



Solar PV Panels and their Operation - 7 Frequently Asked Questions

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Customers who have had their properties surveyed for a solar photovoltaic (PV) installation ask a whole variety of questions. These are often about the way that an installation actually works. Some of these questions are dealt with here.

1. How do solar panels work?

Photovoltaic panels generate electricity whenever there is daylight. Any daylight will produce power, but the most power (the system's rated peak power) will be produced with direct sunlight. They work summer and winter, 365 days per year. A typical household has a background electricity consumption between 500 watts and 1kW. The photovoltaic panels will exceed this amount for much of the day, hence your panels could be powering your house 100% for much of the time. Any excess power produced by the panels is fed back into the grid and the power company pays you for this. Once installed the system is fully automatic and its performance can be monitored with the inverter's display.

2. What does the inverter do?

PV panels produce high voltage (more than 400v) direct current (DC) electricity. It is the job of the inverter to convert this DC current to 240V 50Hz alternating current (AC) which is the standard voltage used by the appliances in your home. The inverter also has to match the voltage and phase of the alternating current that it produces exactly to the same phase and voltage as the grid. This enables the excess power produced by the solar panels to be directly fed back into the national grid for the benefit of everyone.

3. Where can I place the solar collector?

On a roof or on the ground, ideally facing South, or anywhere between South-East and South-West, for best performance. If your roof ridge is oriented north-south, you can install panels on each side of the roof (a dual-aspect installation). This works well since the east facing panel will take advantage of the morning sun and the west facing panel the afternoon/evening sun. This spreads the power generation curve so that there is less of a peak mid-day and gives more power in the morning and evening. In this configuration more panels can be attached to given size inverter. In terms of getting the most power out of a single panel it should be facing south.

4. What is the ideal angle to mount the panels?

Usually when mounting on a roof just use the roof angle. For a flat-roof installation the latitude, wind loading, and shading of adjacent panels must be considered. For maximum power generation the panels should be closer to the summer optimum solar angle, hence 30 degrees is ideal. Using a shallower angle reduces wind loads and also reduces shading, so adjacent rows of panels can be

mounted closer together. Hence 20 degrees is also commonly used for flat roof and ground mounted installations.

5. How long might a solar PV system last?

System life is approximately 25-30 years. There are no moving parts. The panels are tested to withstand hail up to 25 mm in diameter. The panels power output is guaranteed to remain greater than 80% of the original output up until 25 years.

6. How can I get the most value from my solar PV panels?

During the day you will now effectively have free electricity (up to a point). Hence you should run appliances such as washing machine, dishwasher, vacuum cleaner, electric lawn mower, electric oven during the day when the panels are producing the most electricity. If you have a large system you can use an immersion heater to heat your hot water using the free electricity being generated.

7. My panels appear not to be performing as well as I was expecting?

The panels' output can be adversely affected by hot temperatures, which is quite normal. When it is really hot and there is very strong sun, often the performance will not be as good as during cooler conditions. This seems counter-intuitive but is normal operation for all PV cells. (In very hot countries they use water to cool the panels.) In very hot and sunny conditions the panel temperatures can get up to 80 degrees C, which would give a 25% power reduction. You will find that the peak output will usually be achieved on a day with scattered cloud when the sun comes out from behind a cloud and the panels are cool, the output peaks then starts to reduce as the panels heat up.