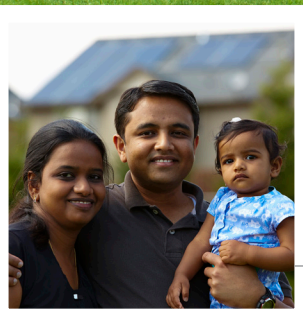
Clean Energy States Alliance

A HOMEOWNER'S GUIDE TO SOLAR FINANCING

Leases, Loans, and PPAs



By Nate Hausman, Project Director, Clean Energy States Alliance | Updated November 2018

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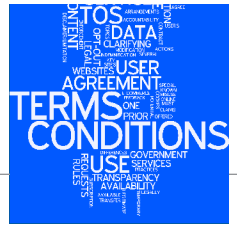
contents

Introduction pg2

Financing for the Residential Solar Marketplace pg3

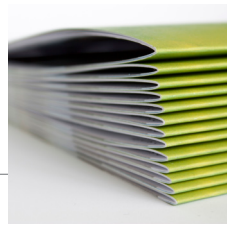
What You Need to Know about Leases, PPAs, and Loans pg5



Common Terms in Solar Financing pg8

Weighing the Benefits of Direct Ownership versus Third-Party Financing pg13

Questions to Ask pg17



Solar Financing Resources for Homeowners pg21

introduction

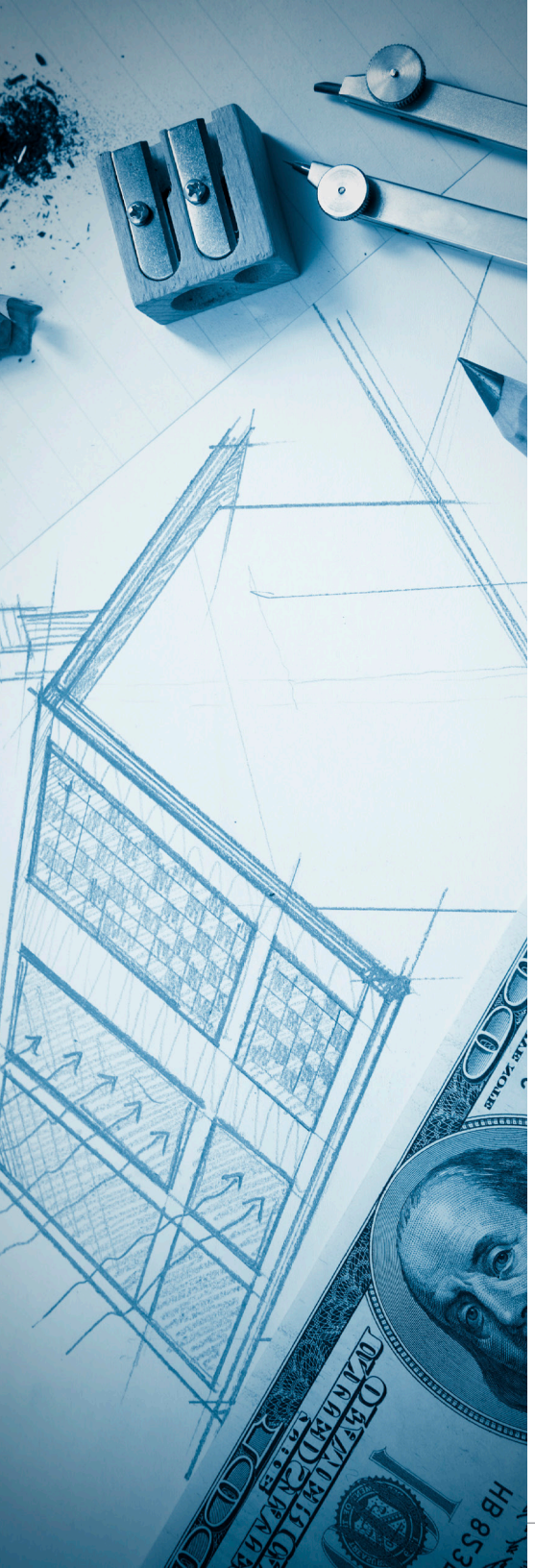
Are you thinking about installing a solar photovoltaic (PV) system on your house and are trying to figure out how to pay for it? Perhaps you are debating whether to purchase the system outright or take advantage of a financing option. Perhaps you do not yet know which financing options are available to you.

