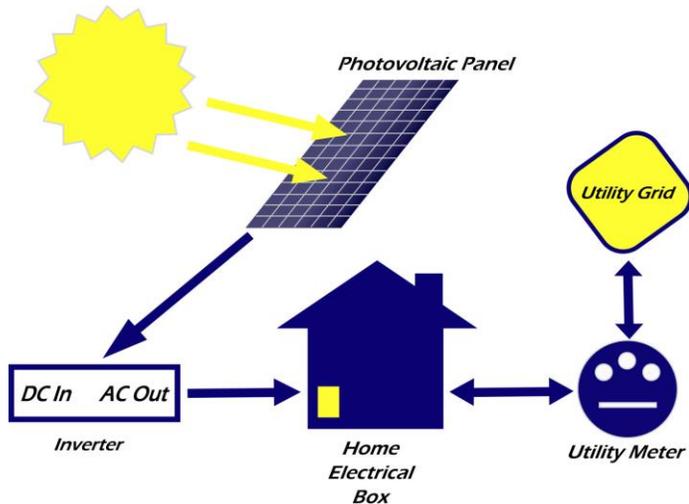


Solar Power Fact Sheet

Interested in solar power for your house? Get the basics here.

What is solar power? Solar electric power, aka photovoltaics or “PV”, is solid state technology that converts sunlight directly to electricity. This is done with large flat panels that are aimed to face directly towards the sun and absorb the sunlight.



What are the parts of a solar system?

- **Solar panels:** the most obvious and visible component, these are large flat panels, typically 39” x 65”, that mount flat on your roof. Each panel is rated for a certain amount of peak power (e.g. 280 Watts). However note that this is ideal DC power, and your actual power out will be lower, due to DC-to-AC conversion losses, sun angle, clouds, and other real-world inefficiencies.
- **Inverters:** these electronic devices convert the DC power coming from the panel to the AC power that your house (and the grid) uses. A microinverter is the size of a paperback book and mounts to the back of each solar panel.
- **Power disconnect:** this large switch, mounted on the outside of your house next to the utility meter, is a mandatory safety device that cuts off the solar system in case of emergency.
- **Monitor:** this small electronic device, typically mounted on an indoor wall, simply reports on the performance of the system, and often provides a way for you to see the system’s status on your home computer or even remotely via the internet.

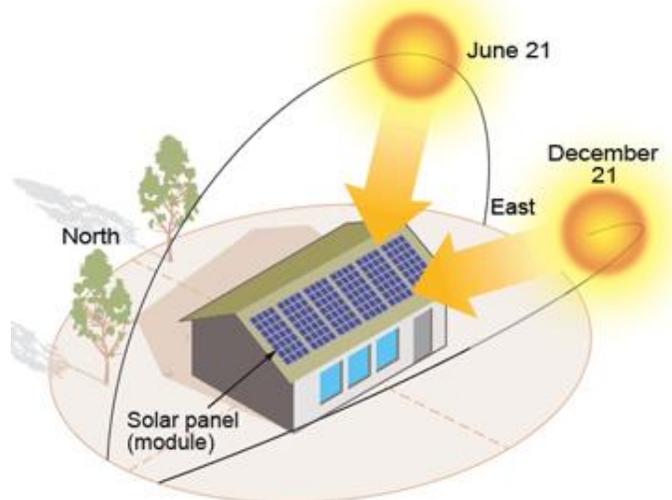
How does it save you money? During the day, as the panels generate electricity, the power flows through the breaker panel to support various loads (power consuming devices) inside your house, reducing your demand from the utility. If at any instant your solar

system generates more than you are using, the excess goes backwards into the utility – *it literally flows back towards the power pole*. The power company pays you for your excess power -- sometimes not much, though.

Solar power is particularly ideal for use in the southern US, since the peak power production neatly coincides with our peak power usage due to air conditioning loads.

You need good southern exposure. You will want your panels to be fully lit by the sun, with no tree shade, for as many hours of the day as possible. Some shading in the early morning and late afternoon is OK, as is some shading in winter when the sun is lower, but every minute of direct sunshine helps. If your panel location will frequently be shaded, or you are party to a subdivision HOA that still refuses to allow solar panels, solar power may not be right for you.

Sun's Path During Summer and Winter



Lay panels flat on roof. Most residential systems simply put the panels on the roof. While your roof’s angle may not be *perfectly* aimed at the sun, it’s normally good enough. By laying the panels flat on your roof, you get the most robust system (not vulnerable to high winds) and aesthetically it will be less jarring. It’s more important to get the panels aimed close to due south, and with as few shaded hours as possible. Note that you should finish any pending shingle replacement work before installing solar panels, since the panels will obstruct access to the roof surface. The ideal solar system has motorized mounts that turn the panels to follow the sun’s movement during the day; however these are much more expensive to install.

