

Consumer Guide to Solar Electricity for the North Carolina Homeowner



NC SUSTAINABLE
ENERGY ASSOCIATION



Consumer Guide to Solar Electricity for the North Carolina Homeowner



NC SUSTAINABLE
ENERGY ASSOCIATION

Published by North Carolina Sustainable Energy Association and the North Carolina Public Staff

About this Guide:

This Consumer Guide to Solar Electricity for the North Carolina Homeowner is intended to educate homeowners and home buyers about the many factors to consider before, during, and after installing solar panels on their homes. This Guide is not meant to be a technical resource on how to design or install a system. Homeowners should consult with at least one experienced solar contractor to determine the best and most cost-effective system for their property and their home's energy needs. Likewise, purchasers of a new-build home or home buyers in search of a home suited for solar panel installation must consider numerous factors including compass orientation of the home's roof, roof style and attachments, and various other factors which are best evaluated by qualified solar facility designers, architects, engineers, or qualified home builders. This guide provides resources to assist in the selection process. The authors of this guide do not endorse any products or service providers. The information in this guide is based upon a similar guide developed by the South Carolina Office of Regulatory Staff – Energy Office and South Carolina Electric & Gas Company. Also, information and resources, in part, have been adapted from:
www.energy.gov/energysaver/buying-and-making-electricity/using-solar-electricity-home.



Table of Contents

4 Important First Steps

- 4 Ensuring Your Home is Energy Efficient
- 4 Easy Energy Savings Tips
- 4 Quick Projects

5 Potential Benefits of Solar Electricity

- 5 Solar Electricity Basics
- 6 Types of Solar Photovoltaic (PV) Panels
- 7 Types of Solar Electric Systems

10 How to Choose a System

- 10 Roof Requirements
- 10 Space and Orientation
- 11 Condition
- 11 Shading

12 Installation and Maintenance

- 12 Warranties and Insurance
- 12 Zoning and Permits (includes Homeowners Association {HOA} Fees)
- 13 Utility Permits and Special Requirements
- 13 Maintenance
- 13 Installation and Finding a Contractor
- 14 Information You Should Verify

15 Cost and Financial Incentives

- 15 Cost
- 15 Net Energy Metering
- 15 Financing
- 15 What Should My Solar Bid Include
- 16 Important Facts: Buying vs. Leasing Solar Panels
- 17 Chart: Buying vs. Leasing
- 18 Rooftop Solar Checklist
- 20 Questions to Consider
- 22 Resources
- 23 Contact Information



IMPORTANT FIRST STEPS

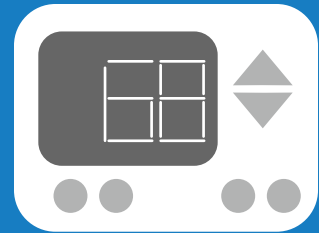


Ensuring Your Home is Energy Efficient

Many people turn to solar energy as a way to save money on utility bills—**but remember that your biggest savings will always be the energy you don't use.** An energy-efficient home ensures that the energy you pay for is used to make you and your family more comfortable. By maximizing your home's energy efficiency, you can be sure the electricity generated by your solar panels is not lost through leaky ductwork, inadequate insulation, or an inefficient heating and cooling system. Reducing your electricity use may also allow you to reduce the size of your solar electric system, saving even more money.

Easy Energy Savings Tips

- Set your thermostat at 68°F or lower in the winter and 78°F or higher in the summer;
- Take advantage of programmable or smart thermostats to save energy while you're away from your home;
- Check air filters monthly and change when dirty or according to manufacturer guidelines;
- Keep heating, ventilation, and air conditioning (HVAC) vents and interior doors open to promote air flow to and from the unit;
- Close window shades during the warm weather season to reduce heat in your home;
- Have your HVAC unit professionally serviced annually;
- Set your water heater to 120°F; and
- Practicing water conservation also conserves energy. Examples include shortening time spent in the shower, running washing machines only when full, and being mindful about running sinks.



