HARNESSING RENEWABLE POWER

South Central Indiana SCI REMC

THE MANY FORMS OF RENEWABLE ENERGY

And how to work with **your co-op** to harness them

Renewable energy is not a new concept. As a matter of fact, renewable power sources have provided electricity in the United States since as early as the 1880s, when the first hydroelectric dams were constructed. *But what is it, exactly?*

The phrase "renewable energy" generally refers to any source of power generation that isn't depleted upon use. When power is renewable, its energy source can be replenished. Other forms of power — such as coal, oil and gas — were formed over millions of years. When we use them, they're gone forever.

When people think about renewable energy, they may imagine vast fields of solar panels. While solar is an undeniably essential source of renewable energy, there are five other types of renewable energy in widespread use today.

While some of these forms of renewable energy are more complicated to create, others — such as solar and wind — can generate power at homes with the right equipment. That said, there are many considerations, including how to know you can trust the individual or organization you work with to create renewable energy for your home. This booklet will help you understand how, with the help of your cooperative, you can navigate the ins and outs of renewable energy safely and effectively.

Solar
Captured by panels and stored in batteries.

Wind
Captured by large wind turbines.

Hydropower
Generated in hydroelectric dams.

Geothermal
Heat from beneath the earth's crust converted to steam.

Ocean
Energy from heat and tides captured by turbines.

Hydrogen
Chemical energy converted with fuel cells.

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KNOW THE FACTS

Research before you buy a renewable energy generation system

MYTH: I don't need to contact my electric cooperative before I install a distributed generation system on my property.

FACT: Owners of distributed generation, also referred to as alternative energy production facilities (such as solar photovoltaic cells and wind turbines), are required to notify their utility company — including electric cooperatives — of plans to construct, install and operate any system that will be connected to the utility's systems. Utility systems include electric transmission lines, distribution lines or attached equipment. Talk to your co-op about filling out an interconnection application in advance of purchasing or installing any distributed generation equipment.

MYTH: My electric cooperative will help cover the costs associated with determining whether a distributed generation system is a good choice for me.

FACT: It is the sole responsibility of the member-owner to determine if owning a distributed generation system is a good investment. Your electric cooperative does not provide financial assistance with the analysis. However, electric co-ops have created this reference information to help member-owners understand the complexity of owning a distributed generation system before making a decision.

MYTH: Because I already have a wind or solar generating facility at my property, I don't need to contact my electric cooperative if I plan to expand my system.

FACT: Whenever a system expansion is planned, it's necessary to contact your co-op to ensure all electrical needs can be adequately met and that system reliability and safety are not compromised. In some instances, line upgrades may be necessary to serve the expansion. The system expansion will also need to undergo the same inspection process that is required of a new generation system.

MYTH: Since I will be using all of the energy output generated by my distributed generation system, I don't need to contact my co-op.

FACT: No matter the size of the system or the power output, consumers are required to notify their electric cooperative of plans to construct, install and operate any system that will be connected to the cooperative's systems (electric transmission lines, distribution lines or attached equipment). Talk to your co-op about filling out an interconnection application in advance of purchasing or installing any distributed generation equipment. An interconnection agreement is also required prior to operating the system.

MYTH: If I install a distributed generation system, I won't need the grid.

FACT: In order to ensure reliable and uninterrupted power, individual renewable systems typically must be balanced with a continuous source of dependable power from central station generation. It's rare for individuals who want continuous and reliable electricity to be completely off the grid. Backup generation in the form of a gas-powered generator, battery bank or some other storage technology is needed if the consumer desires a continuous supply of power but is no longer on the grid. Backup systems can be more expensive and less reliable than currently available central station generation provided by an electricity provider using the grid.

MYTH: An interconnection agreement is not required between me and my electric cooperative.