If you are thinking about going solar, there is good news: The price of a solar PV system has come down dramatically in recent years, and there are more ways to pay for it. But with so many solar financing options now available, the marketplace for these products has become increasingly complex. It can be hard to choose among the different packages and vendors. The differences between them may not be readily apparent. Some contracts are filled with confusing technical jargon, and key terms can be buried in the fine print of a customer contract.

> This guide is designed to help homeowners make informed decisions about financing solar.

This guide is designed to help you make informed decisions and select the best option for your needs and finances. It describes three popular residential solar financing choices—leases, PPAs, and loans—and explains the advantages and disadvantages of each, as well as how they compare to a direct cash purchase. It attempts to clarify key solar financing terms and provides a list of questions you might consider before deciding if and how to proceed with installing a solar system. Finally, it provides a list of other resources to help you learn more about financing a solar PV system.

The guide does not cover technical considerations related to solar PV system siting, installation, and interconnection with the electricity grid,[1] nor does it cover all of the particular local market considerations that may impact financing a PV system. For example, we do not include state-specific information about solar programs, policies, products, or rules. Check with a solar installer servicing your area or with the relevant energy agency in your state to learn more about those topics. Your state's energy agency may also have state-specific solar financing guides available.



financing

Options for Homeowners

The size of a residential solar photovoltaic (PV) installation can vary dramatically but is generally between 2 and 20 kilowatts (kW) depending on a variety of factors, including the available roof space (or ground space if it is a ground-mounted system), site conditions such as roof aspect and shading, the electricity usage of the home, and available financing. To put these system sizes into context, a 10 kW system in Maryland produces slightly more electricity than the average Maryland household uses in a year.[2]

A system's size is unsurprisingly a key determinant of its cost.[3] While the price of systems varies considerably, a residential solar PV system usually costs between $15,000 and $35,000, roughly the same as a new car.[4] But just as buying a car outright can be financially burdensome for many automobile customers, so too can paying upfront for a solar PV system.[5] That's where solar financing comes into play.

> Financing innovations have helped fuel the exponential growth of the solar market in the United States.

Financing innovations have helped fuel the exponential growth of the solar market in the United States and fall into two broad categories based on ownership of the solar PV system: third-party ownership and homeowner ownership via a loan. A later section of this report explicitly compares the types of financing.

Some solar companies will arrange for the installation of a solar system and also provide financing for the system. These companies are often called full-service solar developers. In other cases, the installer is a different entity than the financial lender. A solar financing lender might be a bank, a solar company, a credit union, a public-private partnership, a green bank, or a utility.

