



# Residential Consumer Guide to Solar Energy

Updated July 2025



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## 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.

*Note: This guide is about systems installed on a home. For more information on community solar, check out our consumer guide on community solar.*

## 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 various factors:

- The size (or "power rating") of the system measured in kilowatts direct current (kW-DC); 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. However, some options may not be available in your state. 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 fixed 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, which can change from month to month

### 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 the electricity it produces. You are usually responsible for system upkeep, although most residential solar systems require no to low maintenance over its lifetime, 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

Many states allow homeowners to 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. Be sure to read the lease terms carefully to understand any potential increases in lease payments over time.

## 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. In a power purchase agreement (PPA), as with a lease, the solar company owns the system on your property. You agree to purchase all the electricity produced by that system for a specified rate and agreed-upon terms specified in a contract. Similar to a lease, a PPA is 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. Be sure to read the PPA terms carefully to understand any potential increases in the rate you pay over time for the electricity produced by the solar system.

## 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. The energy storage system is charged by the solar system and releases the stored electricity when needed. These systems are equipped with software that manages the charging and discharging based on customer preferences or utility program requirements. A solar-plus-storage system can provide backup power during a power outage, provided you choose the correct type of storage system. Note that most energy storage provides only limited back-up power during an outage and can be configured to power your most needed appliances.

You may want storage to control when you consume the electricity generated by the solar system when your utility has the following: (i) rates that change based on the time of day; (ii) 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) compensation 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 a 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 make any changes to the roof. Third, if your system has monitoring that relies on the internet, be sure to maintain your internet connection and learn how to use your monitoring system to make sure your system is working properly. 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 an informed solar 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 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. Before making a final decision, make sure you understand what you will pay each month and each year for your home solar energy system.

### 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. The lowest price may not offer the best value when you evaluate the annual savings and warranties.
- ***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 for systems installed through 2025, on the total cost of the solar system. The federal tax credit is only available to you if you own the system. Keep in mind that the federal tax credit only reduces your taxes and is not a rebate. Other state and local incentives may be available, as well as programs from your

local utility. Incentive programs can change or have a limited amount of funds, 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.*** Tax credits and solar incentives help to reduce the final cost of a rooftop solar energy system. However, 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. Depending on the program, you may need energy storage to enjoy the full benefit of your system. 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 produced from your home solar energy system. 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 your financing options.*** There are increasing options to finance a solar system purchase such as solar loans, home equity lines of credit, and, in some states, Property Assessed Clean Energy (PACE). Each option has different payment schedules, annual percentage rates (“APR”), and qualification criteria.

## 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 for it. Remember: make sure key terms including system size, total cost, lease or PPA rates, warranties, etc. are included in the official signed contract documents.
- ***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. See below questions that consumers might ask when entering a solar transaction.
- ***Separate estimates from guarantees.*** Many households can save money by choosing solar, but the 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 policies that would impact the economics of your investment. Check with your utility or state utility regulatory office for any currently planned rate changes but remember that rates and utility policies may change in the future, even if none are currently planned. Rate and policy changes often allow systems already installed to be grandfathered into the current rates and policies to avoid negative impacts to consumers.
- ***Fully understand warranties.*** Like any other major residential product or service, a solar system typically includes warranties covering parts, labor, and performance. There may be separate warranties for major system components, as well as how the system interacts with your roof and its warranty. Ask your solar company to explain what your warranties protect, for how long, who stands behind them, and who is responsible for servicing the warranty. Make sure that these details are included in the final contract.
- ***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. If you purchased a system with a loan and it has not been connected to the grid yet, consider contacting your lender. It is best to select components from companies with a long history of being in business with lower probabilities of going bankrupt.

## Key Questions to Ask Before Entering into an Agreement

### For all solar systems:

#### System Cost and Incentives

- What is the total cost of the solar system? For purchased systems, are you assuming any incentives in the total cost? If you are, which incentives and what are their requirements?
- What incentives am I eligible for and how does this reduce my final cost of going solar? Do I owe enough taxes to use the federal tax credits?
- How much is the total cost of the solar system if I add storage?
- What is your timeline for this investment? Do you 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?

#### System Design and Performance

- What is the system size in kilowatts-DC?
- 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? Are there any fixed fees that I need to pay the utility company each month?
- 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?
- What will the system look like once installed? Will I receive a system design for my review and approval before installation?

#### Contracting

- Is the installation company licensed and insured?
- Do I need to purchase additional homeowner's insurance?
- Will I be required to make any changes to my home (e.g., roofing upgrades)?
- Do you use the relevant SEIA residential disclosure forms? Can you provide a completed copy of the form?
- When can I cancel the agreement without any penalty?

#### Warranties

- 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 operations and maintenance (O&M) services included? Who backs the O&M coverage? If not, who should I contact to purchase O&M coverage?

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- 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?
- If the company fails, who should I contact regarding panel and inverter warranties and replacements?

## *Other*

- 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?
- In some states, laws prevent homeowner associations (HOAs) from restricting rights to install a solar system. What are the rules in my state and can you help me work with my HOA to avoid potential conflicts and delays?
- Does your company follow the SEIA Solar Business Code? Do you agree to abide by SEIA's Complaint Resolution Process?

## **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?
- Will you place a lien on my house? 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 a new homeowner? Are there any other requirements or conditions for the new homeowner to take over the lease or PPA?
- Do I have to pay off the lease when my home is sold?
- Who is responsible for repairs and maintenance on the system?
- What happens if I need to replace my roof after the system is installed? How much will you charge to remove and reinstall the system?

## **For financed system purchases only:**

*These are questions to ask lenders and not the solar provider*

- What are my financing options?
- What is the length of the financing?
- What is the APR (Annual Percentage Rate) for the financing?
- What is the payment schedule and how much do I pay at each due date? Do my monthly payments stay the same or do I have to make any lump sum payments midway?
- When do I have to start making payments? Is it when the system is interconnected or at some other point? Who gives the green light for payments to start?
- What is the total amount I will pay at the end of the agreement?
- Will a lien be placed on my home? Will a lien be placed on my system? Are there any filings connected with my system that will be filed with a state or local government office?
- What happens if I want to refinance my mortgage?



- What happens if I wish to pay off the financing early?
- What are my options when I sell my home?
- Are there fees to transfer the financing to the new homeowner? Are there any other requirements for the new homeowner to take over the financing?
- What happens if the contractor does not finish the job? Do I still have to make payments? Will you help me complete the installation? Will this cost extra?

## 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 that describes the resolution process.
- If you choose a SEIA-member solar company to work with, SEIA may be able to assist you in resolving your issue.
- 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 – <http://www.seia.org/consumers>
- Official SEIA State Affiliates – <https://seia.org/official-state-affiliates/>
- Better Business Bureau (BBB) – [www.bbb.org](http://www.bbb.org)
- Database of State Incentives for Renewable Energy (DSIRE) – [www.dsireusa.org](http://www.dsireusa.org)
- Interstate Renewable Energy Council – [www.irecusa.org](http://www.irecusa.org)
- National Renewable Energy Laboratory (NREL) – [www.nrel.gov](http://www.nrel.gov)
- U.S. Department of Energy (DOE) – [www.energy.gov](http://www.energy.gov)
- Your state or local consumer agency – [www.usa.gov/state-consumer](http://www.usa.gov/state-consumer)
- Your state attorney general – [www.naag.org](http://www.naag.org)

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