Quick Projects

- Caulk, seal, and weather-strip around all seams, cracks and openings to protect against drafts (*Pay special attention to windows and exterior doors*). See the [N.C. State Extension website](#) for do-it-yourself guides on this and other projects;
- Replace incandescent light bulbs with light-emitting diode (LED) bulbs, which use up to 75 percent less energy;
- Check your ductwork and fix any leaks, tears, or sagging; and
- Have a contractor conduct an assessment of your home to help you learn more about potential energy efficiency issues. For starters, use the [Building Performance Institute search tool](#) to locate contractors.

Resources on residential energy efficiency:

- [U.S. Dept. of Energy: Energy Saver Guide](#)
- [N.C. State Extension: Home Energy Conservation](#)
- [ENERGY STAR®: Home Tips](#)



POTENTIAL BENEFITS OF SOLAR ELECTRICITY



Potential Benefits of Solar Electricity

- Saving money on your electric bill;
- Enjoying reliable, clean power for decades with proper care and maintenance;
- Helping to boost our state's economy by creating jobs and new solar companies; and
- Reduce greenhouse gases.

Solar Electricity Basics

Solar Panels/Modules: A solar panel (also known as a solar module) is a packaged, connected assembly of photovoltaic (PV) solar cells. Solar panels capture light from the sun and convert it to clean electricity. When solar panels are strung together in series and combined with other components, they become a solar electric system, also called a solar array or solar installation. A solar electric system can meet part or all of a home's electricity needs.

Solar Electricity: The materials in solar electric panels absorb photons from sunlight and release electrons. Electricity is produced when these electrons are captured. This phenomenon was first discovered in 1839, but the first photovoltaic panel was not produced until 1954. Now, solar cells may power everything from calculators and remote highway signs to homes, commercial buildings, and large power plants. Solar cells power all satellites in space, making them responsible for many of the world's communications products.

What is a solar panel?

What is your carbon footprint?

Take a few minutes to find out with EPA's Household Carbon Footprint Calculator.



Quick Tip

Quick Tip

A solar electric system can reduce greenhouse gas emissions related to your home electricity use, which is a part of your home's carbon footprint.

The U.S. Environmental Protection Agency provides a tool so you can estimate your home's carbon footprint, use their website <https://www.epa.gov> to learn more.



Types of Solar Photovoltaic (PV) Panels

There are two conventional types of solar panels: crystalline silicon and thin film. The most common solar cell material is crystalline silicon, but other materials for making solar cells include thin-film materials such as amorphous silicon and cadmium telluride. Recently, solar companies have begun to use plastic and aluminum foil to produce solar electricity, but it may be several years before these new products become available to consumers. Solar PV technologies have been developed and studied since the 1950s and are known to be safe and reliable when properly installed (see [Health and Safety Impacts of Solar Photovoltaics](#) by NC State University's Clean Energy Technology Center).

Crystalline Silicon Solar Panels

Crystalline silicon solar PV panels are made from blocks of silicon that contain many small crystals and **account for over 90 percent of solar PV panels installed today**, they can be Poly-crystalline or Mono-crystalline. Over 80 percent of the weight of the crystalline silicon panel is tempered glass and the aluminum frame. The remaining materials include common plastics, the silicon PV cells, and the electrical leads and wiring. The PV cell is nearly 100 percent silicon, which is the second most common element in the Earth's crust and is obtained by the processing of quartz sand. These panels are durable and designed for a service life of over 25 years.



Thin-Film Solar Panels

These flexible solar panels are made by spreading silicon and other solar-producing materials in a very thin layer, about the thickness of a human hair, directly onto a large plate that is usually made of glass or ceramics. Less efficient than silicon solar panels, thin-film solar panels are also less expensive to produce. The most successful thin-film materials are amorphous silicon, cadmium telluride, and copper indium diselenide.



Future Solar Panels

Solar technologies that are emerging include lightweight based panels, plastic collectors, solar shingles, and hybrid solar electric/solar water heating collectors. The new hybrid systems capture hot air from the solar electric panels and use it to heat water. Except for the hybrid systems, most of the new materials are available to home-owners at this time. Please consult with a solar developer about these emerging technologies in rooftop solar.



