Solar Energy Industries Association®

Residential Consumer Guide to Solar Power

June 2018

Introduction

Solar energy use has grown rapidly over the past decade. Costs have dropped, while new ownership and financing models allow more Americans than ever to choose solar. Solar is now available as a power choice in all fifty states, territories and the District of Columbia. Going solar is a significant decision. By understanding the basics of solar energy, your solar options, and the right questions to ask solar professionals, you're well positioned to make the right decisions.

How Solar Works

Today, most residential solar systems are photovoltaic ("PV") – or solar electric – systems. This guide covers only PV systems. They generate electricity using two main hardware components:

- Panels (or modules) that convert sunlight to electricity; and
- Inverter(s) that convert(s) direct current to alternating current for use in your home

Generating Electricity

The amount of electricity (measured in kilowatt-hours, or kWh) produced by any solar system depends on two factors:

- The size (or "power rating") of the system measured in kilowatts (kW); and
- The amount of sunlight the system receives. The amount of sunlight a solar system receives depends on several factors, including:
    - - Geographic location (e.g., Phoenix receives more sunlight on average than Seattle)
    - - Orientation (e.g., roof pitch or compass direction)
    - - Shading (e.g., from chimneys, trees or neighboring buildings)

Your Home Solar Options

Today, most Americans have options for going solar. It's important to understand the choices available to you under state law and the policies of your electric utility, the differences among those options, and selecting the right one for you. The main options available today are bulleted here and explained further below:

- Purchase a solar system (with cash or a loan) and own both the system and all the power it produces
- Lease a system, usually for a monthly rate, and own all the power it produces
- Enter a "power purchase agreement" (PPA) to buy (in price per kWh) the electricity the system produces

Purchase

You can purchase a solar system outright with cash or a loan. When you buy a system, you are the owner of the system and benefit from all electricity it produces. You are usually responsible for system upkeep, although most residential solar systems require no to low maintenance, and some providers offer maintenance services on purchased systems. In most jurisdictions, you also are the beneficiary of any tax credits or other incentives that promote solar energy. If you sell your home, you may include the system in the sale just like any other major home component.

Lease

In many markets, you can lease a solar system for a set time period. The solar company owns the system on your property and leases it to you. You benefit from using the electricity the system produces. The solar company is responsible for system upkeep. You make monthly payments to the solar company at the agreed upon rate specified in the lease for use of the system. Some solar companies will allow you to lease with no initial costs ("no money down"), but that does not mean the system is free. Some companies also give you an option to purchase the system after a certain amount of time. A lease is one type of third-party-owned (TPO) arrangement because the solar company (a third-party) owns the system. You have options when selling your home; make sure to ask your solar company before signing a lease.

Power Purchase Agreement (PPA)

From the consumer perspective, a PPA is very similar to a lease. Under a PPA, you pay for the actual units of electricity generated from the system, rather than leasing the system for a monthly fee regardless of how much energy it produces. In a power purchase agreement (PPA), as with a lease, the solar company owns the system on your property. Also similar to a lease, you agree to purchase the electricity produced by that system for a specified rate and agreed-upon terms specified in a contract. A PPA is also a TPO arrangement because the solar company owns the system, but some companies give you the option to purchase the system after a certain amount of time. You have options when selling your home; make sure to ask your solar company before signing a PPA.

Energy Storage

Consumers are increasingly interested in pairing solar with energy storage ("solar-plus-storage"). Batteries are currently the most common energy storage product for homeowners. Energy storage is charged when power is available and releases the stored electricity when needed. You may look to install solar-plus-storage systems for backup power during a power outage, provided you choose the correct type of storage system. Or you may want storage to control your electricity generated by the solar system when connected to a utility: (i) and your utility rate depends on the time of day; (ii) that imposes fixed charges based on your peak usage during a short period of time during the month that's difficult to control without storage or (iii) that compensates you for any excess electricity generated by your solar system below retail rates (see Understand how you are compensated for excess electricity below under "Do Your Homework"). This can get complicated quickly, so be sure to ask your solar professional about the pros and cons of solar-plus-storage in your area to make the right decision.

