sensors permanently monitor the wind speed. In winds above 34 mph, the smartflower automatically folds into its secure position in order to avoid damages. If the wind increases further, 39 mph or more, it takes up the secondary security position (same as night position). The sensors continue to function and when the wind decreases, the smartflower folds out completely and returns to its electricity-producing tracking position. In the case of fire, the smartflower offers a significant advantage over rooftop systems as it can be disconnected from the power supply at any time and thus presents no danger during fire-fighting operations.

INTEGRATED ENERGY STORAGE AND BATTERY BACK-UP

Completely integrated energy storage is available as either a fully independent off-grid version or connect the grid as a back-up. The smartflower comes in energy storage capacities of 4.6 kWh and 13.8 kWh and uses state-of-the-art lithium-ion batteries. On sunny days the smartflower supplies you with power directly and replenishes the storage at the same time. At consumption spikes, e.g., at midday, energy is supplied from the battery to cover the high-energy requirement automatically. By the evening the power storage is charged sufficiently to span the night and morning hours without sun. If power from the battery runs out and there is still enough solar energy, power is taken from the grid automatically—fully automatically so that your power supply is guaranteed at all times.

VERSATILITY

The smartflower is ideal if your roof is not an option (installation, aesthetics, rental property, etc.): this system can be set up in the garden and can be taken along when you move. Now for the first time ever everyone can join in the clean energy revolution.

GUARANTEED PERFORMANCE

The company guarantees the power output of the solar modules for 25 years.

AESTHETICALLY PLEASING

The smartflower can be set up in the garden or the yard and can be more aesthetically pleasing than a bank of solar panels. Here's a complete system that not only maximizes the energy created but allows solar to be mobile for the first time. Regardless of the benefits, some designers and potential consumers don't always like the look of PV on the roof or the roof isn't correctly orientated in order to maximize on output. The smartflower combats all of these drawbacks within one all-encompassing solution. It's the first designer solar PV system available in the world.

ECONOMIES OF SCALE

Cost is kept down through an industrialized process since the smartflower does not need to be customized to an individual as in other photovoltaic systems. Every sub-system within the smartflower is pre-wired at the factory and comes ready to produce electricity within an hour of arrival at your residence.

