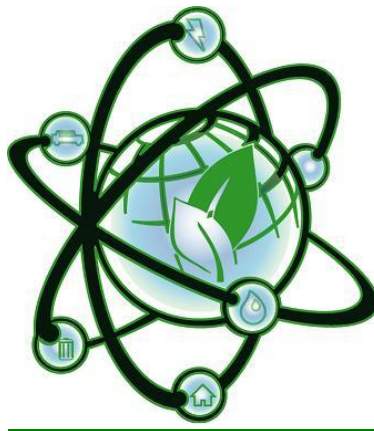


Schools & Solar



Solar schools make excellent showcases for displaying the benefits of solar and other forms of renewable energy. Not only do they educate our children, but they also serve to teach the entire community about the benefits of solar energy.

“Educating our students to the benefits of solar energy is important to their understanding of a power source that will help to shape their future. The use of alternate energy sources such as solar energy is critical, especially now when we are faced with significant increases in the cost of fossil fuels,”

A special connection to the school’s computer network can enable students to monitor the solar panels’ output from the classroom.

Solar Photovoltaic Systems

Follow the path of solar energy from the Sun to a school.

The Sun produces radiant energy by consuming hydrogen in nuclear fusion reactions. Solar energy is transmitted to the earth in portions of energy called *photons*, which interact with the earth's atmosphere and surface. It takes about 8 minutes and 20 seconds for the sun's energy to reach the earth.



The Earth receives and collects solar energy in the atmosphere, oceans, and plant life. Interactions between the sun's energy, the oceans, and the atmosphere, for example, create winds, which can produce electricity when directed through aerodynamically designed wind machines.



Solar photovoltaic cells on the school's rooftop convert solar radiation into electricity (*photovoltaic* literally means "light energy"; "photo" = light, "voltaic" = energy). Individual cells are packaged into *modules*, like the one shown at the right; groups of modules are called *arrays*. Photovoltaic arrays act like a battery when the sun is shining, producing a stream of direct current (DC) electricity and sending it into the school building.



The DC disconnect switch allows professional electricians to disconnect the photovoltaic array from the rest of the system. With the switch in the "off" position, workers can safely perform maintenance on other system components.



The inverter converts direct current (DC) electricity generated by the array into alternating current (AC) electricity for use in the school. Most *electrical loads* (energy consuming devices like lights, motors, computers, and air conditioners) in schools, homes and businesses use AC electricity.



The transformer ensures that the voltage of the electricity coming from the inverter is compatible with the voltage of the electricity in the school building.



The AC disconnect switch allows professional electricians to disconnect the school's electrical system from the solar photovoltaic system. With the AC disconnect switch in the "off" position, workers can isolate the solar photovoltaic system and its components from the school's electrical system, and can safely perform maintenance on the solar photovoltaic system's components.



The electric meter keeps track of the amount of electrical energy produced by the solar photovoltaic system and sends electronic signals to the data acquisition system where they are recorded. Electrical energy is measured in *kilowatt-hours*.



The data acquisition system receives signals from the weather station and the electric meter. It runs a computer program to calculate and record the weather conditions and electrical output of the system every fifteen minutes, and it allows students, teachers, and Watts On Schools staff to log in and download information from the school or offsite.



The school's electrical distribution panel receives electricity generated by the solar photovoltaic system, combines it with other electricity supplied by the school's electric utility company, and routes the energy to the school's classrooms to power lights, computers, and other energy consuming devices.



Students and teachers enjoy the benefits of electric energy without even thinking about it. The school also benefits by having a portion of its electrical needs met by solar power, resulting in lower monthly electric bills.



What are the benefits of installing a Commercial Solar Power System On your school today?

There are many reasons for installing a Solar Power System for your school today:

1. **Protect yourself against rising utility rates.** As our global population and economy grows, so does our demand for energy. We are also faced with declining amounts of fossil fuels. These two factors work against us, the consumers. Demand is increasing, and supply is decreasing. Rates will continue to increase, as the shortage causes price spikes. Generally speaking, utility rates are rising faster than inflation. You can lock yourself in now! With a Solar Power System, your initial investment is your cost of electricity for the next 40 years! **Being a producer of your own power, you are insulated against the future rate increases.**
2. **Solar Power is a Good Investment.** Your initial rate of return can be as high as 10%. **The more that the rates go up, the higher your rate of return. The investment is as profitable as any other type of investment.** With the reliability of Solar products, and the equipment on your roof, an investment doesn't get any safer.
3. **Right now, the government will help you pay for Your system.** Many states have implemented Solar Energy Rebate programs, to help offset the up front costs of a System. Using Solar Power is environmentally responsible. **As a producer of your own, clean solar power, you are giving us all a breath of fresh air.** By now, we all know about our climate's delicate state. Our CO² pollution is causing catastrophic global climate changes. The changes will continue until we all do the right thing, turning away from fossil fuels and using clean renewable energy sources instead. **Your small power system can make a huge difference.**

In comparison, **fossil fuels are** available only in limited supplies, **costly to extract, and contribute to greenhouse gas emissions.** Some greenhouse gases occur naturally in the atmosphere, while others result from human activities. Naturally occurring greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Certain human activities, however, add to the levels of most of these naturally occurring gases:

- **Carbon dioxide is released** to the atmosphere when solid waste, fossil fuels (oil, natural gas, and coal), and wood and wood products are burned.
- **Methane is emitted** during the production and transport of coal, natural gas, and oil. Methane emissions also result from the decomposition of organic wastes in municipal solid waste landfills, and the raising of livestock.
- **Nitrous oxides are emitted** during agricultural and industrial activities, as well as during combustion of solid waste and fossil fuels.

Investing in renewable energy today creates:

- **Environmental benefits:** Because renewable energy technologies are clean, or non-polluting, sources of energy, they have a **much lower environmental impact** than conventional energy technologies.
- **Reliable supplies:** Renewable energy **will never run out.** Other sources of energy are finite and will some day be depleted.
- **Economic benefits:** Most renewable energy investments are spent on materials and workmanship to build and maintain the facilities, rather than on costly energy imports. Renewable energy investments are usually spent

within the United States, frequently in the same state, and often in the same town. This means your energy dollars stay home to create jobs and boost local economies, rather than going overseas. Meanwhile, renewable energy technologies developed and built in the United States are being sold overseas, helping to **reduce the U.S. trade deficit**.

- **Energy security:** After the oil supply disruptions of the early 1970s, our nation has increased its dependence on foreign oil supplies instead of decreasing it. Relying more on renewable energy systems allows us to **reduce our dependence on foreign sources**.