Types of Solar Electric Systems

A solar electric system is typically made up of solar panels and an inverter, which converts the direct current (DC) electricity created by the solar panels to the alternating current (AC) that is used in your home. Some solar electric systems may also include a battery and charge controller. The three most common types of solar electric systems are grid-connected, grid-connected with battery backup, and off-grid or stand-alone. Each has distinct applications and components.

Grid-Connected

In this system, your home remains connected to your local utility's electrical grid and your solar electric system complements the normal power supply from your utility company.

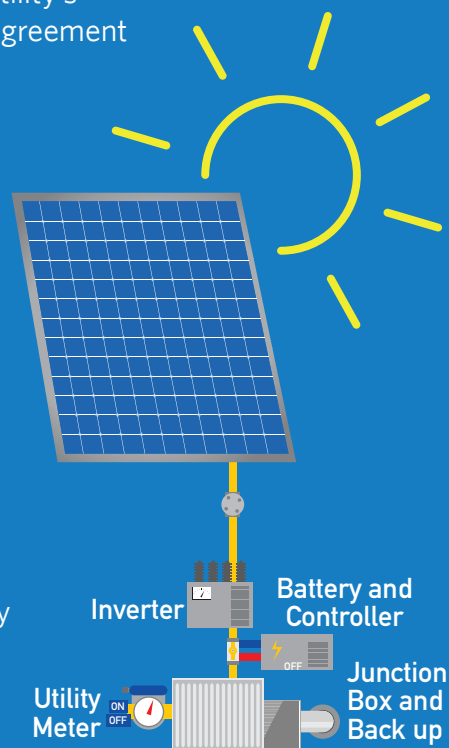
Grid-connected systems consist of:

- Solar panels mounted on the roof of your home or on the ground;
- An inverter with an internal switch that prevents the system from islanding, or sending power to the grid during a power outage, in order to protect electric line workers;
- A junction box that connects the solar panel wiring to the breaker panel on the home; and
- A utility meter that displays how much power the home produces or uses and a disconnect switch required by code and the local utility.

Because your solar electric system is connected to your local utility's electrical grid, it is necessary to enter into an interconnection agreement with your utility to ensure your safety and that of others. The North Carolina Utilities Commission (NCUC) has established a standard interconnection agreement for use by the state's three investor owned utilities: Duke Energy Progress, Duke Energy Carolinas, and Dominion Energy North Carolina. The NCUC's standard interconnection agreement does not govern interconnection to municipal utilities or electric cooperatives. A grid-connected system without battery back-up cannot supply your electricity needs during a power outage.

Grid-Connect with Battery Back-up

This system is like the grid-connected system, but this system adds a battery to store electricity generated from the solar electric system. Electricity stored in the batteries can be used during power outages. The battery collects power generated by the solar panels, sends it to a breaker box, and into the home's electric system.





The components of this type of system consist of:

- Mounted solar panels (usually on the roof or on the ground);
- An inverter to convert solar electricity from DC energy into AC energy;
- A battery or bank of batteries for power storage;
- A charge controller to prevent overcharging the battery;
- A junction box that connects the solar panel wiring to the breaker panel on the home;
- A utility meter that displays the amount of power you use;
- Meters that display the amount of power your solar PV system produced, and your battery stored; and
- A disconnect switch required by code.

As with a grid-connected system, a grid-connected with battery backup system requires an interconnection agreement with your utility.

Off-Grid or Stand-Alone

Off-grid systems are not tied to a utility's electric grid and are most common in remote areas where connecting to the utility's electric grid is more expensive than purchasing an off-grid system. In off-grid systems, the solar electric system is the home's main source of power and batteries store unused electricity for use at night. Generators, small wind systems, and other fuel sources are sometimes used as backup power when the electricity stored in the batteries is not enough to meet household needs. These systems consist of the following:

- Solar panels mounted on a roof or ground;
- An inverter to convert electricity produced by the system from DC into AC energy;
- A rectifier (sometimes used to change AC to DC and back again to get the most use out of a system);
- A charge controller to prevent overcharging the battery;
- A junction box that connects the solar panel wiring to the breaker panel on the home;
- A junction box for backup power supply from a generator;
- A meter that displays the amount of power you use; and
- Meters that display the amount of power your solar PV system produced, and your battery stored.

