

# Harnessing the power of renewables

Dear Co-op Member,

Thank you for your interest in consumer-owned generation. To assist our members, we have developed a streamlined process that will ensure all members continue to have safe, reliable, efficient and cost-effective electricity.

Our mission is to protect the safety of cooperative personnel and member-consumers, maintain the integrity and reliability of the grid, and establish mechanisms to ensure rate fairness for all member-consumers. Consumer-owned generation interconnections can affect the safety and reliability of the distribution system. We have developed technical interconnection rules that address those safety and reliability impacts as well as a net metering rate that ensures fairness across all members.

We are ready to help you by offering factual information and answering your questions. It is our goal to provide you with the tools that you need to make an informed decision about adding generation to your home or business.

## **AVAILABLE ON OUR WEBSITE YOU WILL FIND:**

### **Information Section**

- Questions to ask a prospective solar panel installer
- Ten installation considerations
- Myths vs. facts
- Consumer compensation
- Renewable avoided cost
- Glossary of terms

### **Interconnection Section**

- Application
- Agreement
- Insurance Requirement

Your co-op looks forward to working with you. If you have any questions, contact the office using the information below.

Sincerely,  
*Joe Henson*  
*General Manager*

## **For more information**

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## Myths vs. facts

**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 and wind turbines) are required to notify their utility company, which includes 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 if owning 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

### IF YOU'RE THINKING ABOUT INSTALLING A RENEWABLE ENERGY GENERATION SYSTEM, MAKE SURE YOU HAVE ALL THE FACTS FIRST.

information to help members-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 on my premise, 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:** I will be using all of the energy output that I generate with my distributed generation system; therefore, 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

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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 my electric cooperative and me.

**FACT:** To ensure your safety and that of your fellow cooperative member-owners, you must notify your co-op if you intend to install a distributed generation system and 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 as 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. The member-owner who owns

the resource is responsible for all necessary maintenance and repair investments and activities.

**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 a construction permit, specific signage and markings, properly spaced access points, and smoke ventilation, just to name a few. 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 the fire department, by ensuring that there is appropriate system notification in the case of fire to prevent injury.

**MYTH:** I don't need to have any additional insurance for my distributed generation system.

**FACT:** In most states, distributed generation owners 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 gener-

ation is typically between 2-4 p.m. and consumer electric use generally peaks in the early evening, which 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 60-70 percent 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 affordable, safe and reliable power. Along with Hoosier Energy, your electric cooperative's power supplier and 17 other local electric cooperatives, we have invested millions of dollars 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. Recently, Hoosier Energy and their member cooperatives have invested in building 10MW of solar projects throughout southern Indiana. Each solar facility produces enough power in a year to serve 150 average cooperative homes.

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# Glossary of terms

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

## **AVOIDED COST**

The incremental cost for a utility to produce one more unit of power.

## **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 infra-

structure 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 percent by weight and more than 70 percent by volume of carbonaceous material.\*

## **COGENERATION**

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 ratemaking 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 (kWh) or megawatt hours (MWh).\*

## **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

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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. \*

### **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 light bulbs). Unlike conservation, which involves some reduction of service, energy efficiency provides energy reductions without sacrifice of service. May also refer to the use of technology to reduce the energy needed for a given 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 and 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-owner'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 1 hour. One kWh is equivalent to 3,412 Btu.\*

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# Glossary of terms (cont.)

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## **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.\*

## **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 (PURPA) of 1978. One part of the Nation-

al 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 production of electricity by cogenerators and users of renewable resources.\*

## **QUALIFYING FACILITY (QF)**

A cogeneration 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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# Ten installation considerations

## **IMPLEMENT ENERGY EFFICIENCY**

Completing a thorough energy efficiency audit is an important first step when considering distributed generation (DG).

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 DG installations.

## **DO YOUR HOMEWORK BEFORE YOU WRITE THE CHECK**

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; and financing, potential incentives, and other requirements, such as insurance required.

In addition to professionals, ask for the advice of others who have installed a DG

system to learn what they like about their system or what they wished they would have done differently.

Your cooperative representative may know about systems installed in your area.