FACT: To ensure your safety and that of your fellow cooperative member-owners, an interconnection agreement must be in place. Whenever a generating resource is connected and providing power, your co-op must be aware of the system so that line personnel and other employees are not put in harm's way. There are a number of safety mechanisms that must be taken into account and put into place with member-owned generating facilities.

MYTH: The grid acts as a battery for my excess kilowatt-hours.

FACT: The grid does not act as a battery for excess energy. It is not capable of storing electricity in a manner that is cost-competitive with other technologies.

MYTH: If I install a distributed generation system, and my co-op requires an interconnection agreement, then my co-op is responsible for the maintenance of my system.

FACT: Your electric co-op does not have responsibility for the maintenance of member-owned distributed generation systems. Member-owners are responsible for all necessary maintenance and repair investments and activities on their own distributed generation systems.

MYTH: Owning and operating a distributed generation system on my property does not present any additional safety issues for my cooperative.

FACT: Each type of generating source often has specific requirements. For example, in the case of a rooftop solar system, the International Fire Code requires, among other things, a construction permit, specific signage and markings, properly spaced access points and smoke ventilation. These measures are to ensure the safe and reliable operation of the system and to protect our member-owners and employees who interact with the power grid. If our linemen are not aware of an interconnected system, they could be at risk of serious injury when working on the distribution system. These requirements also support the protection of local safety personnel, such as emergency responders, by ensuring appropriate system notification in the case of fire to prevent injury.

MYTH: I don't need additional insurance for my distributed generation system.

FACT: In most states, owners of distributed generation systems are required to provide proof of general liability insurance as part of the interconnection agreement. Check with your electric cooperative for the specific insurance requirements needed for the system you are considering.

MYTH: Solar generation production matches my cooperative's peak demand periods.

FACT: Peak production for solar generation is typically 2-4 p.m., and consumer electric use generally peaks in the early evening. That means there is a mismatch between energy production and energy consumption. In order to maximize the potential benefits of distributed generation, it's important to size the system properly and invest in the technology that coincides with providing the most output during your peak-use period.

MYTH: On a cloudy day, my solar generation system will produce the same amount of energy as it does on a sunny day.

FACT: Solar energy production is at its highest on a sunny day; cloudy skies can significantly impact production. Research shows that production may drop 60% to 70% or more on a cloudy day versus a mostly sunny day.

MYTH: My electric cooperative isn't engaged in renewable energy.

FACT: Your electric cooperative supports renewable energy and responsible environmental policies that balance the needs of the environment while providing safe, affordable and reliable power. Along with Hoosier Energy, your electric cooperative's power supplier and 17 other local electric cooperatives, we have invested significantly into renewable resources, such as wind, solar, hydro and landfill methane gas into our portfolios. In addition, your cooperative has a policy to obtain 10% of its energy from renewable resources by 2025. Hoosier Energy and its member cooperatives invested in solar projects throughout southern Indiana that will produce 10 MW of power. Each solar facility produces enough power in a year to serve 150 average cooperative homes.

QUESTIONS TO ASK YOUR COOPERATIVE, YOUR POTENTIAL SOLAR PANEL INSTALLER AND YOURSELF

Do your homework before you write the check

ASK YOUR COOPERATIVE

What are the cooperative's policies for rates, interconnection and purchased power?

Your local not-for-profit energy provider can help you understand the rate structure your services fall under and the types of charges likely to be incurred, as well as how you may be compensated for the unused energy generated by your system.

What are my responsibilities as the owner of a power generation system?

Installing a distributed generation system requires that certain responsibilities are met by all parties involved in the process. For example, the owner of the distributed energy system is responsible for obtaining the proper equipment and ensuring that all requirements of the electric co-op's interconnection agreement are met, including paying any necessary costs. Local and/or state officials are responsible for conducting safety inspections, but the owner of the distributed generation system must notify the local and state officials in order to set this in motion. Once all interconnection requirements are met and the safety and integrity of the system meet all necessary criteria, the cooperative is responsible for the final stages of interconnection. Ongoing maintenance and system repairs are the responsibility of the generation system owner.

