

## Customer Generation and Solar Energy FAQ

Duke Energy receives numerous customer inquiries about renewable energy generation systems, including solar panels, wind turbines, and small scale hydroelectric generators, etc. Some customers are interested in information about installing their own systems, others are interested in learning if Duke sells or will install a system for them. This FAQ addresses many of those questions.



### **Q. What is solar energy?**

A. Solar energy is the general term used for capturing and using the sun's energy to perform useful work, such as producing heating for homes or businesses or converting the sun's energy into electricity. Solar thermal energy systems usually use rooftop panels to produce hot water or hot air for heating. Solar photovoltaic systems use photovoltaic cells to convert sunlight directly into electricity.

### **Q. How does a solar photovoltaic system work?**

A. A solar photovoltaic system, or PV system for short, uses specially prepared silicon materials to convert sunlight into electricity. These materials can be arranged into cells on panels or made into sheet material like a roll of linoleum. When exposed to sunlight, these materials release atomic electrons that produce a direct current (DC) flow of electricity similar to the energy that is stored in batteries. This direct current (DC) electricity can be used to power almost any device that runs on battery power, but is often converted to alternating current (AC) like the electricity on the power grid using a device called an inverter. This alternating current electricity can then be used to operate common household devices that are plugged into a wall receptacle.

### **Q. Can Duke Energy customers install their own solar panels, wind turbines, hydro systems, etc., and produce their own electricity?**

A. Yes. Duke encourages the installation of cost effective small scale customer-owned renewable energy systems. There are several rate options that permit customers to install solar panels, wind turbines, hydroelectric generators, and other renewable energy generating systems at their home or business.

### **Q. How much does a solar photovoltaic ("PV") system cost?**

A. Residential solar PV systems can cost from \$5 to \$8 per watt or \$5,000 to \$8,000 per kilowatt installed. A typical home system can cost from \$25,000 to \$50,000 depending on the size of the system, and whether batteries are used to store some of the electricity for use at night or on cloudy days. This equates to an average kWh cost for a PV system that can range upwards to \$.20 per kWh or more, not including maintenance costs for batteries.

### **Q. Can I use PV to power my entire home?**

A. Yes, but that can be an expensive proposition without first using other energy efficiency measures (appliances, insulation, energy efficient lighting, etc.) to reduce the amount of energy

needed in the home and help reduce the size and cost of the PV system needed.

On an annual basis each installed kilowatt of solar PV capacity in the Carolinas will produce approximately 4.5 to 5 kilowatt-hours per day. So a 4 kilowatt system can produce up to 600 kilowatt hours per month, about half of the needs of the average Duke Energy Carolinas residential customer, and cost between \$25,000 and \$40,000 installed.

There are state and Federal tax incentives available to help offset the cost of solar systems, but paybacks based on energy costs alone can be long. The North Carolina Solar Center has additional information on tax incentives located on its website at [www.ncsc.ncsu.edu](http://www.ncsc.ncsu.edu).

If your PV system is large enough to produce more energy than you need, the excess can be delivered to the grid or stored in batteries so it will be available to use when the sun isn't shining so brightly.

**Q. What if my PV system cannot supply enough electricity to meet my needs?**

A. Residential and nonresidential customers have several options available for installing solar panels. If the customer uses the PV system to supply a load that is completely separate and is not interconnected with the utility, such as a water heater or separate lighting, there are no special requirements from the utility. When the customer opts for this arrangement and the PV system is not supplying power, there is no back up from the utility; so batteries or an alternate power source such as a generator are necessary.

The other options involve interconnecting your PV system with loads already served by the utility's system or interconnecting directly to the grid and selling all of the output to the grid.

**Q. What is interconnection?**

A. Interconnection is the process of obtaining permission to physically connect a generator to the electric grid, whether on the customer side of the meter, or on the utility side of the meter. Getting permission to interconnect with Duke Energy's grid is relatively easy, but there are several important steps the customer must follow to ensure that it is done properly and safely.

