SWOpti

Solar Watts Optimisation

SWOpti strives to optimise the use as self-consumption of the electricity generated by your photovoltaic solar panels and/or wind turbines. This means that it allows your electrical appliances to operate only if you have free electricity available (your panels are producing more than you are consuming), and on the contrary, it turns off appliances when it sees that you are consuming electricity from the grid. This control is very fine because SWOpti measures your production/consumption every 5 seconds.

How did SWOpti come about?

An individual in Normandy, France had solar panels installed. He has an electric hot water tank, and with the size of his family, it runs about 3 hours every day. One day, he was looking out the window and notices that there were a lot of clouds. His hot water heater was operating, but, because of the clouds, the solar panels were not producing enough electricity, and the hot water heater was consuming electricity from the grid. This situation lasted an hour, then, all of a sudden, the sun came back and brightly lit his panels, and that was the case for 5 hours. He was frustrated because, for one hour, he had to pay for the electricity yet at another moment of the day, there was largely enough power from the panels to heat his water entirely free. He wondered "What if I were able to make my appliances operate only when I have enough free electricity from the panels." He searched but could not find a solution that would do what he wanted. As a home automation enthusiast and programmer, he decided to create this solution himself.

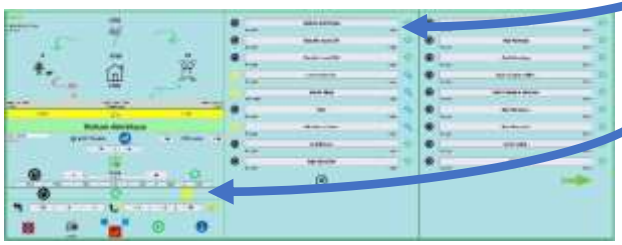
How does it work?

The best way to illustrate this is with a concrete example. When SWOpti is installed, you draw up a list of the electrical appliances that you want to control, with the appliances at the top of the list having the most priority. Your panels are producing 7000 watts and your house is using 3000 watts. SWOpti analyses "I have 4000 watts available… how can I use these 4000 watts… what can I turn on?" SWOpti will begin at the top of the list and will look for the first appliance that is not already turned on and that requires 4000 watts (or less) to operate. The hot water tank for example, which consumes 2500 watts. Once SWOpti has turned on the tank, the diagram will indicate production of 7000 watts, with 5500 watts used by the house, and 1500 watts sent to the battery (if you have one) or to the grid. Because you still have surplus production (1500 watts here), SWOpti will continue to try to use this electricity. But if at a given moment, instead of surplus production, SWOpti sees that you are starting to use electricity from the grid, it will look for the appliances that have a low priority that it could turn off in order to reduce, or even eliminate, this consumption from the grid. In our example, suppose that someone has just turned on a hair dryer (1000 watts) and unfortunately, some clouds are passing overhead and at the same time there is a drop in production from the panels. The panels are now producing only 5000 watts, and the house is consuming 6500 (with the hot water tank already on and now the hair dryer too). We are missing 1500 watts, and we are going to have to get these 1500 watts from the grid. SWOpti will intervene, and will try to turn off an appliance (an electric radiator in a hallway with low priority, perhaps?) in order to eliminate this consumption from the grid. With the passage of time, the person using the hair dryer will turn

it off, sunshine will return and, sooner or later, the hot water tank will stop using electricity because all the water is hot, and SWOpti will probably be able to turn on the radiator that it had turned off. SWOpti monitors all of this and takes the decisions that are needed to increase your self-consumption.

And what about batteries?

As seen by SWOpti, a battery is nothing more than a "second sun". Indeed, the electricity in the battery comes from the panels, and finally from the sun. For SWOpti, it is simply another source of free electricity. At the beginning of our example above, where we have 4000 watts available, these 4000 watts are being sent to the battery (or to the grid if the battery is full). Finally, you should know that some batteries have a charging limit: the battery could be empty, yet we cannot send more than 3000 watts to the battery at any given time. In this case, of our 4000 excess watts of production, 3000 are sent to the battery and 1000 to the grid. Another thing to consider: your BMS (battery management system, which is upstream of SWOpti), makes all the electricity stored in the battery available. Even in the middle of the day (bad weather?), if the house needs it, the BMS will fully discharge the battery to meet the needs of the house. And that is a good thing. Think about it… the goal of self-consumption is to use this free energy that you are producing, whether it is coming from the panels or the battery. Even if you start out the night with an empty battery, you will have at least consumed the free electricity at a moment when you would have paid the high rate for it; what little electricity you may need to consume at night will at least be at the lower rate (if you are on a peak/off-peak plan). And you must always keep one thing in mind: SWOpti does not try to help you pay your energy provider at a lower rate… SWOpti tries to eliminate this consumption altogether or at least reduce it.



