

Solar Power Hour SM

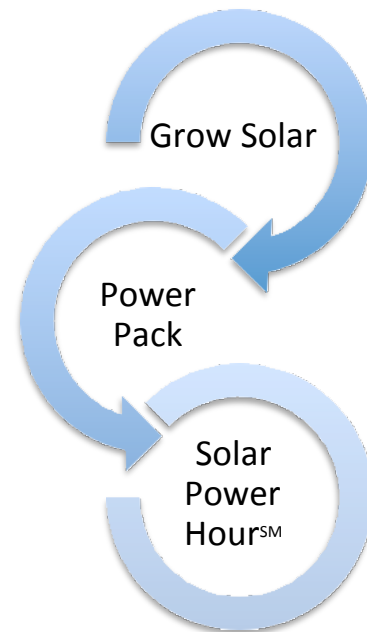
Solar education for your community.

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About

The Solar Power HourSM provides consumer education that promotes community--based solar market development. The one--hour seminar occurs throughout the Midwest as part of Grow Solar, a Midwest partnership for solar advancement led by the Midwest Renewable Energy Association (MREA) and funded by the US Department of Energy SunShot Initiative. The Solar Power HourSM explains how a photovoltaics (PV) system works, what to expect from a site assessment, potential cost and return on investment, qualified installers in the area, and available financial incentives.



The Solar Power HourSM streamlines the first step towards solar adoption for homes, businesses, and municipal buildings by delivering important educational information and connecting consumers to qualified professionals. If you are interested in solar, familiarize yourself with the information in this guide. Then experience the virtual Solar Power HourSM at GrowSolar.org/power---pack or look for a Solar Power HourSM coming to an area near you.

Does your community have a high interest in solar? Request a Solar Power HourSM. Contact MREA's Peter Murphy at pmurphy@midwestrenew.org.



Commonly Asked Questions

1. How durable are the modules (panels)? Will they stand up to hail?

Modules are considered to be hail resistant and damage from hail is extremely rare. Tempered glass used in solar panels is designed to withstand a direct vertical impact of hail up to one inch in diameter, travelling at approximately 50 miles per hour. Additionally, most standard roof and ground mounted panels are tilted and do not receive direct hail impact.

2. How big of a system will I need for a 2,000 sq. ft. house?

Solar system sizing for your home is determined more by electrical usage than the size of your home. The average US homeowner uses approximately 950 kWh hours per month or approximately 10,000 kWh hours per year. Many factors affect your usage including types of appliances, and the energy habits of your household. For example, do you turn the lights off when you leave a room or do you have electronic devices plugged into a power strip that can be turned off when not in use? Many electronic devices continue to draw electricity when turned off. A solar site assessment by a qualified solar professional will include an energy audit of your home and make energy efficiency recommendations. Investing in energy efficiency measures can help to reduce your energy requirements and the size of your solar PV system.

3. Will solar work in my area? Is there enough sunlight?

Several factors influence the solar resource. The United States has more than enough sunlight to power PV modules. Germany has less of a solar resource than the US and yet they possess the most installed solar in the world.

4. How do solar modules handle the snow?

Any shading to a solar panel will reduce electrical output. Solar panels can work covered by light snowfall, but extensive snow coverage diminishes the panel's ability to generate electricity. Solar panels are dark in color, have a slick surface, and are positioned at an angle, helping snow slide off as sun melts it. Ground mount systems can easily be brushed clean after a snowfall.

5. How many days will it take to install the solar panels?

The size of your solar system, type of installation, and special mounting needs are some of the factors that can influence the installation time. A residential solar array can be installed in as little as one or two days.

6. How long do solar panels last?

Most solar modules are guaranteed to last 25 to 30 years. Some last over 40 years. Although the kilowatt output degrades minimally each year, the panels maintain a fairly consistent output. The majority of solar manufacturers provide

a performance warranty of 25 years. Other PV system components, such as an inverter, could possibly need replacement during the lifetime of your array. Inverters often carry a warranty of five to 10 years.