There is an application process that gets the process started. Applications for interconnection can be downloaded from this website. There is a \$100 application fee for smaller systems, and a \$250 application fee for larger commercial systems to help offset the costs of inspection and interconnection request processing.

The inverter of the system being installed must comply with certain interconnection requirements and industry standards or Duke will have to install utility-owned protective equipment at the delivery point at the customer's expense. Interconnection standards for North Carolina and South Carolina can be downloaded from this website, and are necessary for grid integrity and public safety as the PV system will be operating electrically in parallel (connected) with the grid. Even if the PV system is installed on the customer side of the meter, it will be capable of sending electricity back to the grid at times.

Interconnections must be individually inspected and accepted by Duke Energy Carolinas prior to operating in parallel with the electric grid. Customers that install generation must also maintain certain liability insurance coverage for their projects.

**Q. Is net metering available in North Carolina and South Carolina?**

A. Yes. Net metering means installing a generator on the customer's side of the meter and using the energy that is produced to serve the customer's electric loads. If the customer produces more energy than is needed, the excess energy will be delivered to the grid, where it can be netted against monthly usage, or purchased by Duke. (Customer's choice)

Net metering riders are available in North Carolina and South Carolina for both residential and nonresidential customers.

**Q. What are the net metering options?**

A. There are two net metering/net billing options available in North Carolina and one option in South Carolina.

Rate **Rider SCG, Small Customer Generator** (for NC customers only) is used when generation is installed on the customer side of the meter and the customer wants to sell any excess energy back to the grid.

Rate **Rider NM, Net Metering** (available in NC and SC) is used when generation is installed on the customer side of the meter and the customer wants to offset their monthly usage with production from their generating system. Energy delivered to the grid is netted against that month's energy purchases from the grid, and any monthly excess is carried over to the next month.

These rate riders are explained in detail on the Duke Energy website under the rate options section. Both riders permit residential customer to install systems with nameplate ratings up to the estimated maximum monthly kilowatt (KW) demand of the residence or 20KW, whichever is less; and non-residential customers to install systems with a nameplate rating up to the customer's contract demand or 1,000 KW in North Carolina and up to 100 KW in South Carolina

**Q. How will I be charged for electricity I may still need to purchase from Duke Energy?**

A. Customers pay the standard electric rate per kWh for any energy purchased from Duke Energy, including a Basic Facilities Charge. A Supplemental Basic Facilities Charge is added on Rider SCG to cover the cost of additional metering required to measure the bi-directional flow of electricity. The Rider also includes a standby charge per kW based on the size of the PV system because Duke Energy is providing a standby supply of electricity.

**Q. What if I want to sell all of the energy that is produced to the grid instead of net meter?**

A. Duke Energy Carolinas offers purchase power rate schedules in both North Carolina and South Carolina to buy all of the energy that is produced and delivered to the grid from a renewable energy generation system. In North Carolina **Schedule PP-N(NC)** is available for most types of renewable generators, including photovoltaic and wind, and **Schedule PP-H(NC)** is available for hydroelectric facilities. In South Carolina **Schedule PP(SC)** is available for all renewable energy projects.

Selling the total output of your generation system may allow you to maximize your participation in the NC GreenPower or Palmetto Clean Energy Programs.

**Q. Will Duke install solar panels at a customer's home or business?**

A. Duke Energy Carolinas received approval from the North Carolina Utilities Commission to install solar PV systems at various residential, business, and manufacturing facility sites across North Carolina. The energy produced from these systems is fed directly into the grid and is used to supply renewable energy to all customers in NC. This program is currently fully subscribed and we are not accepting additional applications at this time.

Additional information about renewable energy, energy efficiency, customer-owned generation, interconnection procedures, and rate schedules is available on the Duke Energy website located at [www.duke-energy.com](http://www.duke-energy.com).