Taking Care of Your System

Because PV systems have no moving parts, regular maintenance is straightforward for a consumer. First, make sure you have enough rain each year to wash the panels. If you live in a desert or highly dusty environment, periodic cleaning is recommended once per year with distilled water. The same is true if you are located near the ocean and receive marine mist that could leave salt deposits. Second, talk with your solar company about whether you will need to trim nearby branches or do anything with the roof. Third, if your system has monitoring that relies on the internet, maintain internet connection and learn how to use your monitoring system. Finally, if your system is not working properly, contact your solar service provider. Never attempt to repair the system yourself.

Moving Forward

When evaluating your options to go solar, you should always do your homework, talk to friends and neighbors who have chosen solar, use common sense, and be active and engaged in dealing with solar companies. Below are some suggestions on how to become a better-informed consumer.

Know Your Situation

- **Know your electricity usage**. You should understand how much electricity your home uses. Your utility bill will show your electricity usage in kilowatt-hours and the amount you pay for that electricity. Are you planning any changes that will affect your electricity use, such as buying an electric vehicle, planning an addition to your home, or improving your home's energy efficiency? Does your home always need electricity even during a power outage? Electricity usage can vary significantly based on your geography and time of year. Discuss your usage with the solar companies you interview to get a system sized for your needs.
- **Know your electricity rates**. Consider how your electricity bills are calculated. Do your electricity rates differ depending on the time of day? Does your utility charge a fixed monthly fee based on your peak electricity usage (a.k.a. a demand charge)? Will the utility compensate you for any extra electricity your solar system produces beyond your need, and, if so, at what rate? These factors can affect the economics of whether to go solar.

- **Know your roof.** Is your roof appropriate for solar? Does it receive a good amount of sunlight or is it mostly shaded? How old is the roof? If you plan to replace it soon, do so before installing a rooftop solar system—your solar company may help coordinate with the roofing contractor. In America, roofs facing due north are not good candidates for solar because they don't receive direct sunlight. A solar professional can calculate the amount of sunlight expected to reach a planned system on any roof over the course of a year.
- **Know your finances.** Like any major decision for your home, it's wise to understand your finances when shopping for solar systems. Although sunlight is free, buying or leasing solar systems, or paying for electricity under a PPA, are not.

Do Your Homework

- **Get the best deal**. As with any major purchase, get multiple bids for your solar system project. Many Americans will find the market highly competitive, with multiple solar companies competing for your business. Make sure you're comparing apples with apples by closely reading the terms from different firms. Use this guide and other resources throughout the process.
- **Research your solar company**. Before entering an agreement with a solar company, do your homework. Ask for references of solar installations in your area and call them. Ask for proof of licensure, and check with your county or state to ensure the firm is in good standing. Ask if they are a member of the Solar Energy Industries Association (SEIA), the national trade association for solar that requires all its members to abide by the SEIA Solar Business Code. Check with the local Better Business Bureau and other consumer guides.
- **Understand any tax credits or other incentives**. There is a 30 percent federal tax credit available through 2019, on the total cost of the solar system, but only if you own the system. The federal tax credit drops to 26 percent for 2020, and 22 percent for 2021, before ending in 2022 for residential systems. Other state and local incentives may be available, as well as programs from your local utility. Keep in mind that incentive programs can change, and some may only be available if you own the system. Many can be found online on the Database of State Incentives for Renewable Energy (see "Additional Resources" below).
- **Understand any potential tax implications of credits or incentives**. Remember, only a CPA can give tax advice and only an attorney can give legal advice. When consulting such professionals, choose ones who are experienced with solar.
- **Understand how you are compensated for excess electricity**. Net metering allows residential consumers to send electricity that they do not use back into the electric grid and "spin the meter backwards." Although net metering is widely available, net metering rules are set by the jurisdiction that you live in and can change. Some states or service territories have moved or are looking to move to different programs to compensate you for excess electricity generated by your system, typically at rates lower than what you pay for electricity. Ask your solar professional about the rules in your area.
- **Understand Renewable Energy Certificates (RECs)**. RECs or SRECs (Solar Renewable Energy Certificates) represent the renewable qualities of the electricity your solar system generates. If you own RECs, you can claim you use "solar" or "renewable" electricity from the system. Selling or transferring your RECs can help lower the cost of your system, but you can lose the ability to make "renewable" or similar claims about your home. Check your contract to see who will own the RECs. It's a new topic for many residential consumers and solar companies can explain RECs and REC ownership to you if available in your area.