7. What kind of maintenance does a solar system require?

Solar systems require very little maintenance, which is primarily due to a lack of moving parts. A tracking system on a pole mount array does contain moving parts and thus has the potential to require maintenance. Battery backup systems also require some minor maintenance to ensure battery longevity. Work with your installer to set up an operations and maintenance plan to ensure that the system is operating at optimal capacity.

8. How much does it cost?

The cost of a solar system involves several system design variables including, but not limited to, module size, mounting type, inverter selection, and the balance of the system components. Before any installation occurs, the installer performs a detailed site assessment to determine your renewable energy goals and needs, energy efficiency measures, and solar window among other things. The installer will recommend a system size and an initial estimate for the solar system.

The cost of solar modules and components has fallen dramatically in the last few years. Many banks and credit unions offer low-interest solar loans, making a solar purchase as easy as buying a car. Rebates and other financial incentives may be available in your area to further reduce costs. Your installer will be able to outline the current incentives.



The Giordano---Smeltz Zero Net Energy residence.

The Solar Site Assessment

A site assessment is the first step to determining how a solar system will work for you. A certified installer or assessor will visit the site to have a one-on-one meeting to understand your needs and answer your questions. They will do a basic energy analysis of your home and recommend energy efficiency improvements where possible. They will evaluate the solar window at the site using specialized tools to find the best location for a solar system.

The site assessor will then write a comprehensive report. This evaluation provides:

Optimal Location

The site assessment uses a complete shading analysis of your site. It determines the percentage of time the solar system will be exposed to full sun for each day of the year. The goal is to find the most productive location for the times of the day and year that are most crucial and will provide the most electrical output for solar PV and most thermal output for solar hot water.

Mounting Options

Solar panels can be located on rooftops, ground mounts, or pole mounts. If the rooftop is not structurally capable or does not receive enough sun, other options can be explored.

Energy Usage

A full solar site assessment includes an evaluation of the electrical usage over time. This includes the efficiency and usage of appliances, the burdens of heating and cooling, and the habits of the residents, and lighting systems. It compares the energy usage to the average consumption in the state.

Expected Energy Output and Estimated System Cost

The site assessor will give an estimate on the expected output and the system cost of the PV system that is recommended based on the site's energy usage.

Financial Incentives

Find out what incentives are still available to offset the initial investment of a solar installation. The site assessment will provide a list of local, state, and federal rebates that are available to you.

Return on Investment

The assessment includes a detailed financial analysis of your investment over time. Accounting for factors such as shading, initial cost, and financial incentives, learn how long it will take for your system to start to making you money.

What should a customer expect from a site assessment report?

- A review of the goals for having a renewable energy system
- A basic analysis of your energy needs
- An evaluation of the solar resource at your site
- Recommendations for system size and siting to meet energy goals
- Estimate of the system's production
- An initial cost estimate for the system
- An overview of eligible incentives (state, federal, utility) for the system
- Preliminary economic analysis of the system
- The next steps you need to take to make the installation a reality

Selecting a Solar Installer

The Power Pack program maintains an approved list of trained solar electric installers that meet or exceed the MREA qualification standards for experience and credentialing. The list of installers can be found on the following page and at GrowSolar.org.

The North American Board of Certified Energy Practitioners (NABCEP) maintains an approved list of trained and certified **solar installers**. Check out the list on their locator map at nabcep.org/certified---installer---locator.

A number of installers are also members of the MREA, and many have participated or even taught courses for the MREA. Visit the MREA Business Member Directory at midwestrenew.org/businessdirectory.

How do I know if my installer is qualified?

National certifications show an advanced level of knowledge for solar installers such as:

- NABCEP certified (North American Board of Certified Energy Practitioners)
This national certification requires coursework through accredited training programs, designing and installing a specified number of solar installs, and passing a professional technical exam. You can search for NABCEP certified installers at nabcep.org.
- UL Photovoltaic (PV) System Installation Certification
Installers receive the PV System Installer Certification by passing an exam that is intended to measure the necessary competencies, safety training, and several years of hands---on experience in the field.
- Electronics Technicians Association Photovoltaic Installer Certification
This certification involves an in---depth program with apprenticeship and exam requirements.