What are the safety requirements involved?

Your electric cooperative provides electricity when your distributed generation system does not produce sufficient energy to meet your needs. That keeps member-owners connected to the grid. Because of this connection, distributed generation owners must work with their co-op to meet requirements that keep the grid reliable and safe. All interconnection and safety requirements must be met prior to operating a distributed generation system in parallel with your co-op's electric distribution system. This is necessary to protect other member-owners, cooperative employees, public safety personnel and the general public from risks that could result from the improper installation of distributed generation.

ASK YOURSELF

What is my electric load? What are the distributed generation system's capabilities?

A thorough examination of your electricity needs will help you determine the size and type of system necessary. Record how your energy use fluctuates throughout the day, both seasonally and over the year. Research when various distributed generation systems produce peak energy, and compare that information to your current and expected energy use. You'll most likely still need power from a centralized energy grid. Distributed generation is intended for supplemental power to meet your own energy needs.

What are the upfront costs associated with installing a renewable generation system?

Most electric co-ops do not install or maintain member-owned distributed generation systems. You will be responsible for the initial costs to install the system and ongoing maintenance and repairs. Doing your homework before investing in a system will help you understand costs involved, such as installation and interconnection expenses, insurance and taxes. Your research will help determine if a distributed generation system is economical for your energy needs.

Are there any potential incentives or tax credits?

Financial incentives, such as the Investment Tax Credit (ITC), may be available to offset your investment costs. We encourage you to talk with a tax adviser and your prospective vendors to learn more. Incentives are often driven by laws or policies. They have expiration dates, vary by type and size of system and other factors. The Database of State Incentives for Renewables & Efficiency (www.dsireusa.org) is one source of information on incentives and policies that support renewables and energy efficiency in the U.S.

How do I choose a reputable vendor?

It's important to find a reputable installer who will size the system properly and give you realistic expectations. Ask for references, check online consumer reviews and ask for third-party input from credible resources. Refer to the North American Board of Certified Energy Practitioners at NABCEP.org to locate certified installers and practitioners in your area.

What records should I keep?

Retain all data and research that you gather, as well as information provided by your electric cooperative, vendors and other credible third-party sources. If you proceed with a distributed generation system, you will want to track and compare actual system performance with expected performance based on vendor information.

How can I best implement energy efficiency with my solar generation system?

Completing a thorough energy-efficiency audit is an important first step when considering distributed generation. By implementing energy-efficiency measures before installing a distributed generation system, you save money by reducing your overall energy consumption and reduce the size of the distributed generation system you'll need to meet your energy needs. Many energy-efficiency projects have a quicker payback than certain distributed generation installations.

ASK POTENTIAL INSTALLERS

... about cost and energy

- What is the total installed cost of the system?
- Do you propose a roof mount or ground mount system?
- What are the differences in cost, maintenance, space, etc.?
- How much of my energy use would my solar system cover?
- How much would my monthly energy bills be after installation?
- How long would my payback period be on my solar system?
- What are the key assumptions associated with my payback that may impact that result?
- How will solar affect my homeowner's insurance?

... about hardware and installation

- If my energy use changes, will I be able to add more panels later?
- Will I need a new roof for any reason to install and utilize these solar panels — e.g., to support extra weight, etc.?
- If these panels or the installation damage my property, who is responsible?
- In which country are the solar panels and inverters you are selling made?
- What kind of warranties do the solar panels and inverters have?
- When does equipment typically need to be replaced?
- How long will the installation take?