## **KNOW YOUR CO-OP'S RATE STRUCTURE AND INTERCONNECTION AND PURCHASED POWER POLICIES**

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 excess energy you do not use that is generated by your distributed generation system.

## **ANALYZE YOUR ELECTRIC LOAD AND UNDERSTAND THE DG SYSTEM'S CAPABILITIES**

A thorough examination of your electricity needs will help you determine the size and type of the 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.

## **DETERMINE THE COSTS UPFRONT**

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 repair costs. Doing your homework before investing in a system will help you understand costs involved, such as installation and interconnection costs, insurance, taxes, as well as incentives and tax credits. Your research will help determine if a distributed generation system is economical for your energy needs.

## **RESEARCH POTENTIAL INCENTIVES AND 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 advisor and your perspective vendors to learn more.

Incentives are often driven by laws or policies, have expiration dates, and can vary by type and size of system, whether it is for residential or commercial/industrial use, and other factors.

The Database of State Incentives for Renewables & Efficiency ([www.dsireusa.org](http://www.dsireusa.org)) is one source of information on incentives and policies that support renewables and energy efficiency in the U.S.

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## **UNDERSTAND RESPONSIBILITIES**

Installing a distributed generation system requires that certain responsibilities are met by all parties involved with 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, then the cooperative is responsible for the final stages of interconnection.

Ongoing maintenance and system repairs are the responsibility of the generation system owner.

## **KNOW SAFETY REQUIREMENTS**

Your electric cooperative provides electricity when your distributed generation system is not producing sufficient energy to meet your needs, which keeps member-owners connected to the grid.

Because of this connection, distributed generation owners must work with their co-op to meet their requirements to 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.

## **CHOOSE A REPUTABLE VENDOR**

It's important to find a reputable installer who will size the system properly and who will 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 (NABCEP) at [NABCEP.org](http://NABCEP.org) to locate certified installers and practitioners in your area.

## **KEEP THOROUGH RECORDS**

Retain all data and research that you gather as well as information that is 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.

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# Questions to ask a potential solar panel installer

## **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?

## **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 i.e. weight?
- 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?



## **VENDOR VERIFICATION**

- When was your company established and how much solar 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 sub-contractors?
- Do you offer any warranties or guarantees on your installation work?

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# Renewable avoided cost

The “avoided cost” value of renewable power is lower than our retail rate. This is due to the natural intermittency of solar and wind and the mismatch between renewable peak power and our early morning winter peaks and late afternoon summer peaks.

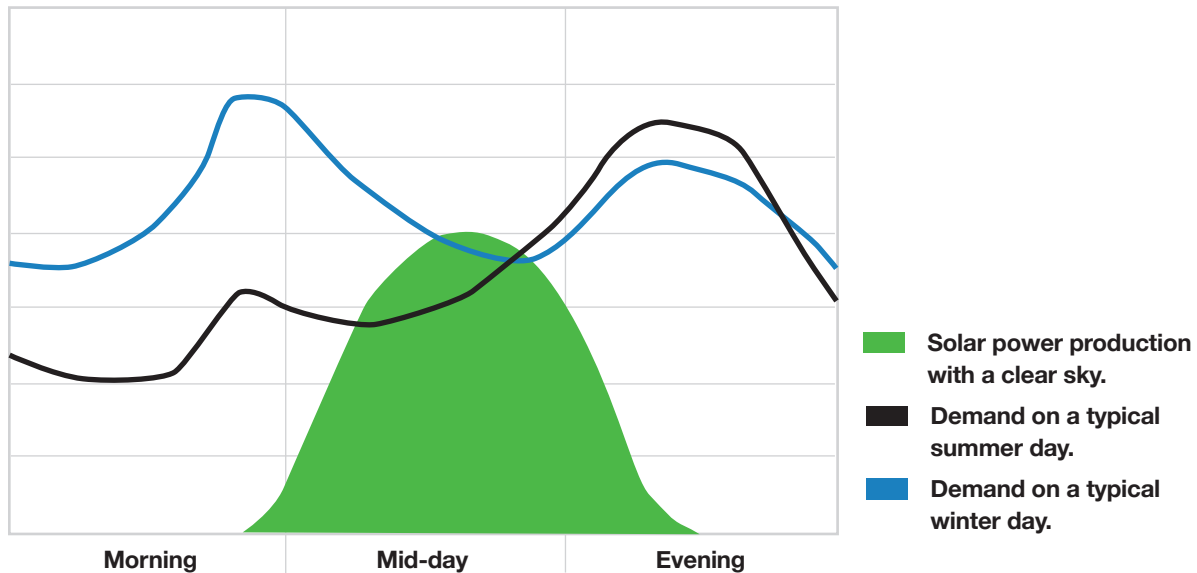
Because renewable energy may not be available during peak periods, your cooperative has to provide for the generation capacity and energy for those peak periods from other sources. For example, when solar energy is available mid-day, the resulting