Quick Tip

Most homeowners think of adding solar to their home's roof, but a roof over a carport, garage, or porch that receives no shading from other buildings or trees will also work well. A south-facing roof is typically most effective.





Electricity Produced by a Solar Electric System

Solar panels are assigned a rating in watts based on the maximum amount of electricity they can produce under ideal sun and temperature conditions. You can use this rated output to estimate the number of panels you'll need to meet some or all your electricity needs; however, the exact amount of electricity produced by a solar electric system also depends on roof orientation and tilt, as well as other factors such as shading, dust, and system efficiency.

Example Savings for an NC Solar Electric System*

- Average Monthly Utility Bill (A) \$126
- Estimated System Size 4kW
- System Cost (at \$3.50 per installed watt) \$14,000
- Federal Tax Credit -\$4,200
- Estimated Cost After Tax Credit \$9,800.
- Potential Duke Energy Rebate: Please Check with [Duke Energy](#) for the latest information about the NC Rebate Program and availability
- Estimated Annual Value of Electricity Produced (B) \$711
- Estimated Payback Period in Years (not including Duke Energy rebate) 13.8.



Many solar electric systems last 30 years and can often pay for themselves in about 10 years (after the federal tax credit and rebate(s) are applied for eligible customers). Furthermore, system sizes vary, and other system options will affect costs/use. If you install batteries to back up your solar electric system, it can provide emergency power in areas with frequent storms, hurricanes, and other natural disasters. Solar power reduces America's dependence on fossil fuels, making our nation more secure while reducing air pollution and greenhouse gases.

(A) Based on 1,000 kWh/month consumption and EIA average price of 11.24 cents/kWh for North Carolina as of July 2018.

(B) Calculated using the NREL PVWatts Calculator tool with irradiance and weather data for Raleigh, NC under optimal conditions.

* Example savings are estimates only. Solar prices continue to become more affordable for consumers and the market is fast-moving. Consult with a solar installer and tax advisor to confirm total costs and eligibility for tax incentives. Using the NREL PVWatts Calculator, it is estimated that an average 1-kilowatt system with optimal orientation and tilt will produce between 1,400 and 1,500 kilowatt hours per year depending on its location in the state. A normal 4-kilowatt system can be expected to offset about 30 percent of the electricity needs of an energy-efficient home. That number could be lower or higher depending on the amount of sunlight (regardless of climate) your home receives each year and the energy efficiency of your home. A system facing 45 degrees East or West of South only reduce the system efficiency by less than 5 percent. Many solar vendors now sell standardized 2- to 3-kilowatt package systems to lower costs and can tell you how much energy will be offset by a system depending on your home's energy use, roof orientation, and other factors.



HOW TO CHOOSE A SYSTEM



When purchasing a solar electric system, the right choice will depend on how much sunlight your area receives, your budget, how much conventional electricity you want to offset with solar power, how much room you have on your roof or in your yard, and where the solar panels will be mounted.

Your solar vendor and installer should be able to tell you how the factors described below will affect the performance of your system.

Roof Requirements

Before purchasing a solar electric system, homeowners need to determine the amount of space available on the roof, the condition of the roof, and whether the roof can support the weight of a solar electric system (systems weigh approximately 3 to 5 pounds per square foot).

Space and Orientation

For maximum performance, your solar electric system needs about 50 to 100 square feet of unshaded south-facing roof or yard space for every kilowatt of electricity produced with some higher end systems having higher efficiency. If your roof does not face south, you can still use a solar electric system, but even with a southeast- or southwest-facing system the performance will be less. Eastern, western, and northern exposures will show an even greater drop in performance, so be sure you understand how such a system will meet your expectations. Roof pitch is also important to capture the path of the sun, but the requirements vary with location. When a south-facing roof is not available, some people install solar electric systems on garage roofs or use them as window awnings and porch coverings. If you have a shortage of roof space, panels can be mounted on a pole or in your yard. Ground-mounted systems are great for homes with large yards. Some systems come mounted on a tracker that follows the sun's movement and produces more electricity.