- **Understand if PACE is available to you**. In some states, you can finance a solar system with Property Assessed Clean Energy (PACE) financing in which you repay over time what you borrow using a line-item on your property tax bill. Not all states allow residential PACE programs and, among those that do, each state's PACE program is unique. If you are considering a PACE program, you need to be familiar with the rules of your state's PACE program, if any. Ask your solar professional and do your homework.

Understand the Agreement

- **Understand the terms**. Contracts are legally binding and should be read carefully. Make sure you understand what you are receiving from the solar company and how much you are paying. Insist that terms that are important to you are included in the signed contract.
- **Don't hesitate to ask questions**. The best transactions are ones where the consumer and the contractor both fully understand the deal. Asking questions upfront can avoid misunderstandings later in the process. Below are some of the top questions that consumers ask when entering into a solar transaction.
- **Separate estimates from guarantees**. Many Americans can save money by choosing solar, but savings depend on the cost of the electricity from your solar system compared to cost of electricity from your utility. If a solar company promises savings, or states that electricity costs from your utility will increase in the future by a certain amount, ask them to explain. Make sure you understand any assumptions made regarding future utility rates and rate policies. According to the U.S. Department of Energy, national residential electricity rates increased on average by 3.4 percent annually between 2004 and 2014. Rates in your area may have changed more or less during that period and may change more or less going forward. Check with your utility or state utility regulatory office for any planned rate changes. Rates and utility rate policies may change even if no changes are planned today.
- **Fully understand warranties**. Like any other major residential product or service, a solar system typically includes warranties covering parts and labor. There may be separate warranties for major system components, as well as how the system interacts with your roof warranty. Ask your solar company to explain what your warranties protect, for how long, and who stands behind them.
- **Know what happens if your company goes under**. While the residential solar industry is booming, like any other industry, some companies do go bankrupt. Major components of a system (e.g., solar panels) have warranties backed by their manufacturer, so check the contact information for warranty servicing. In addition, there may be companies in your area that offer maintenance and repair services.

Key Questions to Ask Before Entering into an Agreement

For all solar systems:

- What is the total cost of the solar system?
- How much is the total cost of the solar system if I add storage?
- What is your timeline for this investment?
- How do my options differ if I want a short-term arrangement or a long-term asset?
- How much do I pay up front, and how much over time, for how long?
- What is the system size?
- How much electricity will the system generate each year? Do you guarantee a minimum amount (a production guarantee)? Are there any other guarantees?
- Will my system be net-metered? How will I be compensated for excess electricity generated by the system?
- If there is a blackout, what will happen to my system?
- If I need storage in case of a blackout, what size system and system attributes do I need?

- Do system output calculations consider actual installation details of the system?
- Can I expect to save money with this system? If so, how much? Based on what assumptions?
- Does installing storage change how much I can save with this system? If so, how much?
- Is the installation company licensed and insured?
- What will the system look like once installed? Will I receive a system design for my review and approval before installation?
- Will I be required to make any changes to my home (e.g., roofing upgrades)?
- Do you use the SEIA residential disclosure form? Can you provide a completed copy of the form?
- Are there separate warranties for parts and labor?
- What do the warranties cover and what are their durations?
- What type of maintenance or cleaning is required? Are any maintenance services included? If not, who should I contact?
- Who deals with the utility and arranges for interconnection, inspections, and permission to operate?
- Is performance of the system monitored and, if so, by whom? How can I monitor system performance?
- Who should I contact if I have a question about the system following the installation? Who should I contact if my system stops working?
- Who will keep the RECs generated by the system? Will you retire the RECs on my behalf?
- Can you explain how RECs work in my situation? If I don't keep the RECs, is there an option to purchase the RECs? If not, what can I say about my home?
- If I want to sell my home and don't own the RECs, how can I describe my home to potential buyers?
- Can my HOA stop me from installing solar?
- What are my rights under state law?
- Does your company follow the SEIA Solar Business Code? Do you agree to abide by SEIA's Complaint Resolution Process?
- Is residential Property Assessed Clean Energy (PACE) financing available in my state and locality?
- If the company fails, who should I contact regarding panel and inverter warranties and replacement?