savings or “avoided cost” of solar energy is the avoided fuel cost and the avoided variable operations and maintenance cost from other generation sources.

In summary, the value of electricity varies throughout the day. It is most valuable during peak periods, which is early morning during winter and late afternoon during both summer and winter. It is less valuable in the middle of the day and least valuable in the middle of the night, which explains the value associated with avoided cost.

## Understanding electricity demand periods

**On a clear day (green curve) solar power generation does not match well with the time when your electric cooperative needs electricity the most.**



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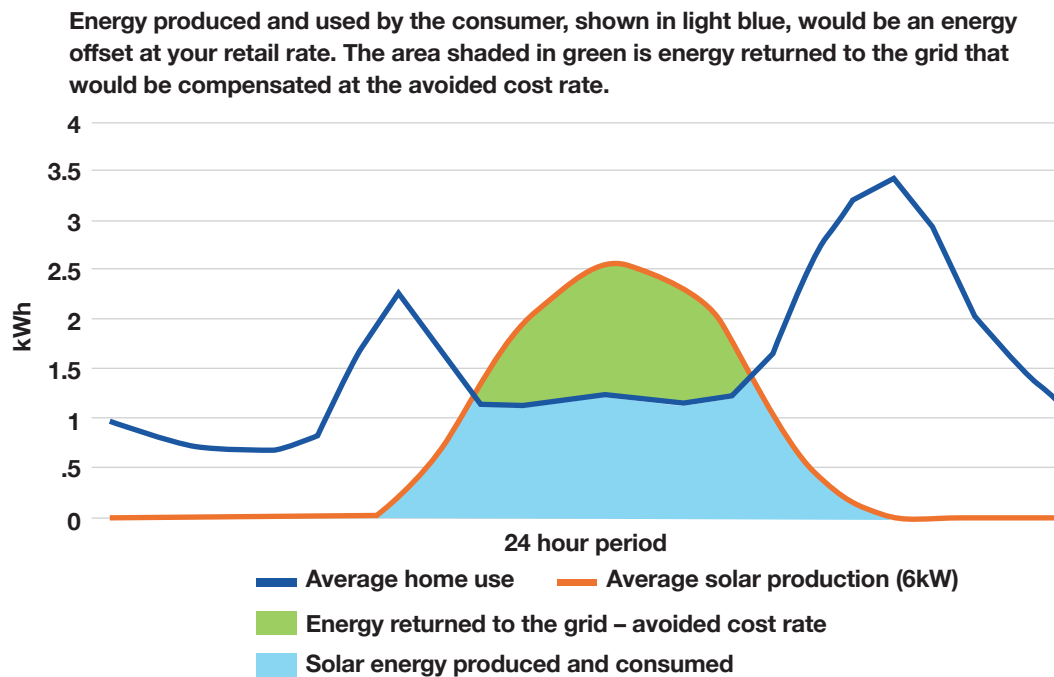


# Consumer compensation

After careful consideration, Dubois REC has established compensation levels for consumer-owned renewable energy that ensures equity for all member-consumers. It is important that compensation be fair to both those who choose to interconnect a distributed generation device and those who do not. The payment structure is a modified net metering 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 an avoided cost rate.

Energy produced and used by the consumer, shown in orange in the chart below, would be an energy offset at your retail rate. The area shaded in green is energy returned to the grid that would be compensated at the avoided cost rate.



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