Will the solar system power my house when a storm knocks down the utility power lines? It can, but only if you also get battery system or generator, which are big, heavy and expensive. This then gives your system “off grid” capability. Without that extra system, your solar system will not power your house when the utility power goes out, even if the sun is shining! This is for safety reasons. If you want the off-grid capability, you’ll need to get the battery or generator system.

Microinverter or string inverter? See above for description of what an inverter is. Modern residential systems use “microinverters”, which are small electronic devices mounted to the back of *each* panel. Older or commercial systems may use “string inverters”, which are large wall-mounted devices. With the recent dominance of microinverters, the only reasons you might be looking at string inverters is if you plan a very large system, or will have a lot of battery storage for an off-grid system, or will have some DC loads. Definitely consult a professional for these cases!

How much does it cost? System cost depends on the size. A typical, small, roof-mounted residential system might be 3000 Watts (3 kiloWatts, or 3 kW) in size, and would cost roughly \$9,000 to install. However there is a federal tax credit that provides a 30 percent discount, so in this example the actual net cost would be \$6,300. These are *installed* numbers – you just write a check.

Sizing / cost rules of thumb:

- Installed systems cost \$3.00 per watt, as of 2017
- Atlanta gets an annual average of 4.7 “perfect hours” of sun per day, assuming no shading (from 3.4 hours in winter to 5.1 hours in summer, per NREL 3rd party)
- Maximum AC output will be 80% of panel DC rating

How does spending all that money save me money?

Once your solar power system is in, your monthly power bill (from your power utility, e.g. Georgia Power) drops a bit. It will likely *not* go all the way down to zero unless you install a huge, expensive solar system. Over time, however, the system will eventually pay for itself.

State and utility incentives speed up payoff. Currently Georgia does not offer any incentives. However, some utilities in Georgia (e.g. Cobb EMC, Jackson EMC) offer solar incentives that dramatically shorten the payoff time. At the start of the project, an installation rebate reduces the upfront cost. Then, during operation, how much the utility pays you for excess power makes a huge difference in payoff time. Some utilities (Georgia Power) only pay “avoided cost” which is a paltry 4.5 c/kWh, and at that rate it can take 20 years to payoff. Look closely at your utility’s buyback rate; if it’s high, your system will pay for itself much faster.

As of 2015, solar leasing is now available in Georgia! You may have heard of people “leasing” solar systems in California and other states. They sign a contract with a company that installs solar on their house with no upfront cost, and agree to pay that company a monthly amount for the next 20 years. The company effectively owns the panels on their roof, and sells the resulting electricity to the homeowner. This can result in significant monthly savings. ***This financial arrangement is now legal in Georgia, thanks to legislation that passed in 2015.*** Local companies now offer leasing deals to install solar on your roof.

Warning: know the difference between power (in kW) and energy (in kWh). POWER, expressed in kiloWatts or kW, is a measure of the *rate* of energy consumption. A solar system will have a peak power rating, indicating how much power it can produce at a given instant. ENERGY, expressed in kilowatt-hours or kWh, is a measure of the *amount* of energy consumption. Note that this is not kilowatts *per* hour, rather kilowatts *times* hours. Your utility bills shows how much energy, in kWh, you consumed last month, and that’s what you actually pay for. Confusing kW and kWh is a common mistake that people make; the two are as different as miles-per-hour and miles!

Change your utility account to a time-of-use (TOU) plan. A TOU plan changes your billing so that instead of paying a flat rate (electricity costing the same at all hours), you pay different rates depending on *when* during the 24-hour day you consume the power. Typically the overnight rate is very cheap (so charge your electric car and run your dishwasher overnight) and the summer midday rate is very expensive. But with a solar system, you will be offsetting much of your summer midday consumption. TOU plans make sense for residential installs with solar power.

Use a solar contractor. Don’t try to design and build the system yourself – get a couple of quotes from some local contractors and let the professionals do it. It is a complicated business, and is quickly evolving. I recommend Creative Solar USA, which is an Atlanta-area solar installation contractor.

Want to use your new solar system at night? Get energy storage, aka a battery system. See products from veterans Sonnen and upstarts Tesla. Let a pro build it.

Want to learn more? Get a subscription to Home Power Magazine, or buy a few back issues from them, both of which you can do via their website. This is an excellent magazine and you will learn much just by flipping through the pages.

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