For leases and PPAs only:

- What is the length of the lease or PPA?
- Who receives solar tax incentives and how are they factored into the cost?
- Will my payments increase over time? How much will they increase?
- What happens if I wish to end the lease or PPA early?
- Can I purchase the system, either during the agreement or once it ends?
- What are my options when I sell my home?
- Am I free to sell my home or do I need the system owner's permission?
- Do I have to pay off the lease when my home is sold?
- Can you explain the UCC-1 filing to me? What happens if I want to refinance my mortgage?
- Are there fees to transfer the PPA or lease agreement to the new homeowner?
- What are the conditions for a new homeowner to take over the lease or PPA?
- Who is responsible for repairs and maintenance on the system?

Working Out Differences

As with any other service or product, consumers may encounter issues in dealing with a solar company. In general, solar companies want satisfied customers and are willing to resolve any problems that arise. SEIA and the solar industry are strongly committed to consumer satisfaction and protection.

- First, try to resolve problems directly with your solar company.
- Your contract or lease may have a dispute resolution section and process.
- If you choose a SEIA-member solar company to work with, SEIA may be able to assist you in resolving your issue. Contact us at consumer@seia.org.
- If you are still having issues, note that SEIA member companies are bound by the SEIA Solar Business Code. If you believe a company has violated the SEIA Solar Business Code, you may submit a complaint to SEIA, which can help resolve certain issues.
- You can contact private consumer organizations (e.g., your local Better Business Bureau) about your issue.
- In addition, state and local governments have resources to promote consumer protection. See below for more information

Additional Resources

- SEIA Consumer Protection Portal – www.seia.org/consumers
- Official SEIA State Affiliates – www.seia.org/about/seia/official-state-chapters
- Better Business Bureau (BBB) – www.bbb.org
- Database of State Incentives for Renewable Energy (DSIRE) – www.dsireusa.org
- Interstate Renewable Energy Council – www.irecusa.org
- National Renewable Energy Laboratory (NREL) – www.nrel.gov
- U.S. Department of Energy (DOE) – www.energy.gov
- Your state or local consumer agency– www.usa.gov/directory/stateconsumer/
- Your state attorney general – www.naag.org
- Federal Trade Commission (consumer protection)- www.ftc.gov
- PACENation – www.pacenation.us

About SEIA

The Solar Energy Industries Association (SEIA®) is the driving force behind solar energy and is building a strong solar industry to power America through advocacy and education. As the national trade association of the U.S. solar energy industry, which now employs more than 260,000 Americans, we represent all organizations that promote, manufacture, install and support the development of solar energy. SEIA works with its 1,000 member companies to build jobs and diversity, champion the use of cost-competitive solar in America, remove market barriers and educate the public on the benefits of solar energy.

Explore SEIA's Consumer Protection Portal:

www.seia.org/consumers

Solar Energy Industries Association
600 14th Street, NW | Suite 400
Washington, DC 20005

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202-682-0556
www.seia.org

Common Solar Myths Busted

Are you thinking about going solar but don't know where to turn for accurate information? As the Valley's solar experts, we're busting common myths so you can decide if going solar is right for you.

We receive a lot of questions and have seen misrepresented information on social media about solar power. Some of the information is accurate while other information is not. You can rest assured that your Local Power Company and TVA have you covered. We want to ensure you have accurate information to make the best, informed decisions about solar energy.

Here are some considerations:

Myth: You have to own a home to go solar

FACT. Anyone can support solar regardless of whether you rent or own, or where you live - apartment, duplex, dorm or at home. For renters and those who can't or don't want to install solar, community solar is a smart investment for anyone who cares about the environment. Today, with TVA's help, more than 1.4 million Valley residents have the option to choose community solar from their Local Power Companies. If community solar isn't available, TVA offers another easy option - Green Switch. Green Switch is priced at $2 per 200 kWh block of energy, customers of participating Local Power Companies can purchase blocks of electricity generated by renewable sources. Both of these options remove many of the roadblocks for solar adoption – cost, shaded rooftops and home ownership. Contact your Local Power Company to see if a community solar program or Green Switch option is available to you.

Myth: Solar is the only energy source we need

FACT. There is no doubt that solar power has environmental and grid stabilization benefits but solar energy is not available 24/7. Even with the technology available today, you can't directly plug your hot water heater, heating and air conditioning system, refrigerator or small appliance into your solar panel and expect it to run. Therefore, we need other sources of energy to ensure you can power your life around the clock. The good news is that over 50% of the electricity you use in the Tennessee Valley is carbon-free.

