Solar FAQs

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1. What is a PV panel?

A PV solar panel, referred to in the industry as a solar module, is constructed by connecting photovoltaic cells (or PV cells) to produce electricity. The cells are a semiconductor-based technology that converts solar radiation into direct current (DC) electricity.

2. How does shade affect the performance of a PV solar system?

One of the leading causes of power loss in a solar PV system is when part of the panel or array becomes shaded. In a panel there will usually be either 60 or 72 cells connected together. Each cell produces a certain voltage and amperage. The cells are configured and connected in a combination of series and parallel connections to produce the correct amount of power. If any individual cells performance is degraded by shade, the performance of the entire panel will fall to a point relative to the worst performing cell. Likewise, in a string of panels, the entire string suffers performance reduction to that of the lowest performing panel. A solar installation should be designed in a way such that none of the panels are even partly shaded at any point of the day.

3. How much room does a PV system need?

A typical solar panel of 230 Watts will measure about 39" x 66". Once our engineering department has determined the required angle, shading factors, etc. for your site, we can give you a more accurate number.

4. Do solar panels have to be installed on the roof?

Solar panels can be installed on the roof, on the side of a building, on the ground or on a pole. The most cost effective installation will usually be on the ground, but if space or shading conditions prevent the use of the ground we can help you review the other options.

5. Do installed solar panels have to face a southerly direction?

In the USA, facing south at the correct angle of elevation will provide the best performance (most KWh per dollar) however solar panels can also be installed facing towards the east or west as long as proper considerations are made. Solar panels should not ever face north.

6. What about cloudy days?

PV solar panels will generally produce electricity at a reduced rate under cloudy conditions. Severe clouds will interrupt the production of power.

7. What is insolation?

Insolation refers to a daily total of direct sunlight. In the solar industry it usually refers to the average daily hours of sunlight equaling 1000 watts per square meter. On average, locations within the USA will get between 4 and 6 hours of insolation per day depending on season and location.

8. How long will a solar panel system last?

Solar panels are known to last 40 years or longer. Typical guarantees of a solar panel include five years workmanship and materials warranty and a 20-25 year performance warranty. The typical PV panel performance warranty will guarantee 90% of rated production for 10-15 years, and 80% for 20-25 years. Solar panels are designed to withstand hail, severe wind and weather conditions assuming proper installation. See our SCHOTT warranty for more information.

9. How do I know if a solar PV system is a good choice for me?

If you live in an area where the sun shines, electricity is costly, chances are that PV solar panels will make financial sense for you, especially if there are tax credit, rebates or other incentives available. Contact our sales team to get assistance in evaluating your situation.

10. What are the maintenance requirements or other costs for a PV system?

For a grid-tied system where no batteries need be replaced, there is typically little or no maintenance required. You might consider a periodic inspection to ensure that the panels remain clear of leaves, dirt, bird droppings etc. Other than that, unless there is an equipment failure there should be no maintenance required.

11. What happens if the solar panels are covered by snow?

Some sunlight will penetrate the snow, causing the panels to warm and eventually melt the snow. Spraying the panels with water from a garden hose can speed things along. On a single story roof, a snow rake can be the best option to remove most of the snow allowing the panel to melt the remainder quickly, we suggest using a model with a rubber squeegee blade attached to the end of it. Google: roof rake. Never use any type of broom, shovel or rake that will scratch the solar panel!

12. How do the solar panels stand up to hail, wind, hurricanes etc?

Solar panels themselves are built using tempered glass for durability and safety, and are designed to withstand hail and high winds. Depending on the wind-load requirements in your area, heavier mounting hardware may be required.

13. Will solar panels damage my roof?

Properly installed solar panels will not damage your roof. If your roof is near the end of its expected life, it might be a good idea to consider replacing the roof before adding solar panels, because removing and reinstalling the panels can add to the cost of a roof replacement.

14. What is the warranty on a PV solar system?

Typical guarantees of a solar panel include five years workmanship and materials warranty and a 20-25 year performance warranty. The typical PV performance warranty will guarantee 90% of rated production for 10-15 years, and 80% of rated performance for 20-25 years. See our SCHOTT warranty for more information.

15. Besides the solar panels, what else is needed for a complete system?

In a grid-tied system local power company regulations must be met, each area is different. Otherwise, the system will include the panels, mounting hardware, connecting wires, and an inverter to convert the DC power from the panels into the correct AC voltage.

