

Q. What's so great about the sun, anyway?

The sun is amazing. Without it, none of us would be here, and there would be no life on earth. It is bigger than anything we can really imagine—a million planet earths would fit inside it! It takes millions of years for the energy from the center of the sun to reach the sun's surface, and then just eight minutes for it to travel the 93 million miles to earth! The sun gives off more energy in one second than people have used since the beginning of time.

But wait, there's more! Plants make food out of sunlight, and then animals eat plants, and then we eat animals (or maybe we just eat plants, if we're vegetarians). Either way, without sunlight, plants couldn't make food, and there would be nothing for us to eat. Not only could plants not make food without the sun, they also couldn't make oxygen, and no animals could breathe, including us!

The sun produces nearly all the heat on the planet, too—without it, the earth would be freezing cold—minus hundreds of degrees Fahrenheit, almost as cold as space. The sun also makes the wind blow and the ocean currents flow. Its heat makes clouds, rain, snow, and all the weather on our planet, too.

Q. What does solar energy mean?

Solar energy just means energy (light or heat) that comes from the sun. There are as many different ways to use solar energy as you have ideas in your head. What gets you hot lying on the beach on a summer day? Solar energy. What gets your car hot when it's parked in the sun with the windows closed? Solar energy. What makes your solar calculator go? Solar energy. What makes the giant solar panels on satellites work? Solar energy. What makes plants grow? Rain and...solar energy.

Q. Is solar energy new?

No! Solar energy has existed for five billion years, since the sun was born. And humans have been using solar energy for thousands of years. People used simple magnifying glasses to concentrate the light of the sun into beams so hot they caught wood on fire. The Greeks were the first to use solar architecture, over 2,000 years ago. They built their houses so the sun's rays entered during the winter, but weren't able to enter during the summer. Entire cities were built this way! (They were way ahead of us.) The Romans got the idea to put glass in windows, which allowed the sun's light to pass through but trapped its heat. They even built glass greenhouses so they could have fruit and vegetables all winter. Skipping ahead a few thousand years or so... someone in Europe figured out you could make water boil by collecting the sun's heat behind a few panes of glass. A solar hot water heater! From the early 1920s to just before WWII, everyone in Florida heated their water with solar hot water heaters. Using solar panels to turn the sun's light directly into electricity is new, though. That technology was only invented only 50 years ago.

Q. What are different ways we can use solar energy today?

First, we can use solar energy is to turn light from the sun directly into electricity, using solar panels on our houses (or businesses and other buildings, even schools). Collecting the sun's light and turning it into electricity is called photovoltaic's, PV for short. [See the next question.] Second, another kind of solar energy is called solar thermal. Thermal means heat, so solar thermal energy just means we collect the sun's heat and turn that into energy. Basically, solar thermal uses mirrors to focus the sun's rays onto one central area to collect the heat, and that heats water.

Q. Could you explain more about solar-electric or photovoltaic (PV) power?

Solar-electric, or photovoltaic (PV), power produces clean, reliable electricity directly from sunlight without consuming fossil fuels. Essentially, solar panels (also called modules) made of silicon usually located in a group (called an array) on a rooftop absorb photons of sunlight, knocking electrons loose. The freed electrons are then forced to flow through wires, producing direct current (DC) electricity. An inverter converts the DC power into alternating current (AC), the standard type of current we use in the United States. [Solar panels are also called photovoltaic panels. "Photo" means light and "voltaic" means electricity.]

Q. Could you explain a bit more about how solar panels work?

Solar electric (PV) panels are made up of something called silicon, the same thing that makes up sand. There is more silicon on the planet than almost anything else. Even though you can find silicon almost everywhere, making a solar panel is difficult and expensive. The silicon has to be heated to super high temperatures in a big factory, and then formed into very thin wafers. When sunlight hits a solar panel, it makes electrons in the silicon move around. (Electrons are teeny tiny specks—they're way too small for us to see, even under a microscope.) The electrons flow through wires that were built into the solar panel. And presto! We have electricity! We can do whatever we want with this electricity, run a calculator, a CD player, or, if we have big enough solar panels, a satellite!

Q. What if I want my solar panel to make electricity at night, or on cloudy days?

When the sun stops shining on your solar panel, its electrons stop moving and electricity stops flowing. So what do you do if you want to be able to read or watch television at night? You use electricity that is stored for you about the electric company. And that's exactly what people do with solar panels on Long Island do. They have the electric company store any extra solar energy they don't use on some very sunny days so they can use it on other, usually cloudy days. That's called net metering, which basically means the solar energy produced is sent back through the meter to be stored by the electric utility company (on Long Island, that's usually LIPA). That stored electricity can be used at night or when the sun is behind the clouds.

Q. Where are solar electric panels used?

Have you seen those big orange signs along the highway with flashing messages about an exit being closed or a traffic jam ahead? Ever look on top of those signs? Yup, there are big solar panels up there. Also, little solar panels are used on solar calculators (the panel is usually in a little strip across the top). Plus, you might have seen solar panels along highways lighting up signs or powering emergency equipment or roadside telephones. And, more and more you can see solar panels on the rooftops of people's houses. Hundreds of homes on Long Island just like the one you live in get their electricity from the sun.

Q. How many solar electric panels would I need to power my house?

That depends on how much electricity you use in your house, and how much sun shines where you live. The first thing you'd have to do, before you "went solar," would be to cut down on your electricity use in other ways. The average size of a solar system that completely powers a house is about 6,000 to 10,000 watts (also called 6 or 10 kilowatts). Since Long Island the sunniest place in New York, to make that kind of solar power, you usually need a few dozen solar panels on your roof, depending on their size, usually facing south and not shaded by too many trees. And, once you have the solar panels up there, they last for well over 20 years. And since they have no moving parts, they almost never need fixing.

Q. How much of the world's energy does the United States use?

Of every 100 people on the planet, 6 live in the United States. If everything were fair and equal, we would use as much of the world's energy as we have people—6%. Instead, we actually use between 25% and 30% of the world's energy! Each of us uses twice as much energy as the average person in England, two and-a-half times as much as the average person in Japan, and 106 times that of the average person in Bangladesh!. And using too much energy isn't just bad because we're going to run out of it someday. It's also bad because energy from burning coal and oil and even energy used in our cars produces a lot of pollution. Per person, people in the United States produce way more "greenhouse gases" than any other people on the planet. Greenhouse gases are substances in the air that trap heat in the atmosphere. As those are increasing at higher levels, it is creating global warming, a change in climate that can affect all living creatures.

Q. How does a solar-electric system help the planet?

Global warming. Greenhouse gases. Ozone depletion..."Green" has become today's buzzword for good reason. The ultimate payback of a solar-electric installation is the impact it makes on our planet. In the first year alone, the average solarelectric system that Built Well Solar installs eliminates over 14,000 pounds of carbon dioxide emissions, equivalent to planting 48,000 square feet of trees or removing the auto emissions of driving from New York to Los Angeles and back six times.