System Parts

Photovoltaic (PV) Array - is composed of solar panels made up of PV cells. The Institute's panels are 140 watts each that produce approximately 140 watts of power while the sun is at its strongest. The eight 140-watt panels will produce a maximum of 1,120 watts of power at one time.

Inverter - is a device that converts electrical current from DC to AC. There are two types of inverters: off-grid and grid-tied. The off-grid inverter sends the power to batteries, through a charge controller, where the energy is stored or it is sent directly to a load onsite such as lights. The grid-tied inverter sends the power from the solar panels to a load, feeding any unused energy into the electrical grid and making the electric meter turn backwards. The inverter must be sized to fit the system that is being installed, with keeping future expansion in mind.

Amp-hour meter - measures the electrical current and/or power consumption.

DC Disconnect - is an important safety device used to interrupt the connection from the solar panels to the rest of the PV system.

AC Disconnect - is another important safety device and is required for grid-tied systems to isolate the PV system from the electric power grid. This may already be built into the grid-tied inverter.

Mount - is needed to hold the solar panels. Various mount types are available that allow panels to be installed on a rack on the ground or installed directly on a building roof.

Energy & Society is a new set of supplementary materials from Project Learning Tree (PLT), an award winning environmental education program. PLT's Energy & Society curriculum provides educators with tools and activities to help Pre-K through 8th grade students learn about their relationship with energy and investigate the environmental issues related to energy's role in society.

To learn more about this, and other educational programs, contact:

Pierce Cedar Creek Institute
for ecological education

701 W. Cloverdale Road
Hastings, MI 49058
Phone (269) 721-4190
Fax (269) 721-4474
www.cedarcreekinstitute.org

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Photovoltaic Demonstration System

THE SUN AT WORK!

Photovoltaic Demonstration System

Thanks to grants from the Energy Office of the Michigan Department of Labor & Economic Growth and the U.S. Department of Energy, and the Barry Community Foundation, Pierce Cedar Creek Institute was able to install an eight-panel solar, or photovoltaic (PV) system.

How Does the PV System Work?

Photo refers to **light** and voltaic refers to **power,** therefore, photovoltaic means power from light.
A PV system converts sunlight directly into electricity.

Solar panels are solid-state semiconductor devices that absorb sunlight, and break electrons loose from their atoms, allowing the electrons to move through the material onto wires, producing DC (direct current with one-way flow). The DC power can be stored in batteries and used to run appliances and items that run on DC.

In the Institute's system, DC is converted to AC (alternating current with back and forth flow) by an inverter. The system is then tied into the electric grid through wiring it directly to the Education Building. This requires approval from your utility company, such as Great Lakes Energy.

Why Use Photovoltaic?

A PV system creates green power or renewable energy. Renewable energy is generated from resources that are not depleted with use, like the wind and sun.

A photovoltaic system is silent with virtually no moving parts, creates no emissions, and uses no fuel-besides sunshine! It produces clean energy, unlike the use of fossil fuels such as coal and oil. Their use releases into the atmosphere global-warming emissions, soot-forming and smog-forming pollution.

Interesting Facts!

The United States, with 5% of the world's population, uses 25% of the world's energy resources, much of which is imported from overseas.

Enough sunlight falls on the Earth's surface each minute to meet the world's energy demand for one year.

Edmond Becquerel, a French physicist, discovered the concept known as photovoltaic effect in 1839. However, Bell Laboratories did not create the first photovoltaic cells until 1954.

Today it costs about 20 to 30 cents to generate one kilowatt-hour of electricity with PV, while in Michigan, it costs about 8 cents to generate one kilowatt-hour of electricity with conventional power plants (coal or nuclear).[i]

In 2000, only 2% of Michigan's energy was generated from renewable sources. Coal made up two-thirds of Michigan's energy mix, making Michigan one of the most coal-dependent states in the country.[ii]

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i Impression5 Science Museum, www.impression5.org/solarenergy/electiricty.html Lansing, MI
ii U.S. Public Interest Research Group, www.uspirg.org Washington, D.C.