16. What are solar inverters?

An inverter is any device that inverts DC (direct current) into AC (alternating current). In a solar installation, an inverter is a centralized device that connects to and manages the performance of the solar panel array; it aggregates the DC power coming from the panels or strings of panels and inverts the DC power into single phase (or three phase) AC power at the correct voltage for delivery into the users electrical system, and provides equipment protection and safety features. The better inverters on the market also allow for data logging and web-based remote monitoring of important performance metrics and power generation.

17. What are micro-inverters?

In a solar application, a micro-inverter is a small de-centralized inverter that attaches directly to each panel. The advantages of micro-inverters are several; they may be safer for the installer because they eliminate high voltage DC in the system and instead use household type power; installation may be quicker, and, performance of the panels or strings can be improved if there are shading conditions or otherwise poorly performing panels within the array.

Little is known about the longevity of micro-inverters as they are a new product without an extensive track record. Further, a failed micro-inverter may be very hard to access and replace if it is in the center of a multi-panel installation. Micro-inverters may lower the cost of installation by making it somewhat easier to wire the array, but they also cost more, per watt, than a centralized inverter.

18. What is a grid-tied solar system?

98% of PV solar panels installed in the USA are grid-tied systems, meaning that the system is tied to the power grid (local electric power utility company). The solar power is added to the grid power, reducing the amount of power that must be purchased from the utility.

19. What is an off-grid solar system?

An off-grid solar energy system is where there is no connection to the utility company power grid. This type of installation requires a charge-controller, a bank of batteries and in most cases an inverter, so that electric power requirements can be met at night or during cloudy conditions.

20. What incentives are offered for users of PV solar systems?

Currently, the Federal government offers a personal or business tax credit of 30% of the cost of a PV system. If you are operating a business there is an accelerated depreciation offered, and the USDA REAP grant (specifically for full time farmers and owners of small businesses located in rural areas) is for 25% of the project costs. You also have the option to sell your Solar Renewable Energy Credits (SREC's). Contact Harvest to determine the price for SREC's in your area. This can be a substantial amount coming back to the consumer. Many states also offer additional incentives for utilizing PV solar products.

21. What are the different types of PV panels?

There are currently four main types of solar PV panels:

1. Monocyrstalline — these are made from cells created by cutting thin slices from single crystal silicon block and are higher in efficiency, but also higher in cost per watt. They are easy to spot because they have a smooth even color, usually black.
2. Polycrystalline — these are made from cells created by cutting thin slices from polycrystal silicon block and are slightly lower in efficiency, but also lower in cost per watt. Polycyrstal silicon is the "chicken nugget" of silicon, made by combining many individual crystals. They are easy to spot because they have an uneven color, usually blue.
3. Multicrystalline — a different term for polycrystalline.
4. Thin film — these are made by depositing a thin layer of very finely powdered silicon (amorphous silicon) or other photovoltaic material, on a substrate. These are much lower

in efficiency that crystalline cells, and somewhat cheaper per watt. They are a good choice for large ground mounted utility scale solar arrays where real estate is plentiful. Their low efficiency makes them undesirable for commercial and residential applications because they consume a large amount of roof space compared to mono or poly panels.

22. How do I decide how large my PV solar system should be?

Typically the best return on investment is when you target the average power in watts used during the month with the lowest electric bill. Some net metering programs do not let you carry forward a credit, meaning that when you produce more solar electricity than your total consumption, it is given without compensation to you.

23. What is Net-Metering?

Net Metering is a useful tool in the field of alternative energy. For owners of PV systems, net metering provides an opportunity to sell excess electricity produced to your local utility company. In North America, forty states currently have net metering policies in place. Net metering means that the amount of solar electricity produced (measured in KWh) is subtracted from your overall usage, meaning you only pay the utility for the difference (the "net" amount).

24. What are the utility company requirements to connect my solar power system to the power grid?

The requirements vary depending on the size of the system and the particular state and/or utility. In some states a special meter must be obtained from the power company. Information can be found here:

- http://www.seia.org/cs/federal_issues/net_metering
- http://www.dsireusa.org/

25. Will the Utility Pay Me for My Surplus?

Many European countries have adopted feed-in tariffs (FITs). This is a renewable energy policy that ensures eligible renewable electricity generators (the renewable energy system owners) are paid for total energy generation at set rate, regardless of retail or avoided cost rates. These policies have stimulated rapid renewable energy growth by incenting the consumer.