Quick Tip

Quick
Tip

Planning to repair or replace your roof? That's the perfect time to purchase a solar electric system because you want your roofing material to last as long as your system—up to 25 years with certain panels.



Condition

If your roof materials are nearing the end of their usable life, you may want to consider replacing them when you purchase your solar electric system; otherwise you will need to remove your entire solar electric system whenever you update your roofing materials. Most solar vendors recommend using roofing material that will last as long as the system, which is usually about 25 to 30 years. Your contractor will need to make sure the roof can hold the weight of the system, which is estimated at three to five pounds per square foot, depending on the type of technology used and installation methods. In addition, be certain to ask your installer about the structural integrity of your existing roof and its ability to safely support solar panels.

Shading

Shading blocks sunlight to a solar panel and reduces its performance. The most common items that shade solar panels are trees, chimneys, nearby buildings, pipes, skylights, and vents. To determine possible shading problems, consult a solar professional who uses a software program that can estimate site shading. Many professionals will also examine a proposed location throughout the day and year to see how the area shading changes. For example, shading in an area can change from summer to winter because the sun's path changes and nearby deciduous trees lose their leaves.

Sun's Path During Summer and Winter

Summer: From the East, June 21, the sun travels in a high arc
Winter: From the East, December 21, the sun travels in a lower arc





INSTALLATION AND MAINTENANCE



Before purchasing a solar electric system, homeowners need to be aware of issues that affect system installation and maintenance.

Warranties and Insurance

Most solar electric systems come with a 20 to 25-year output warranty, but maintenance may be required to comply with a manufacturer's warranty. Inverter warranties are usually 10 years, and you can reasonably expect to have to replace the inverter during the life of the system. Since these warranties don't cover workmanship or installation, you may wish to consider requesting a kilowatt hourly production guarantee or yearly maintenance contract from your installer, if available. Most homeowner insurance policies will cover the systems but check with your insurance agent to be sure. Also, be sure to ask your insurance agent if you need to be aware of any installation issues that could affect coverage for the roof, such as roof penetrations during system installation. North Carolina regulations require a homeowner with a solar PV system that is grid-connected or grid-connected with battery backup to carry liability coverage in the amount of \$100,000 per occurrence.

Zoning and Permits (includes Homeowners Association {HOA} Fees)

Local zoning laws may restrict where you can place solar panels on your home. Check with your city and county to find out about any restrictions. North Carolina law states that no ordinance, deed restriction, or homeowners' association bylaw can prohibit the installation of solar panels. However, current law does allow for restrictions, such as those contained in HOA bylaws, on solar panel installations that can be visible to a person in public access or common areas. If you are part of a community governed by a homeowners' association, check the association's limitations before signing a contract to install a solar electric system. Homeowners will need to obtain appropriate building or other local permits before installation. Also, homeowners must file a report of proposed construction form with the NCUC. Typically, your installer will assist you in filing the necessary reports and registrations.



Utility Permits and Special Requirements

It is very important that you, or your solar installer, contact your electric utility early in the process to confirm you have all the necessary permits, documentation, and any special requirements to support the interconnection agreement for your system prior to installation. A typical checklist will include the following:

- Interconnection Application
- Interconnection Agreement
- One-Line Diagram of the System
- Certificate of Insurance
- Application Fee
- City/County Inspection
- Utility Onsite Inspection



Selling Into the Sun: Price Premium Analysis of a Multi-State Dataset of Solar Homes is available online and includes a comprehensive study of the value of solar to a home's resale value. Information is based on an analysis of data on PV homes and non-PV homes in eight states, including North Carolina.

View the report at: <https://emp.lbl.gov/publications/selling-sun-price-premium-analysis>

Maintenance

Proper maintenance of your system will keep it running smoothly. Some vendors recommend a yearly maintenance check by your installer, but you should carefully review the maintenance instructions shown in the system manual with your installer or maintenance provider. Electronic components usually require replacement parts after 10 years.