Myth: Solar power is free energy

FACT. While sunshine is free, there is a cost to harness the sun's energy and convert it to energy that can be used to power your home or business. TVA's Solar Calculator can help you determine the cost and payback of installing solar at your home or business.

Considering solar panels for your home? Green Connect will provide you with tools and resources to guide you through the process. Visit www.TVAGreenConnect.com or call 1-866-673-4340 to learn more.

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Common Solar Myths Busted

Myth: Solar panels operate at 100% efficiency from sun up to sun down

FACT. We wish this were true because it would solve a lot of our energy problems. According to EPA data for the Tennessee Valley, a small-scale installation delivers maximum efficiency only 18% of the time – generally on clear, sunny days when the sun is directly overhead. Actually, this is a good thing because during the summer we generally need the most energy between 1pm-5pm – the sweet spot for solar generation.

Even though solar can't power our lives 24/7, you can count on your Local Power Company and TVA to deliver energy with 99.999% power reliability.

Myth: Solar panels are ugly and take up too much room

FACT. Beauty is in the eye of the beholder. While we acknowledge some people believe solar takes up space that could be used for other purposes like growing food or wildlife habitat, adding solar power to our technology mix is good for our communities. Because we care about the environment, TVA continues to invest in solar programs and a good example is Music City Solar from Nashville Electric Service (NES). NES transformed an abandoned landfill into the city's first community solar park. If we are smart, we can have solar, help the environment and keep our communities beautiful.

Myth: Solar systems don't operate in cold temperatures

FACT. Photovoltaic (PV) systems actually generate more power at lower temperatures. Like most electronic devices, they operate more efficiently when it's cooler. PV systems generate less energy in the winter than in the summer, but that's due to the combination of fewer daylight hours and lower angles of the sun, not to cooler temperatures.

Myth: Solar panels are 100% safe for the environment

FACT. Solar panels provide 100% carbon-free energy, but there is a trade-off. Solar panels contain hazardous elements such as lead, chromium and cadmium making it difficult to disassemble and recycle them. A 2017 study from Environmental Progress found that solar panels create 300 times more toxic waste per unit of energy than nuclear power plants. If you go solar, we recommend that you recycle your solar panels properly to help protect the environment.

Considering solar panels for your home? Green Connect will provide you with tools and resources to guide you through the process. Visit www.TVAGreenConnect.com or call 1-866-673-4340 to learn more.

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Common Solar Myths Busted

Myth: TVA's proposed rate structure blocks private roof top solar

FACT. TVA and your Local Power Company support solar, and federal law ensures your right to put a private solar energy system on your home or business. It's important to remember that solar power is not the lowest cost energy source on our electric grid. We are committed to a pricing structure that ensures we are fair to everyone so you are not subsidizing your neighbor's solar system through your power bill. Ultimately, it's your money. We want to provide you with low-cost electricity to keep it where it belongs – in your pocket.

Myth: Solar panels are maintenance free

IT DEPENDS. To achieve peak performance, certified solar professionals recommend that homeowners clean panels regularly to remove dirt and other substances, such as bird droppings, that have accumulated to ensure maximum access to the sun's rays. With regular monthly maintenance there is still an annual degradation of the panels, generally estimated at 0.5%. Pros also recommend an annual inspection of connections, cables, panels, rooftop mounting, DC isolator switches and inverters. The inspection costs vary, so it is smart to shop around if you can't do it yourself.

Myth: I can easily take my solar system with me if I move

IT DEPENDS. There are several factors when considering moving with your solar system:

1. Home Value – a solar system may increase your home value, but that depends on several factors, such as market value, area, age of panels, buyer's preference, etc.
2. Cost of moving and reinstalling your solar system on your new property
   - Condition and characteristics of your new property's roof that could impact the overall cost
   - Shading and sun availability on your new home
   - Location – new location rules and regulations for solar installs (contact your Local Power Company for specific guidelines pertaining to your new area)

We encourage you to contact your solar system installation company to understand your options.

Considering solar panels for your home? Green Connect will provide you with tools and resources to guide you through the process. Visit www.TVAGreenConnect.com or call 1-866-673-4340 to learn more.