... about vendor verification

- When was your company established, and how many solar systems has it installed to date? (Ask for references.)
- Does your company have a standard insurance certificate with adequate general liability coverage of $1 million or more? (Ask to see it.)
- Does your company have professional liability insurance? (Ask to see it.)
- Are your solar installers North American Board of Certified Energy Practitioners (NABCEP) Solar Photovoltaic (PV) Electric trained and certified?
- Do you have a licensed professional engineer and master electrician on staff to review and approve drawings, obtain permits and supervise electrical work? Will you handle that paperwork?
- Are you accredited with the Better Business Bureau? If so, what is your rating?
- Will you complete all of the paperwork associated with financing, tax credits and/or grants? Does that cost extra?
- Do you work with any affiliated companies or subcontractors?
- Do you offer any warranties or guarantees on your installation work?

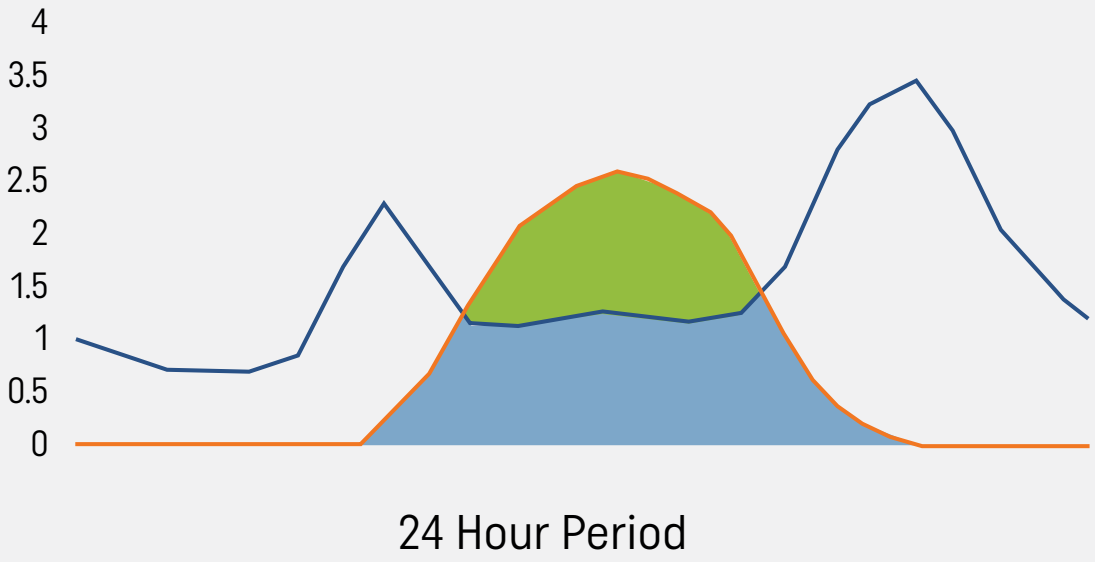
What additional resources do you have for me to study and discuss with my cooperative?

If you are considering investing in a distributed generation system, talk to your electric cooperative before you begin. Also talk to credible, reputable and skilled professionals who are knowledgeable in distributed generation systems. They can direct you to additional resources that will help you understand the economics of a distributed generation system, including the type of renewable energy technology best for your property, financing options, potential incentives and other details such as insurance requirements. In addition to professionals, ask for the advice of others who have installed distributed generation systems to learn what they like about their systems or what they wish they would have done differently. Your cooperative representative may know about systems installed in your area.

CONSUMER COMPENSATION

After careful consideration, SCI REMC has established compensation levels for consumer-owned renewable energy that ensure equity for all member-consumers. It is important that compensation be fair to those who choose to interconnect a distributed generation device and those who do not. The payment structure is a net billing approach as seen below.

- The member-consumer avoids paying retail rate for any energy produced and consumed.
- Energy that is produced and returned to the grid is compensated at a net billing rate.



Average home use
Average solar production (6 kW)
Energy returned to the grid — net billing rate
Solar energy produced and consumed

When you generate as much electricity from your solar array as you are using (shown in light blue), you are not buying power from the grid. If your system produces more energy than you need at a given time (the area shaded in green), the excess power is exported to the grid, and your monthly bill is credited using the renewable energy buy back rate.