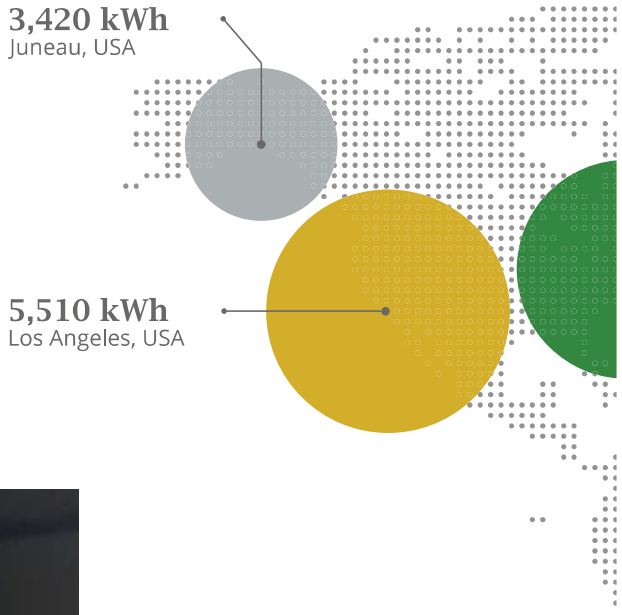
EASY-MAINTENANCE

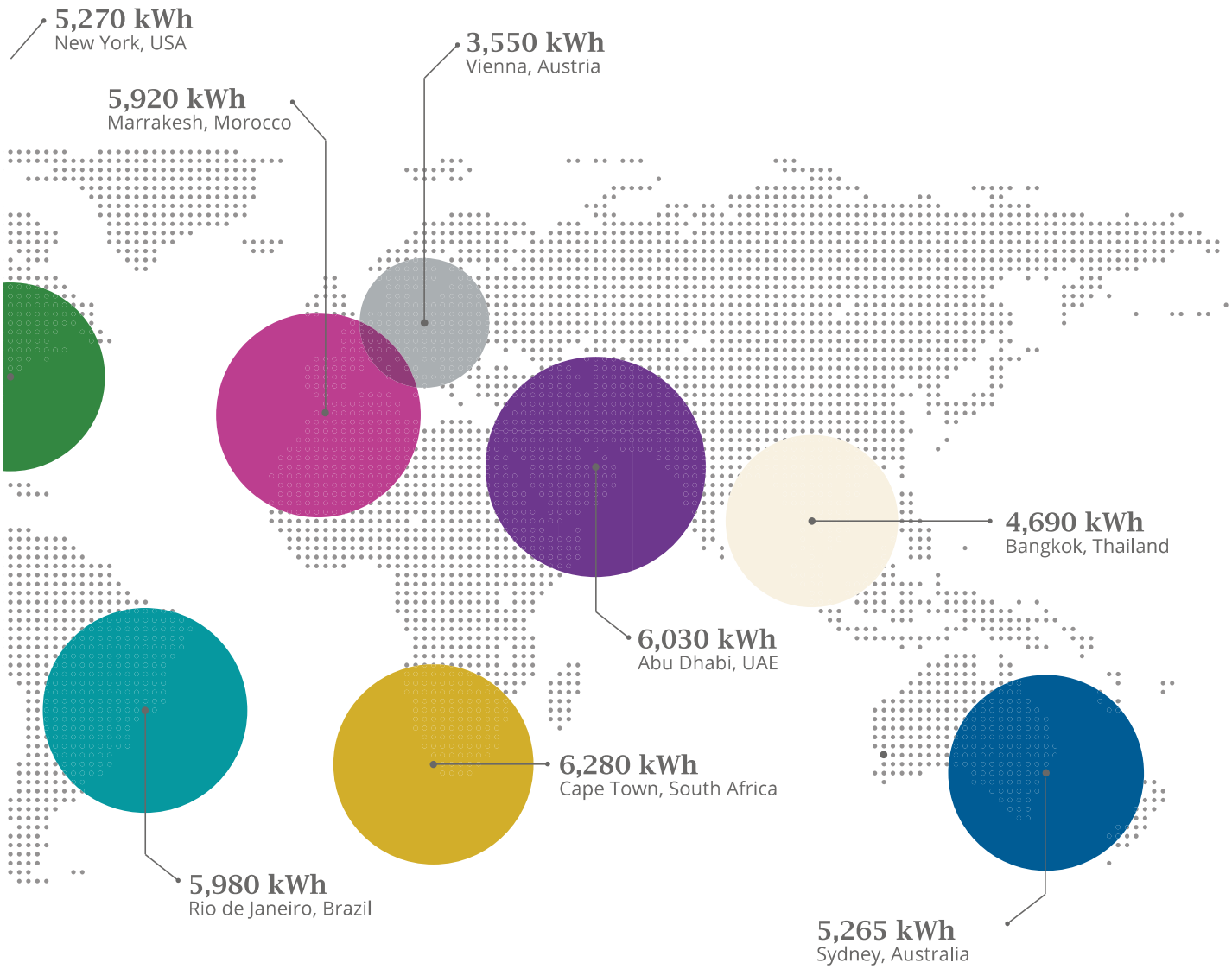
Rooftop systems come with some built-in headaches for homeowners. What if your roof ever needs repairs? First you must dismount the solar panels and then re-install them when the work is complete. The smartflower avoids these issues. Because smartflower is ground-mounted, any repairs or maintenance can be carried out conveniently without having to climb up on the roof.

LONG-TERM LEASE FRIENDLY

Some homeowners have run into problems selling homes with a leased solar system installed on the roof. If they entered into a long-term lease for their system, the new owners need to get approved by the leasing company prior to the sale being finalized. Other buyers might not be interested in home solar and refuse to take on the lease payments at all.

