

# UNDERSTANDING DIFFERENT TYPES OF SOLAR AND MOUNTING SOLUTIONS

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You know it. We know it. There are A LOT of solar technologies. From silicon cells to mirrors and lenses to something called organic photovoltaic, you may feel your head is spinning to figure out what they all do. Don't worry. This bulletin will help make sense of it. We'll focus on the most popular solar technologies to get you started. These include:

- Solar photovoltaic (PV) panels
- Thin film solar panels
- Solar thermal panels

Additionally, we'll give you a quick overview of mounting technologies and when they make sense to use. So let's get rolling.

## SOLAR PHOTOVOLTAIC PANELS: A PROVEN TECHNOLOGY

**What It Is.** The most common types of solar panels are made of crystalline silicon solar cells. These are the ones that you probably already associate with solar technology. You know. They're the flat, rectangular panels people have on roofs among other places, and they produce electricity. Crystalline silicon is one of the most common materials in use, but there are more than a few types of materials in use these days.

**What to Expect.** With no moving parts, solar PV panels offer reliable, long-term energy production. They've been around awhile, so a lot of the kinks have been worked out. Plus, these babies can produce a whole lot of electricity. The highest efficiency commercial solar panels offer efficiencies of up to 20%.

**When to Buy.** With better efficiency than thin film solar panels, conventional solar PV panels are usually the go-to solar technology. Why? Space. Most places don't have unlimited amounts of space. So if you want to get as much electrical juju as possible, you're going to most likely go with conventional solar PV.

## THIN FILM SOLAR PANELS: A FLEXIBLE SOLAR SOLUTION

**What It Is.** Thin film has become really popular in recent years. These solar panels convert sunlight to electricity like conventional solar PV panels, but they are typically thinner and more flexible. Generally, the semiconductor layers on thin film solar panels are only a few millionths of a meter thick, although the name "thin film" comes from their production process and not from thickness.

**What to Expect.** Thin film is less efficient than conventional solar panels. It usually reaches 6% to 11% efficiency, so you better have lots of space available if you're going to produce enough energy to power your organization.

**When to Buy.** Thin film is great for buildings with special architectural needs that limit the installation of conventional solar panels. As we said, you're also going to need lots of free space to get as much energy production as conventional panels. Because you'll need more panels, you'll also need more time for installation and more budget for additional



balance of system (BOS) materials. The BOS is all the other stuff like cabling and mounting materials that go with the panels.

## SOLAR THERMAL SYSTEMS: A COMPLEMENTARY SOLAR OPTION

**What It Is.** Solar thermal panels are a very different technology. They transfer the sun's heat, as opposed to generating electricity. Their most popular application is to heat water.

**What to Expect.** One popular type of solar thermal heating system uses pipes filled with water in conjunction with the panels. The sun's heat is conducted through the panels to heat the water in the pipes. There are generally two types of these solar thermal systems: active and passive systems. Active systems use pumps and controls to regulate the hot water. Passive systems do not. They're typically only used in mild climates where risks from extremes like freezing aren't present.

**When to Buy.** You shouldn't think either/or with solar thermal and solar PV. You'd be better off to think of these as complements. A solar PV system offsets electric usage, and a solar thermal heating system offsets gas. With both, you can potentially eliminate all your energy costs. The key component is to review your building's energy demands to figure out what makes the most sense.

## OTHER SOLAR SOLUTIONS

If that wasn't enough, there are even more types of solar solutions. A number of concentrated photovoltaic (CPV) and concentrated solar power (CSP) solutions have grown in popularity. These solar solutions typically use mirrors and lenses to enhance the conversion of sunlight into electricity. CPV focuses sunlight onto photovoltaic cells to maximize electrical output. On the other hand, CSP technologies focus sunlight in different ways to create heat, and that heat is used to generate electrical power. And there are more beyond that, but most of those haven't become economically feasible for broad-scale deployment. In short, they are really, really expensive.

## A BRIEF LOOK AT SOLAR MOUNTING SOLUTIONS

With the solar panel overview in the bag, let's take a moment to talk about where to put them and what holds them in place. Different solar technologies work with different mounting types, but in general there are three common solar mounting types:

- **Roof-mounted systems**

This is a great solution if your organization has plenty of open roof space. Self-ballasting roof tile systems are one option. Self-ballasting systems remove potential concerns about roof leaks because they do not require hundreds of screws to secure the system to the roof as other racking systems do.

- **Ground-mounted systems**

Excess land is the key component to whether or not to install a ground-mounted solution. In some cases, ground-mounted solar systems can turn otherwise unusable land into an energy-producing asset. For instance, Fort Carson turned a decommissioned landfill into a 2 MW solar system.

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- **Solar parking canopies**

Transforming parking lots into solar power plants maximizes the value of your land, and the solar parking canopies can offer shade to cars parked beneath them. It can be nice to not have to walk into a hot car at the end of a long day.

## FIXED MOUNTING SOLUTIONS VERSUS SOLAR TRACKERS

Many of these mounting solutions can be set at a fixed-tilt or be built with solar tracker technology. Solar trackers follow the sun to enhance light capture and therefore increase your energy production. Some solar trackers can generate up to 30% more energy than traditional fixed-tilt systems.

With a wide variety of solar technologies and mounting solutions available, you are certain to find a solar option that works for your organization.

## YOUR NEXT STEPS

Now that you've learned so much about solar power, we hope you can use it to navigate you through the selection process as you begin your solar project. Armed with the knowledge you will be confident to take the next steps for bringing solar power to your organization. Contact a SunPower sales representative at 1.800.SUNPOWER to request a custom evaluation of your site and find out how much money solar power can save for years to come!

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