midwest renewable energy association

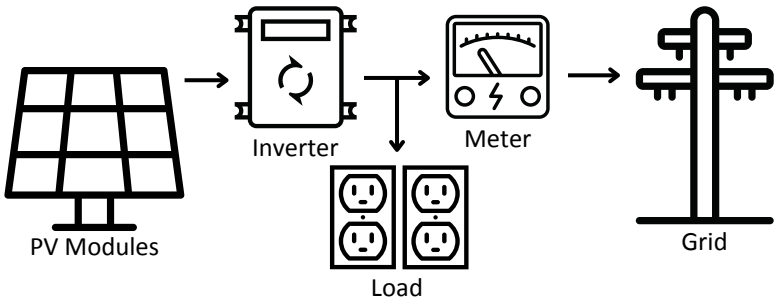
SOLAR BASICS & GLOSSARY

POWER FROM THE SUN:

Photovoltaics (PV) is the direct conversion of solar energy into electricity. Many advantages and benefits add value to PV systems beyond the potential economic savings. PV is an environmentally friendly technology that causes no noise or pollution. Space applications were the first practical use of PV technology, but PV has come along way and gained popularity since the first practical PV cell was invented in 1954.

GRID-TIED PV SYSTEMS:

The most common type of solar systems is the Grid Tied, or Utility Interactive system. In this design, your PV system provides power to your home and any excess electricity generated beyond your energy use is delivered back to the utility grid. If your solar PV system is not producing enough energy to meet your needs, say for example, at night when there is no sun, then you receive electricity from the utility. For safety reasons, if the utility grid goes down, your solar PV array also shuts down. This is done to prevent injury to utility line workers that may be performing repairs. This type of system design also allows for net metering.



The graphic above illustrates how a Grid Tied (utility interactive) PV system works. Off-Grid systems are growing in popularity and use battery for storage instead of the utility grid.

Before installing solar panels, it is always a good idea to consider the energy efficiency in your home or business. By reducing your energy consumption, you can reduce the number of solar panels needed to offset your lifestyle. For more information, please see our "Commonly Asked Solar Questions" handout for more energy efficency recommendations.

Solar panels can be installed on a roof or ground mounted away from the building in a non-shaded area. Your solar panel will produce direct current (DC) electricity, in order to use the electricity, it will need to be changed into alternating current (AC) electricity. This process is performed by an inverter which is generally inside the home or garage. The inverter is wired to your breaker box and from there powers the outlets in your home. See our “Simple Steps to Solar” handout for more information on going solar.

SOLAR PV GLOSSARY

Solar System Components:

Watt - A measure of power, often written as W, indicates how much power is produced by a PV module or system. A kilowatt is 1000 watts, often written as kW.

Kilowatt Hour (kWh) - A measure of energy. Indicates the amount a PV system produces or what is used over a period of time.

Grid - The utility grid is a network of wires that distribute electricity.

Beneficial Electrification - The use of electricity generated from emissions-free power generation resources (like wind and solar) to power our vehicles, buildings, equipment, and devices. It implies a transition away from dirtier resources, such as eliminating the use of gasoline in our cars or natural gas in our heaters.

Module - A complete, environmentally protected unit of solar cells that generates DC power when exposed.

Array - A complete power-generating unit consisting of electrically and mechanically integrated PV modules with structural supports and components.

Inverter - An electronic device that converts DC power from a PV array to AC power that is used in the home.

Balance of System (BOS) - Includes all components of a photovoltaic system other than the photovoltaic panels and mounting equipment.

Fixed tilt array - A photovoltaic array set in a fixed angle with respect to horizontal.

Adjustable tilt array - A variation of a fixed-tilt array that permits manual adjustment of the tilt to increase the array output for seasonal adjustment.

Tracking array - A photovoltaic array that follows the path of the sun to maximize the solar radiation incident on the PV surface.

PV System Types:

Utility interactive PV system (Grid Tied) - A PV system with no storage that is connected to the utility grid and uses PV energy as a supplemental source of power

Stand-alone PV system - A PV system that can either operate in utility-interactive or stand-alone mode and uses storage.

Distributed generation - Electricity that is produced at or near the point where it is used.

Interconnection agreement - A contract between a distributed generation power producer and the local electric utility that establishes the terms and conditions for the interconnection.

Net metering - A metering arrangement where any excess solar energy exported to the utility is subtracted from the amount of energy imported from the utility.

Incentives and Rebates:

Renewable Portfolio Standards (RPS) - Legislation developed by most states that specifies how much electrical generation must come from renewable energy sources. The RPS most often indicates deadlines for compliance.

Sales tax incentives - Provide an exemption from, or refund of, the state sales tax for the purchase of a renewable energy system or energy efficiency measures.

Property tax incentives - Provide that the added value of a renewable energy system is excluded from the valuation of the property for taxation purposes.

Performance-based incentives - Provide cash payments based on the number of kilowatt-hours generated by a renewable energy systems.

Rebate programs - States, utilities and a few local governments offer rebates to promote the installation of renewable energy and energy efficiency projects.

Grant programs - States offer a variety of grant programs to encourage the use and development of renewables and energy efficiency. Federal renewable energy tax credit - A taxpayer may claim a credit of 30% of qualified expenditures for a system installed between 2022-2032 that serves a dwelling unit located in the United States that is owned and used as a residence by the taxpayer. A 26% credit can be claimed for a PV system that was installed between 2020-2021.

Solar renewable energy credits (RECS) - Trade-able commodities from energy generated by solar. One REC is generated every time one megawatt hour (MWh) of clean, renewable electricity is produced. 1 MWh = 1,000 kWh.

Property-assessed clean energy (PACE) financing - Allows property owners to borrow money to pay for renewable energy and/or energy-efficiency improvements.

Internal rate of return - The annualized effective compounded rate of return earned on the invested capital.

SEE MORE SOLAR RESOURCES AT:
midwestrenew.org/community-resources