Clean energy for your everyday life





Unlimited independence thanks to high-end technology

FUNCTIONS RELIABLY EVEN DURING SUNNY HOURS

The innovative bi-axial sun tracking of the solar fan enables increased output by up to 40% and thus a sufficient amount of energy to maintain independence from electricity providers, even where it is less sunny.


Sophisticated technology and perfect design.

Clean solar power, whenever you need it - until now it has just been a pipe dream.

NOW YOU ARE CLOSER TO REALIZING THAT DREAM BECAUSE THE SMARTFLOWER CAN NOT ONLY TURN THE SUN'S ENERGY INTO ELECTRICITY VERY EFFICIENTLY, IT CAN STORE IT IN SUFFICIENT QUANTITIES TOO. COMPLETELY INTEGRATED IN AN INNOVATIVE ALL-IN-ONE SOLAR SYSTEM THAT WORKS ON A PLUG-AND-PLAY PRINCIPLE LIKE ANY NORMAL HOUSEHOLD APPLIANCE.

Solar energy is a clean solution.

THE SOLAR MODULES IN THE PV SYSTEM RECEIVES THE UNLIMITED ENERGY OF THE SUN AND TURNS IT INTO DOMESTIC ENERGY USING THE PV INVERTER. HOWEVER, A STANDARD HOUSEHOLD CAN ONLY USE ONE-FIFTH OF THE GENERATED SOLAR ENERGY DIRECTLY, MEANING SELF-UTILIZATION OF 20%. THE REMAINING SURPLUS SOLAR ENERGY IS FED UNDER CURRENT CONDITIONS INTO THE GRID.

SOLAR ENERGY AND HOW TO MAXIMIZE IT

The reduction in feed-in credits for solar energy, often lower today than the energy price, has led to a rethink by installers and system operators about the use of solar energy. For private homes and small businesses, optimizing self-utilization is currently much more lucrative than simply feeding solar energy into the grid. Better: store solar energy and use it around the clock. With the smartflower, you can store up to 60% for self-utilization. The amount you save is significantly more attractive than the feed-in credit.

OPTIMAL SELF-UTILIZATION WITH BATTERY STORAGE

The smartflower's efficient storage system increases the captured solar energy and increases your self-utilization to 60%. The installation of a smartflower solar system pays for itself much quicker and makes you independent of rising energy prices.

INCREASE YOUR SELF-UTILIZATION UP TO 60%

The secret behind this is easy to explain: you store surplus solar energy not used directly in batteries and use it when the sun isn't shining. Self-utilization of solar energy can be optimized many times over using the smartflower. The smartflower stores surplus solar energy not used directly in lithium-ion batteries for use when the sun isn't shining.

INDEPENDENCE FROM THE GRID

Self-utilization of self-generated solar energy is also called "independence" in the solar industry. Without energy storage, however, you still have to rely heavily on your power provider in the evening and night and when the weather is bad. The smartflower increases your level of independence because you are switched back to the grid only when you have used your stored solar energy.

How the **smartflower works**

THE SMARTFLOWER COMBINES SEVERAL INTELLIGENT FUNCTIONALITIES IN A SINGLE UNIT, SO YOUR ENERGY CAN BE USED AS EFFICIENTLY AS POSSIBLE UNDER THE CURRENT REGULATIONS. OPTIMAL USE OF YOUR SELF-GENERATED ENERGY IS ALWAYS THE KEY ISSUE. THE SMARTFLOWER DIRECTS YOUR ENERGY INTELLIGENTLY TO WHERE IT BELONGS. WITH ITS UNIQUE TECHNOLOGY, THE SMARTFLOWER CAN DECIDE ITSELF WHETHER TO USE SELF-GENERATED ENERGY STRAIGHT AWAY, STORE IT IN BATTERIES, OR FEED IT INTO THE GRID. THIS ALLOWS YOU TO GET MAXIMUM RESULTS FROM YOUR PV SYSTEM USING THE SMARTFLOWER.