GLOSSARY OF TERMS

BACKFEED
When excess electric power is being produced from a distributed generation system into the local power grid, power flows in the opposite direction from its usual flow.

BACKUP GENERATOR*
A generator that is used only for test purposes, or in the event of an emergency, such as a shortage of power needed to meet customer load requirements.

BASELOAD GENERATION (BASELOAD PLANT)*
Generation from a plant, usually housing high-efficiency steam-electric units, which is normally operated to take all or part of the minimum load of a system, and which consequently produces electricity at an essentially constant rate and runs continuously.

CENTRAL STATION GENERATION
Production of energy at a large power plant that is transmitted through infrastructure to a widely distributed group of users.

COAL*
A readily combustible black or brownish-black rock whose composition, including inherent moisture, consists of more than 50% by weight and more than 70% by volume of carbonaceous material.

CO-GENERATION*
The production of electrical energy and another form of useful energy (such as heat or steam) through the sequential use of energy.

COMMISSIONING TEST
A highly specialized activity where a power installation is tested to ensure it meets exacting standards through a set of engineering techniques and procedures to check, inspect and test every operational component of the project, from individual functions, such as instruments and equipment, up to complex amalgamations such as modules, subsystems and systems.

CONSUMPTION (ALSO ENERGY CONSUMPTION)*
The use of energy as a source of heat or power or as a raw material input to a manufacturing process.

COST OF SERVICE*
A rate-making concept used for the design and development of rate schedules to ensure that the filed rate schedules recover only the cost of providing the electric service at issue.

DISTRIBUTED GENERATOR*
A generator that is located close to the particular load that it is intended to serve. General, but non-exclusive, characteristics of these generators include: an operating strategy that supports the served load and interconnection to a distribution or sub-transmission system (138 kV or less).

DISTRIBUTION*
The delivery of energy to retail customers.

ELECTRICITY GENERATION*
The process of producing electric energy or the amount of electric energy produced by transforming other forms of energy, commonly expressed in kilowatt-hours or megawatt-hours.

ELECTRIC POWER GRID*
A system of synchronized power providers and consumers connected by transmission and distribution lines and operated by one or more control centers.

ENERGY*
Energy has several forms, some of which are easily convertible and can be changed to another form useful for work. Most of the world's convertible energy comes from fossil fuels that are burned to produce heat that is then used as a transfer medium to mechanical or other means in order to accomplish tasks.

Items with an asterisk (*) are terms defined by the U.S. Energy Information Administration (EIA).

ENERGY DEMAND*

The requirement for energy as an input to provide products and/or services.

ENERGY EFFICIENCY*

A ratio of service provided to energy input (e.g., lumens to watts in the case of lightbulbs). Unlike conservation, which involves some reduction of service, energy efficiency provides energy reductions without sacrifice of service. May refer to the use of technology to reduce the energy needed for a purpose or service.

ENERGY EFFICIENCY, ELECTRICITY*

Refers to programs that are aimed at reducing the energy used by specific end-use devices and systems, typically without affecting the services provided. These programs reduce overall electricity consumption (reported in megawatt-hours), often without explicit consideration for the timing of program-induced savings. Such savings are generally achieved by substituting technologically more advanced equipment to produce the same level of end-use services (e.g., lighting, heating, motor drive) with less electricity.

ENGINEERING STUDY

A study conducted by the electric cooperative that will indicate the equipment needed for the interconnection of a distributed generation system. Typically, this study will address technical and safety requirements.

GRID*

The layout of an electrical distribution system.

IEEE

Institute of Electrical & Electronics Engineers.

INTERCONNECTION*

Two or more electric systems having a common transmission line that permits a flow of energy between them. The physical connection of the electric power transmission facilities allows for the sale or exchange of energy.

INTERCONNECTION AGREEMENT

A legal contract for the connection of the distributed generation facility to the cooperative's lines, specifying the location, size, cost, manner of payment, terms of operation and respective responsibilities of the cooperative and the distributed generation member-owner.

