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Solar Panels: The Basics of Free Energy for Your Home Part 2

Posted on 05. Nov, 2012 by Maryruth Belsey Priebe in Articles

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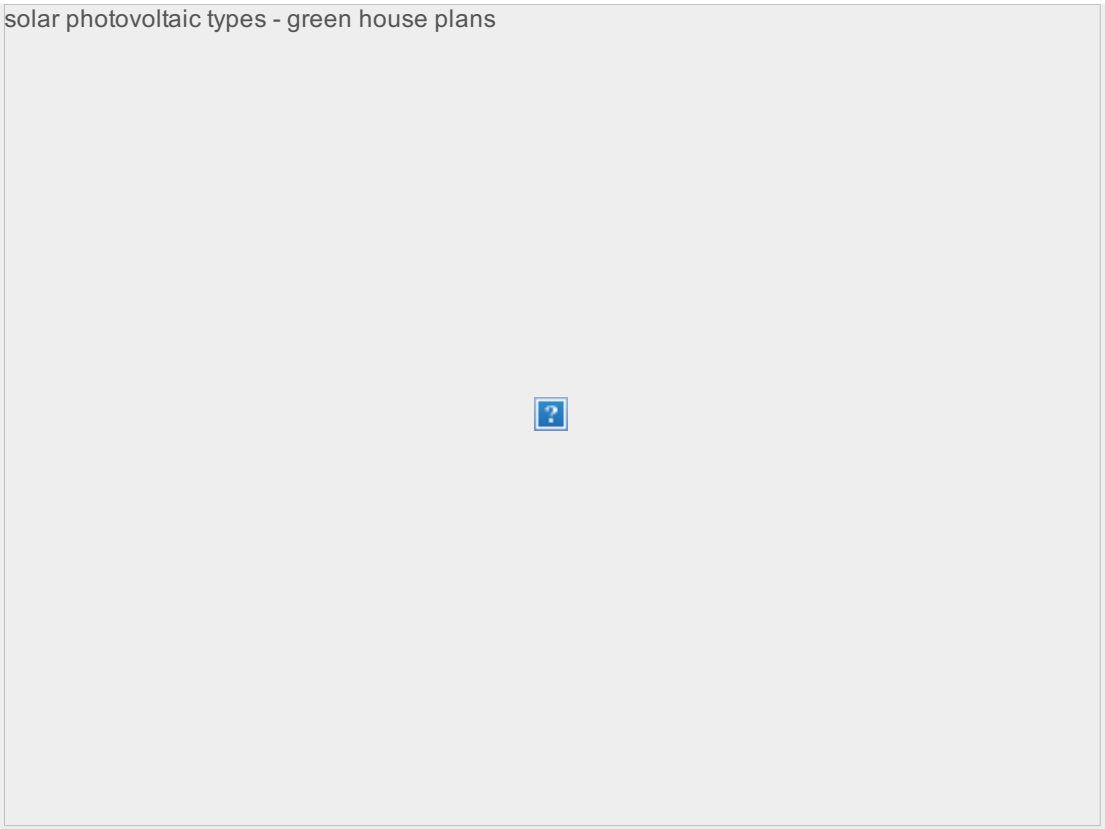
Solar Panels: The Basics of Free Energy for Your Home Part 1



Front to back: 100W monocrystaline panel, 45W amorphous panels, broken remains of what used to be 60W amorphous panels (now outputs about 5W on a good day).

We've already discussed at length whether solar photovoltaics are a good investment for the average homeowner and concluded that for most, they are! So how do you know which solar panels are right for your situation? This quick guide to the types of solar panels available today will give you a basic understanding of what's available so that you can talk intelligently to your solar installer when determining the right system for your green home.

Types of Solar Photovoltaic Panels

Here's a basic breakdown of the various types of solar photovoltaic panels available today:

1. **Monocrystalline panels**: Solar panels that use monocrystalline silicon cells, also called single-crystalline silicon, are made of the purest form of