THE BACK-UP SUPPLY PROVIDES SECURITY IF THE GRID FAILS

The smartflower is equipped with UPS (Uninterruptible Power Supply) functionality. If there is a power failure, the system is designed to separate completely from the grid and switch the load to Local Out. By this arrangement, energy continues to be supplied from the self-generated solar energy and from the batteries.

Daily Energy Consumption

If the battery is discharged before sunrise, energy is drawn from the grid (if your smartflower is optionally configured to connect to the grid as a back-up)

At sunrise, consumption switches to self-generated solar energy

Once enough solar energy has been produced for domestic use, the smartflower starts charging the battery simultaneously

If clouds block the sun and there is no longer enough solar energy for the consumers in the home, the smartflower immediately draws extra power from the batteries

When the sky clears, the batteries are charged using the surplus solar energy

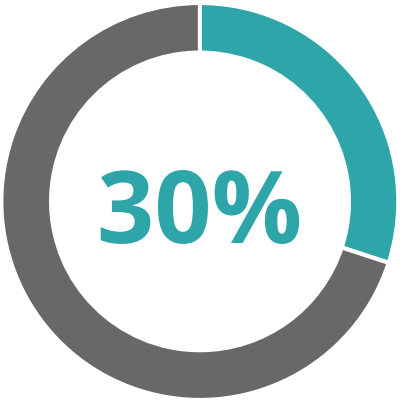
As soon as the battery is fully charged, the additional solar energy is fed into the grid and earns you money if you are under Hawaiian Electric's Grid Supply program

When the sun goes down, the smartflower supplies the consumers in the home with stored energy from the batteries

smartflower increases your property value*

INSTALLING SOLAR PANELS ON YOUR PROPERTY INCREASES THE VALUE OF YOUR HOME. THE NATIONAL RENEWABLE ENERGY LABORATORY OFFERS A USEFUL GUIDE WHEN DETERMINING HOW MUCH YOUR PROPERTY'S VALUE WILL GO UP.* ACCORDING TO ITS RESEARCH, EACH ADDITIONAL $1 IN ENERGY BILL SAVINGS (FROM YOUR SOLAR INSTALLATION) ADDS $20 TO YOUR HOME'S TOTAL VALUE. IN A STATE LIKE HAWAII WITH BY FAR THE HIGHEST ELECTRICITY RATES IN THE U.S., A SMALL 3.1 KW SYSTEM CAN ADD MORE THAN $20,000 TO THE VALUE OF YOUR HOME.

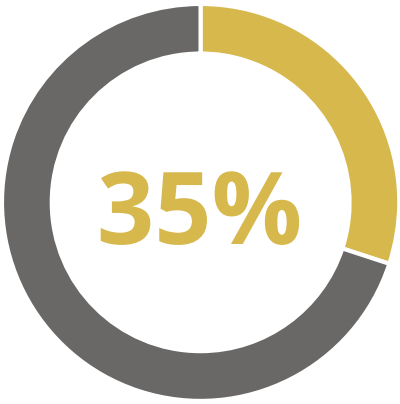
FEDERAL TAX CREDITS



Customer **will receive**

30% OF THE ACTUAL COST OF THE SYSTEM WITH NO UPPER LIMIT IN FEDERAL TAX CREDITS

HAWAII STATE TAX CREDITS



Customer **will receive**

35% OF THE ACTUAL COST OF THE SYSTEM OR $5,000, WHICHEVER IS LESS, IN STATE OF HAWAII TAX CREDITS

- FOR THE 13.8 KWH MODEL THIS AMOUNTS TO $14,900 IN REBATES
- FOR THE 4.6 KWH MODEL THIS AMOUNTS TO $13,400 IN REBATES

*http://www.nrel.gov/learning/pdfs/43844.pdf