INTERCONNECTION APPLICATION

A document submitted to the cooperative that provides information for a proposed distributed generation facility and allows the cooperative to assess any potential impacts and ensure all requirements are met.

INTERCONNECTION COSTS (DG)

The reasonable costs of connection, switching, metering, transmission, distribution, safety provisions and administrative costs incurred by the cooperative directly related to the installation and maintenance of a member's distributed generation facility.

INTERMITTENT LOAD*

The range from base load to a point between base load and peak. This point may be the midpoint, a percent of the peak load, or the load over a specified time period.

INTERMITTENT RESOURCE*

An electric generating plant with output controlled by the natural variability of the energy resource rather than dispatched based on system requirements.

ISOLATION DEVICE

A readily accessible, lockable, visible-break switch located between the distributed generation facility and its interface to the cooperative's electric facilities.

KILOWATT-HOUR (KwH)*

A measure of electricity defined as a unit of work or energy, measured as 1 kilowatt (1,000 watts) of power expended for one hour. One kWh is equivalent to 3,412 Btu.

LOAD*

An end-use device or customer that receives power from the electric system.

METHANE*

A colorless, flammable, odorless hydrocarbon gas which is the major component of natural gas. It is also an important source of hydrogen in various industrial processes. Methane is a greenhouse gas.

NET METERING*
A billing mechanism that credits renewable energy system owners for the electricity they add to the grid, at a retail rate.

NET BILLING
A billing mechanism that credits renewable energy system owners for the electricity they add to the grid, at the utility's wholesale rate.

OUTPUT*
The amount of power or energy produced by a generating unit, station or system.

PEAK DEMAND, PEAK LOAD*
The maximum load during a specified period of time.

PHOTOVOLTAIC (PV)*
Energy radiated by the sun as electromagnetic waves (electromagnetic radiation) that is converted at electric utilities into electricity by means of solar (photovoltaic) cells or concentrating (focusing) collectors.

PURPA*
Public Utility Regulatory Policies Act of 1978. One part of the National Energy Act, PURPA contains measures designed to encourage the conservation of energy, more efficient use of resources and equitable rates. Principal among these were suggested retail rate reforms and new incentives for the production of electricity by co-generators and users of renewable resources.

INTERMITTENT RESOURCE*
An electric generating plant with output controlled by the natural variability of the energy resource rather than dispatched based on system requirements.

QUALIFYING FACILITY (QF)*
A co-generation or small power production facility that meets certain ownership, operating and efficiency criteria established by the Federal Energy Regulatory Commission (FERC) pursuant to the Public Utility Regulatory Policies Act (PURPA).

RELIABILITY
A measure of the ability of the system to continue operation while some lines or generators are out of service. Reliability deals with the performance of the system under stress.

RENEWABLE ENERGY*
Energy resources that are naturally replenishing but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Renewable energy resources include biomass, hydro, geothermal, solar, wind, ocean thermal, wave action and tidal action.

SOLAR ENERGY*
The radiant energy of the sun, which can be converted into other forms of energy, such as heat or electricity.

STORAGE CAPACITY*
The amount of energy an energy storage device or system can store.

SYSTEM PROTECTION EQUIPMENT
Equipment that protects electrical power systems from faults through the isolation of faulted parts from the rest of the electrical network. The goal is to stabilize the power system by isolating only the components that are under fault, while leaving as much of the network as possible still in operation.

TRANSMISSION SYSTEM*
An interconnected group of lines and associated equipment for the movement or transfer of electric energy between points of supply and points at which it is transformed for delivery to customers or is delivered to other electric systems.

WIND ENERGY*
Kinetic energy present in wind motion that can be converted to mechanical energy for driving pumps, mills and electric power generators.

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Scan here for more information about SCI REMC
and renewable energy opportunities.

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