Installation and Finding a Contractor

Using a professional, licensed contractor to install your solar electric system can prevent problems with the system caused by improper installation and maintenance. Professional installers can also help with documentation for tax credits, rebates, and the report of proposed construction. The North American Board of Certified Energy Practitioners (NABCEP) maintains a list of certified system installers. North Carolina Sustainable Energy Association (NCSEA) also maintains a list of its member installers who have signed a [Solar Business Code](#) committing them to uphold the highest professional standards.



Installing a solar electric system on your home requires a large investment and a great deal of thought and pre-planning. When choosing an installer, make certain that you do your homework, ask the right questions, and obtain bids from at least three installers. You want to do everything possible to ensure you have enough information to make an informed decision about what's best for you and your family.

Information You Should Verify

- Is the installer a licensed general contractor and does the installer have any complaints pending at the [North Carolina Licensing Board for General Contractors](http://www.ncibgc.org)?
 - Visit: www.ncibgc.org
- Is the installer a licensed electrical contractor and does the installer have any complaints pending at the [North Carolina Board of Examiners of Electrical Contractors](https://www.ncbeec.org)?
 - Visit: <https://www.ncbeec.org>
- Is the installer affiliated with and/or have membership with local, state or national organizations relevant to the work they are doing?
- Does the installer have reviews on the [Better Business Bureau](https://www.bbb.org) website?
 - Visit: <https://www.bbb.org>
- Does the installer have workers' compensation and liability insurance, and if so, how much?
- Use the downloadable checklist on page 18 provided as a guide to help you understand the process of installing a solar electric system on your home.

Quick Tip

Quick Tip While there are many variables that may impact timing of your installation, the average length of time it takes to install a complete solar electric system, from ordering equipment to commissioning, is about three months.





COST AND FINANCIAL INCENTIVES



Many financial incentives are available to homeowners to offset system cost.

Cost

Solar electric systems cost on average \$3 to \$5 per watt installed, but new technologies are bringing the costs down every year. North Carolinians with sufficient tax liability can take advantage of a federal tax credit for the purchase and installation of a solar electric system to reduce the cost. Be aware that this tax credit only applies to the solar electric system, and does not apply to other improvements you may make such as energy efficiency upgrades.

IMPORTANT NOTE ABOUT TAX CREDITS

Tax credits only apply if you owe enough in taxes to balance your credit. You'll reduce your tax liability, but you will not receive a check if you do not owe taxes. See your tax advisor.

Net Energy Metering

Net energy metering is a process by which the electricity you generate is netted against the electricity you consume every month, lowering your electric bill. The North Carolina General Assembly has directed the NCUC to examine the state's net energy metering regulations, but at the time of publication, North Carolina's regulations require investor-owned utilities to give homeowners credit for excess electricity produced by their solar electric systems. If your solar electric system is installed before the regulations are altered, you have the option to continue net energy metering under the existing regulations until January 1, 2027.



Please be aware that Duke Energy and Dominion Energy are required to reset any excess electricity credit balance to zero on June 1st of each year. Therefore, your solar pv system should be sized accordingly. Please consult your utility company for specific information.

Financing

If you can't purchase a system outright, consider financing. Several resources are available for financing a solar electric system including:

- Home refinance
- First mortgages
- Banks (many will finance for less than prime rate)
- Construction loans
- Home equity loans
- Solar vendors (some provide financing)
- Leasing (see comparison chart on page 17 for financing/leasing). This is a new option that is just getting off the ground in North Carolina.
- Community solar – allows you to subscribe to a nearby solar facility. This option was included in recent law changes, and has been recently approved by NCUC, but it has not yet been successfully implemented on a widespread-basis. We would encourage you to contact your utility to see if any Community Solar projects are planned for your area if this is an option you are interested in.



- Mortgage loans and home equity loans offer several advantages: longer terms, lower interest rates than conventional bank loans, and tax-deductible interest. In addition, adding a solar electric system to a loan while you build, buy, or refinance may reduce paperwork and simplify the purchase.