Some, US states have gone to great lengths to employ this policy and increase their renewable energy production. To date, 21 states have at least one utility offering a production-based

incentive (including FIT's), that will provide cash payments based on the number of kWh or BTU's generated. At least five states have even more lucrative feed-in tariffs: California, Vermont, Oregon, Washington, and Wisconsin. These FITs are through specific utilities and are not state mandated. Other states have proposed FIT policies, including Michigan, Indiana and Illinois.

For now, the rest of us are left with net metering: a policy that allows for the flow of electricity both to and from the customer and the local power company. Through standard net metering, additional kilowatt-hours (kWh) generated by your renewable energy system are applied as a retail credit to your account. Surplus kWh during a billing cycle may be carried over to the next period, but not always. Sometimes surplus credits will carry over indefinitely, but checks are almost never cut to you, the system owner.

On occasion a utility, through standard net metering, will issue a check at the end of the month for surplus, but it is typically a minimal amount. The surplus in this case will most likely be paid at a wholesale price. Also, keep in mind a system large enough to generate a surplus generally won't be granted interconnection approval.

26. How are solar panels tested and rated?

PV panels installed in the USA must be tested to UL 1703 standard and in California, also to IEC 61730. They can be tested and certified by any NRTL (nationally recognized testing laboratory) like UL, CSA, ETL, TUV etc. For consumer purposes, the main rating to consider is the watts rating, which is expressed at watts-peak (Wp), which is the amount of peak power produced under STC (standard test conditions).

27. What are Standard Test Conditions (STC)?

STC is the main set of conditions used in testing solar PV modules. Conditions are considered standard when cell temperature is 25C and you have 1000 W/m^2 of direct insolation. STC also assumes a panel is oriented to the proper angle, elevation.

28. How much power will a solar PV system produce?

You would calculate the total production of a system by determining the annual production of a single panel and multiplying it by the number of panels, then reduce this value to account for inefficiencies. A professional approach would be to use a calculator like PVWatts or RetScreen. This approach will consider the NASA data for insolation at the location, the expected weather and temperature conditions, the orientation (angle and azimuth) of the installation and other factors.

Each system will produce a different amount of power based on the system size, orientation, insolation, etc. A quick look at our solar insolation map will give you an idea of average annual sunlight conditions for your area. A quick, free telephone or email consultation with the Harvest sales team will help you be able make a good estimate of your potential.

29. Will my solar PV system include batteries?

When you connect a solar PV system to the grid, you are essentially using the grid as a battery. Think about it (informally) this way: When solar power exceeds your usage, the utility meter spins backwards. When demand exceeds your solar production, the meter spins forward. The utility company grid acts just like a battery (as your energy storage system). In a grid-tied system you do not need batteries.

30. Will the solar electric system function as “back up” power when the utility power is not available?

Not in a normal grid-tied PV solar installation. In a grid-tied system, the inverter will shut off if the power company grid is not also providing or able to provide power. This is more of a safety feature than a technical limitation. To have a back-up battery system, you would need to take the same steps as if there were no solar involved, i.e., install some type of UPS system. Another approach would be to install a hybrid on/off-grid system through the use of a special charger-inverter and batteries.

31. Can I power my entire building with solar panels and disconnect from the utility company?

Yes you can. In an off-grid installation, you must have batteries, a MPPT charge controller and an inverter — in some cases the batteries may cost nearly as much as the solar panels and only last 6-8 years before replacement becomes necessary. Off-grid solar is achievable, but is very costly and only recommended for locations where there is no grid to connect to.

32. What is a charge controller?

A charge controller is a device used to control the voltage and current coming from a PV solar panel array and into a battery bank. Many of newer models employ Maximum Power Point Tracking (MPPT), which looks at the battery bank and configures the PV output to allow for the best combination of voltage and current to enter the battery bank. While using a typical charge controller might result in a power loss of 30%, charge controller using MPPT are 95+% efficient.

33. How long does it take to install a PV system?

A typical residential roof installation can be completed in 2-4 days. The number of panels and type of installation will affect the installation process.

34. Can I install the solar panel system myself?

It may be legal to do so depending on the laws in your area. It is possible for a home owner or farmer to install a solar panel system DIY (do it yourself) however there are many technical and safety issues to be aware of and we do not recommend it.

35. Is a building permit required to install a PV system?

A professional installation will nearly always require a permit. A call to your local city government (electrical inspector) would clear this up.

36. What does a solar PV system cost?

Because of the wide range of variables in system size and installation requirements it is impossible to state the cost of a system. A call to Harvest will narrow down the installation options, and most likely a range of pricing options may be available at that time.