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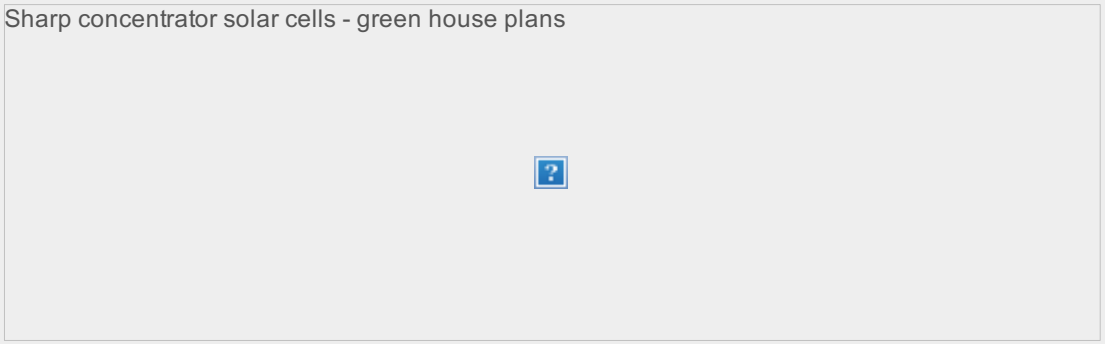
silicon, which makes them the most efficient cells at converting sunlight to electricity, to the tune of 12-19%. This means you need fewer total panels taking up less space. They last the longest and perform better than other types in lower light and temperature conditions. The biggest disadvantage is that they're also the most expensive, and are also less efficient as the temperature rises. Recent advances in monocrystalline panels include double-sided panels that collect direct sunlight on the front and diffused light on the backside, increasing their energy output by anywhere from 10-50% depending on various installation factors.[i] Another breakthrough allows flexible moncrystalline panels to be installed on curved surfaces like bicycle and ski helmets.[ii]

2. **Polycrystalline panels**: Polycrystalline cells now make up nearly half of all solar panels made today. Because the manufacturing process is simpler and less costly, the price of polycrystalline panels is lower than monocrystalline panels. They also perform better at higher temperatures. Because the silicon used is less pure, however, their efficiency is lower than monocrystalline panels. Some also consider the speckled appearance a disadvantage compared to the more uniform look of other panels.
3. **Thin-film panels**: Amorphous silicon panels are one of several thin-film solar cells that involve applying a thin layer of photovoltaic material to a substrate. Amorphous silicon is the only thin-film technology widely available, but many more are in the development and testing phases, including cadmium telluride (CdTe), copper indium gallium selenide (CIGS) and organic photovoltaic cells (OPC). The flexibility of thin-film technologies allows for greater creativity in their application, and they're also the cheapest to produce. Unfortunately, they're also only 6-12% efficient and don't last as long as crystalline panels. That efficiency range is expected to increase substantially with more research and development, but for now these are the space hogs of solar technologies.
4. **Hybrid panels**: Various combinations are also possible, such as adding a layer or two of thin-film amorphous silicon to a monocrystalline panel that greatly improves its efficiency and performance in higher temperatures.

The world of solar photovoltaics is constantly evolving as companies develop newer and better technology that captures more of the sun's energy than ever before. For instance, Sharp has achieved a record efficiency of 43.5% in the solar cells that use a lens-based system to concentrate the sun's rays for generating electricity.[iii] You can even try your own hand at building concentrating collectors.

Sharp concentrator solar cells - green house plans



Sharp concentrator solar cells

Another innovation are solar-tracking photovoltaics that move the way sunflowers do without using any energy to re-position themselves.[iv] This helps to vastly improve the amount of solar energy that can be collected throughout the day. Yet another breakthrough by a German company uses organic molecules in cells that can be layered and applied to building surfaces and windows.[v] Even IBM has gotten into the act, coming up with thin-film solar cells made out of such common metals as copper, zinc and tin, which are much more readily available than traditional solar cell materials.[vi]

For more information on solar PV systems, check out The US Department of Energy' Small Solar Electric Systems or download Own Your Power! A Consumer Guide to Solar Electricity for the Home, also made available by the US Department of Energy. And don't forget to check out our Green Energy Saving Tax Incentives, Rebates, & Programs for advice on finding big cash incentives for your renewable energy system.

Images via Flickr: ryochiji and Sharp.

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[ii] Breakthrough flexible high efficiency solar panels demonstrated on ski helmet, by Christine Lepisto, Treehugger. Retrieved from http://www.treehugger.com/gadgets/breakthrough-flexible-high-efficiency-solar-panels-demonstrated-ski-helmet.html

[iii] Sharp hits solar cell efficiency record of 43.5%, by Megan Treacy, Treehugger. Retrieved from http://www.treehugger.com/solar-technology/sharp-hits-solar-cell-efficiency-record-435.html

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