What Should my Solar Bid Include

The following elements should be included on the bid you receive from the solar installer:

- Total cost from start to finish (including design and construction);
- Additional cost factors resulting from unique design considerations on your property (most installations will not require these);
- Any applicable federal tax credits and other incentives;
- Make and model number of equipment;
- Warranty information;
- Expected operation and maintenance costs;
- Projected monthly, annual, and lifetime energy generation based on orientation, shading, etc. and estimated costs and savings (lifetime pro forma); and
- Finance options: cash, loan or lease.

Important Facts: Buying vs. Leasing Solar Panels

In North Carolina, leasing a solar electric system is a new option available to homeowners, primarily in Duke Energy's service territory (although your local electric utility may also allow it). If you determine this option is best for you and can find a solar company offering this option, please verify that you are contracting with a solar company who has been properly registered by the NCUC to lease the solar electric system. Click [here](#) to check their registration and select "EGL - Electric Generator Lessor" from the drop down menu.

Quick Tip

If you purchase a home with a solar electric system, its value is incorporated into the purchase price of your home. Generally, a solar electric system will increase a home's value and is viewed positively by potential homebuyers. If you have a lease agreement, you will need to work with the service provider to transfer the lease to the new homeowner. In some cases, you may be able to buy out the remainder of the contract at fair market value.



Quick
Tip



Chart: Buying vs. Leasing Solar Panels

	Buying	Leasing
Overview	Purchasing a solar electric system from an approved contractor or manufacturer means paying for it up front or financing your purchase through a bank loan. You own the entire solar energy system, which most manufacturers guarantee for up to 25 years.	Leasing allows you to “rent” the solar electric system for a set period of time. Generally, you pay a fixed monthly rate no matter how much energy the system produces each month.
Benefit	<ul style="list-style-type: none"> ▪ Lower monthly electricity bills. ▪ Potentially greater return on investment. ▪ Potentially increased home value. ▪ Minimum 10-year warranty. ▪ Possible federal tax incentives and other deductions. ▪ Possible incentives through your utility company. 	<ul style="list-style-type: none"> ▪ Lower monthly electricity bills. ▪ No large, upfront financial investment. ▪ Typically, no costs for system operations, monitoring, and maintenance. ▪ Fixed monthly rate regardless of how much electricity produced. ▪ Usually break even or save money in the first year. ▪ Generally provide performance guarantees.
Cost	<ul style="list-style-type: none"> ▪ Expensive components like the inverter may need to be replaced after warranty. ▪ Extended service agreement for maintenance, repairs, and insurance. 	The monthly price of your lease might accelerate over time.
Potential Financial Risks	<ul style="list-style-type: none"> ▪ You are responsible for maintenance costs. ▪ A performance monitoring system may be necessary as an add-on service to maximize energy production. 	<ul style="list-style-type: none"> ▪ If lease provider goes out of business it may cease to provide contracted operations and maintenance. ▪ Check for purchase (buyout) options in your contract.
Advice	You may be able to finance your purchase of a solar energy system by taking a home equity loan or secure line of credit, which is often eligible for tax deductions. Be sure to speak with your tax advisor about the implications of these options before your purchase.	Agreements are long term, and specific fees may rise over time. Be sure to ask about purchase options and understand any changes in your monthly rate over the lifetime of the solar lease agreement. Prepaid leases may also help reduce your monthly payments.



Rooftop Solar Checklist

Use this checklist as a guide to help you understand the process of installing solar panels on your home.*

	Homeowner	Installer	Need More Information
Who obtains permits and authorizations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who confirms that my roof is strong enough for the increased loads and determining if I need a structural upgrade?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who is responsible for a post-installation roof inspection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who is responsible for a post-installation roof repair?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who handles structural damages other than to the roof resulting from the installation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who handles consequential damages, such as ceiling damage, from the installation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does my homeowner's association or another entity have covenants or restrictions with respect to installing rooftop solar?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What safety standards must be followed and who provides oversight?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who removes and reinstalls the system when my roof needs to be replaced/repared?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If there is a warranty issue, can you coordinate repairs or do you have to let the manufacturer or installer (if not you) have an opportunity to resolve the issue?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If there is an equipment warranty issue, who is responsible for the costs of removing the old panel and installing the replacement panel?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who handles equipment replacement while the equipment is under warranty?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What are the consequences and remedies for the installer's warranty if the installer goes out of business?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Rooftop Solar Checklist Continued