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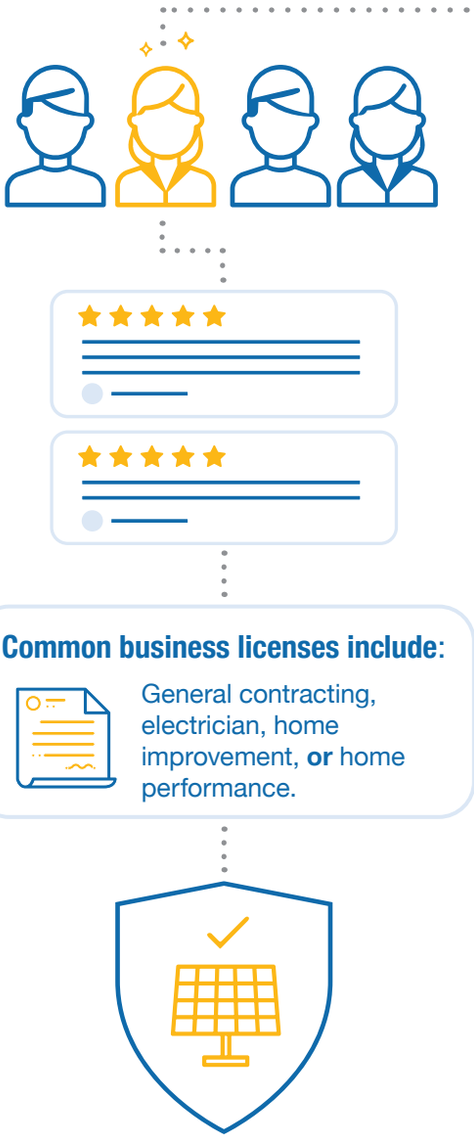
HOW DO I CHOOSE A QUALIFIED SOLAR INSTALLER?

Are you considering installing solar panels? This guide will help you select a qualified and credible company.



Common business licenses include:

General contracting, electrician, home improvement, **or** home performance.

RESEARCH

- **Get quotes** from multiple installers to make sure that you are getting a good price.
- **Read the terms of the proposal** closely and ask questions if you don't understand the process or the contract isn't clear.

EXPERIENCE

- **Ask the installer for references** from previous projects and call them to learn more about the installer.
- **Look at customer reviews** through services like the Better Business Bureau to make sure the installer has a good track record.

LICENSES

- **Check that the installer has up-to-date** business and insurance licenses as required by state and local governments.

EXPERTISE

- Confirm the installer has a **Solar PV Installation Professional Certification** from the **North American Board of Certified Energy Practitioners.**
  This certification is the gold standard for the industry.

IS SOLAR RIGHT FOR YOU?

Explore TVA's Solar Calculator at **edt.tva.gov**.

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Sources: *Energy Sage: https://www.energysage.com/solar/decision-guide/how-to-choose-a-solar-installer/*
Solar Energy Industries Association: https://www.seia.org/sites/default/files/2018-06/SEIA-Consumer-Guide-Solar-Power-v4-2018-June.pdf

SOLAR CALCULATOR

CALCULATE IF SOLAR IS RIGHT FOR YOU

Are your end-use customers interested in exploring rooftop solar? Use this one pager to share tips on how to pick a reputable solar installer that is right for their needs.

Whether you want to know how much a solar installation will cost or how long it takes to recover the upfront investment for solar in the Valley, the Solar Calculator can provide the answer.

INTERESTED IN UNDERSTANDING THE COST AND PAYBACK OF INSTALLING SOLAR?

Visit: https://edt.tva.com

WHAT CAN YOU LEARN WITH THE SOLAR CALCULATOR?

- Payback period
- Approximate cost to install solar
- System size needed
- Number of solar panels needed

	No Solar	Solar
Total Avg Investment	N/A	$19,319*
Monthly Net Electric Cost (20 year avg.)	$173	$93
Payback Period (years)	N/A	20
Incentives	✓ Federal Investment Tax Credit (ITC) - If Applicable * with maximum ITC applied	

Contact your Local Power Company for more information on your solar options or if you would like to schedule a demonstration.

Learn more at https://edt.tva.com · Call 866-673-4340 · Email renewables@tva.gov

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As of February 2020