Questions to ask a solar installer

Asking good questions before committing to buy a solar electric system helps protect you from potential hazards and liabilities associated with having a solar energy system installed on your building or home. Use the following questions to ask a Solar Energy Contractor **prior to** committing to buying a solar electric system.



A Milwaukee solar group buy resident installation.

After these questions are answered to your satisfaction, be sure to mention that no work shall begin until the permit is on-site and all documentation has been delivered and reviewed. If pre-payment is requested, hold the final amount until all expectations have been met.

What qualifications do you or employees have that ensures a quality install?

- Nationally recognized Installer Certifications (i.e. NABCEP, UL)
- Prior documenting experience with system(s) desired
- Contracting license, liability insurance
- Duration that they have they been in the renewable energy business

Does your company hold an Electrical Contracting License or do you hire out?

- Provide name of licensee and type of license

Will installing this system void any roof warranties associated with my building?

- List of precautions taken, products used, and statements from manufacturer's compliance with roofing standards

What is the expected output and who is responsible if expectations are not met?

- Output predictions based on site conditions and statement regarding liability

What is the warranty period of this install?

- Product warranty information and construction and statement regarding liability
- The MREA Power Pack program requires a five year warranty from installers on all residential installations

Who is responsible for the interconnection and incentive documents for this system?

- Name of staff person who will prepare these and other incentive paperwork

For a solar electric system, what is the dollar per watt on this proposal?

- Some incentive programs have caps based on dollars per watt installed

Other questions to consider:

- Can you provide references from previous customers with similar systems?
- When will you be able to perform the work? How long will it take to finish?
- Have you worked with local building officials and utility reps when installing similar systems in the past?
- Do you repair systems that you installed, and if so, what are your rates?
- What kind of training will you provide me with so that I can better operate and maintain my system?

Getting an estimate

It is best to get more than one installation estimate. A good estimate should include the cost of hardware, shipping, installation, connection to the utility grid, travel, and sales tax. As is true for many things, remember that the lowest price may not always be the best price.

Certified Installers by State

The Power Pack program maintains an approved list of trained solar photovoltaic (PV) installers. MREA qualification standards for credentialing and project experience must minimally meet the following criteria:

Certification and experience

Power Pack installers are required to hold certification in one of the following:

- PV Installer Certification through the North American Board of Certified Energy Practitioners (NABCEP) or a Underwriter Laboratories (UL) Photovoltaic System Installer Certification
- Completed a US Department of Labor recognized electrical apprenticeship program and has at least two documented photovoltaic system installations; or
- Has earned a certificate/degree from an accredited solar design and installation training program and has at least two documented photovoltaic system installations
- Power Pack installers must have a history of at least three residential or small commercial solar installations completed during the last five years.

Illinois	Michigan	Minnesota	Wisconsin
Angel Wind and Energy	Harvest Energy Solutions	All Energy Solar	Arch Electric
Continental Energy Solutions	Hunter Energy Resources	Hometown Electric	Harvest Energy Solutions
Eco Solar Solutions	New Energy Solutions	RREAL	H&H Solar Energy Services
Independence Renewable Energy		Zenergy	Midwest Solar Power
Keats Electric			North Wind Renewable Energy
Renewable Energy Alternatives			
WindSolar USA			

Solar Glossary

Solar System Components

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

Kilowatt Hour -- A measure of *energy*. Indicates the amount a PV system produces or what is used over a period of time. Often written as kWh.

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

Module -- A complete, environmentally protected unit consisting of solar cells designed to generate DC power when exposed to sunlight.

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 at a fixed angle with respect to horizontal.

Adjustable tilt array -- A variation of a fixed---tilt photovoltaic 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.

Photovoltaic (PV) Systems Types

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

Stand---alone photovoltaic system -- A photovoltaic system that supplies power independently of the utility grid and can include storage.

Bimodal photovoltaic system -- A photovoltaic 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 system.

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 that serves a dwelling unit located in the United States that is owned and used as a residence by the taxpayer. Current available through December 2016.

Solar renewable energy credits (RECS) – Tradable commodities from energy generated by solar. One REC is generated every time one megawatt--hour (MWh) of clean, renewable electricity is produced.

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.