	Homeowner	Installer	Need More Information
What are the consequences and remedies for the equipment warranty if the equipment manufacturer goes out of business?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
What are the insurance requirements to have a system on my home?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who satisfies applicable electric codes for any existing and new wiring?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who provides notice and what other provisions apply if the installer or inspector needs access to my home?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who makes sure the installation meets any applicable fire department policies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who is responsible for ongoing maintenance and what are the maintenance standards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Who controls customer data derived from the installation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Checklist and FAQs adapted, in part, with information and resources from the Edison Electric Institute (EEI).



Questions to Consider

Research installer options before making a decision. Choosing the right installer is just as important as choosing the right system. Consider asking your insaller these questions when discussing cost and which system is right for you.

Notes

How many years have you been in business?

What experience do you have in this area?

What installations have you completed in my community?

How many installations have you done that are similar to the one I am planning?

Can you provide a portfolio or a list of recent projects, as well as references for me to contact?

Do you specialize in residential or commercial solar electric systems?

What products and services do you offer?

With which products are you most familiar?

Why do you recommend these products for my installation?

How do they compare to other products or technologies?

Are they UL listed with warranties?

What payment options do you offer?

Do you handle paperwork for federal tax credits and other incentives?



Notes

Do you offer packaged systems or any incentives to help lower my costs?

What financial assumptions regarding utility costs were used when determining life-cycle benefits of the installation?

What assumptions regarding tax credits and production curves were used in determining life-cycle benefits of the installation?

What assumptions on continuation and terms of net energy metering were used in determining life-cycle benefits of the installation?

Will my roof be strong enough for the increased loads or will I need a structural upgrade?

Can you provide information on any special zoning, permits and/or code requirements for my particular neighborhood?

Do you have a builder's permit and electrician's license?

Do you have any special certifications?

Are you a member of any solar or sustainable energy organization, such as the [North American Board of Certified Energy Practitioners](#) or the [North Carolina Sustainable Energy Association](#)?

What type of insurance do you carry?

Do you have any pending or active judgments against you?

Will the installation withstand hurricane force winds?



Resources

- Center for Sustainable Energy
 - www.energycenter.org
- Database of State Incentives for Renewables and Efficiency (DSIRE)
 - www.dsireusa.org
- Edison Electric Institute
 - www.eei.org
- ENERGY STAR
 - www.energystar.gov
- Environmental Protection Agency
 - www.epa.gov
- Florida Solar Energy Center
 - www.fsec.ucf.edu/en
- North American Board of Certified Energy Practitioners (NABCEP)
 - www.nabcep.org
- NC Clean Energy Technology Center
 - www.nccleantech.ncsu.edu
- North Carolina Department of Justice Consumer Protection Division
 - www.ncdoj.gov/Consumer.aspx
- North Carolina Sustainable Energy Association
 - www.energync.org
- National Renewable Energy Laboratory
 - www.nrel.gov
- PV Watts
 - www.pvwatts.nrel.gov
- U.S. Department of Energy
 - www.energy.gov
- U.S. Department of Energy – Energy Savers
 - www.energysavers.gov



Contact Information:

Duke Energy – North Carolina

www.duke-energy.com/home/products/renewable-energy/generate-your-own

(866) 233-2290

North Carolina Electric Membership Cooperative

www.ncelectriccooperatives.com

(919) 872-0800 or (800) 662-8835

Dominion North Carolina Power

www.dominionenergy.com

(866) 366-4357

North Carolina Sustainable Energy Association

www.energync.org

(919) 832-7601

info@energync.org

For More Information on Regulated Investor Owned Utilities in NC:

North Carolina Sustainable Energy Association

www.energync.org

(919) 832-7601

info@energync.org

North Carolina Public Staff

(919) 733-2267

<https://publicstaff.nc.gov/electric>

North Carolina Attorney General

(919) 716-6400

<https://www.ncdoj.gov/Consumer.aspx>