I maintain control…

SWOpti runs all by itself and does not require any intervention. However, there will be times when you want to intervene. Let's imagine in the afternoon you receive a call from some friends who have just won the lottery and they want to come and celebrate this evening, and that they will probably be staying the night. You need to go and buy food for the evening, but just before leaving, you go to the SWOpti control screen, you select the hot water tank and you activate the "Override On" icon because you want to be sure that there will be enough hot water tonight (even if you must consume electricity from the grid). You also have the "Timed Override On" mode (same thing as "Override On", except you limit the "on" time to 120 minutes, for example). Of course, the "Override Off" and "Timed Override Off" modes also exist. This could be useful to momentarily change the priority of an appliance. If you have given priority 1 to your hot water tank and your electric vehicle charger has priority 2, you could set up a 120-minute Override Off for the hot water tank so that, for two hours, priority goes to the car. That means that if there is enough production available, it will be given to the car; that does not mean that the car will definitely be charged. If you absolutely want the car to charge, then setting the charger to Override On mode would be better.

Electric radiators

SWOpti allows you to set a desired temperature independently for each radiator, and this per day of the week and to the nearest half-hour. There is also an icon that allows you to turn off all heating devices at once (that is normally the mode in the summer). SWOpti also handles appliances that cool, such as a cooling fan. Here, instead of setting the minimum temperature you want in a room, you set the maximum temperature (starting at which the fan must turn on because it has become too hot).

During the development of SWOpti, a dilemma occurred regarding temperature control. Indeed, you have the part of the software that controls the temperature, which will naturally turn on a radiator because it is 18° in a room for which the desired temperature is 19°. But, at the same time, we have already seen that the main part of SWOpti is always trying to turn off appliances when you start to draw power from the grid. A radiator that was turned on just a few minutes ago could then be turned off. It is as if the two parts of SWOpti are fighting for control of the radiator. To overcome this problem, the notions of "delta temperature" and "catch-up time" were added. These two notions can be configured for each radiator. Little by little, the temperature in the room in question will continue to drop. If the delta temperature for this radiator is 3° and the catch-up time is 45 minutes, when the temperature in the room falls to 19° - 3° = 16°, SWOpti will "self-programme" a Timed Override On for the radiator for 45 minutes, thus allowing the radiator to "catch up".

So, how can I get a SWOpti?

1 Download the "Information Collection" PDF available on the www.swopti.fr website. Fill up the form with all the information required so that we can prepare an estimate for you. The PDF also contains a guide to help you, section by section, in filling out the form. SWOpti is also always available to assist if you need help. Send your completed form to contact@swopti.fr.

2 You will receive an estimate for your situation (no two SWOpti Boxes are identical!). In the estimate, there is a wiring diagram intended for your electrician. With your SWOpti Box, you will receive the clamps and micromodules (if your situation so requires) already paired with your SWOpti, but the final installation of them (behind radiators, in the electrical box, etc.) must of course be done in your home. If you are not at ease with things like circuit breakers, live wires and neutral wires, it is highly recommended that you call upon an electrician. If you call upon an electrician, the cost of their service is at your charge. For information, 94% of customers install these components (themselves, do-it-yourselfer in the family or a neighbour) and 6% call upon an electrician or home automation specialist. By the way, if you are a do-it-yourselfer, you can put your SWOpti together yourself (details on www.swopti.fr).
The estimate is valid for a period of 30 days. You can transform it into an order by signing and

returning it to SWOpti. Once your SWOpti Box has been paid for, we will order the components specific to your system and we will manufacture your SWOpti Box.

3 You will receive your SWOpti Box by post. Except for the micromodules and clamps to be connected to your installation, your box is ready to use. Simply plug it into an outlet and connect to an Ethernet port on your home network or activate the Wifi.

4 You can access SWOpti's control panel from any internet browser, on other computers, tablets and mobile phones (no app to install). If you set a parameter in your internet box, for security reasons, you will be able to access the control panel from outside your home, on your mobile phone for example.

SWOpti

- SWOpti does not rely on the internet; all your data is local
- Communication between SWOpti and the appliances is via harmless radio waves
- Precise management of the temperature settings (by half-hour) for heating/cooling appliances
- SWOpti does not use "weather forecasts" to optimise your self-consumption. It monitors the current "live" situation of your panels.
- Control screen available via an internet browser
- Secure access remotely via the "permanent link" service (included with SWOpti)
- SWOpti comes with a lifetime licence for HomeSeer, the ultra-complete home automation software
- General view of all the electricity flows (panels, house, battery, grid), updated every 5 seconds
- Possibility to monitor the consumption of the appliances that you do not want to control (oven…)
- Precise control for each appliance controlled (Normal, Override On, Timed Override On, Override Off, Timed Override Off …)
- Assistance, software updates whenever a new version is released, and a permanent external link thanks to the subscription

March 2025

For more information…

www.swopti.fr