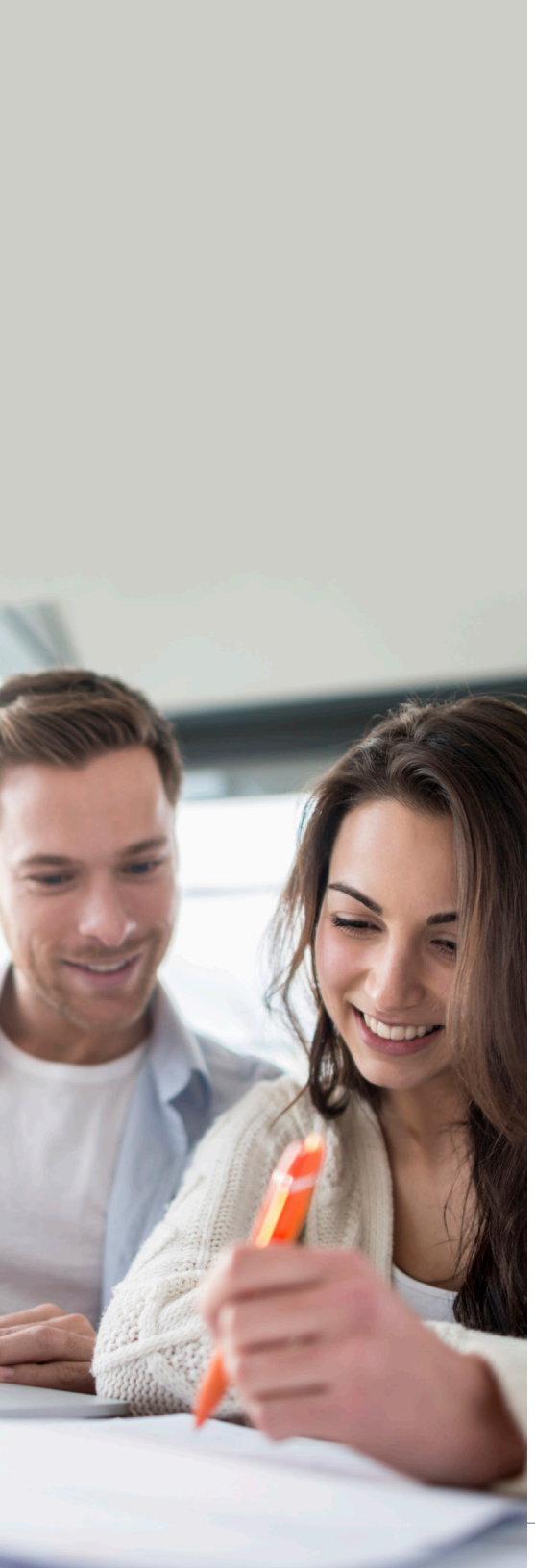
Third-party ownership of residential solar systems allows homeowners to avoid high, upfront system costs and instead spread out their payments over time.

Third-party ownership of residential solar systems allows homeowners to avoid high, upfront system costs and instead spread out their payments over time. It also often puts some or all of the responsibility for system operation and maintenance on the third-party owner. Currently, more than 40 percent of homeowners who install solar take advantage of third-party ownership. The two alternative third-party ownership arrangements are **solar leases** and **power purchase agreements (PPAs)**.

Under a **solar lease** arrangement, a homeowner enters into a service contract to pay scheduled, pre-determined payments to a solar leasing company, which installs and owns the solar system on the homeowner's property. The homeowner consumes whatever electricity the leased solar system produces. If the system provides excess electricity to the grid, the homeowner may get credit for that generation from the electrical utility. As with all types of solar financing options, under a solar lease arrangement the homeowner pays the regular utility rate for any electricity consumed beyond what the solar system generates.

With a residential **solar PPA**, a homeowner contracts with a project developer that installs, owns, and operates a solar system on the homeowner's site and agrees to provide all of the electricity produced by the system to the homeowner at a fixed per-kilowatt-hour rate, typically competitive with the homeowner's electric utility rate.

Loan financing is becoming another popular way for homeowners to pay for solar. Similar to leases and PPAs, solar loans allow customers to spread the system's cost over time, but they enable customers to retain ownership of the system. Solar loans have the same basic structure as other kinds of loans and are being offered by an increasing number of lending institutions—from banks and credit unions to utilities, solar manufacturers, state green banks and financing programs, housing investment funds, and utilities. Unlike third-party solar ownership, a solar loan arrangement enables a customer to own a solar system outright and benefit directly from state and federal incentives. However, the customer also incurs the liabilities associated with ownership.



What you need to know about Leases, PPAs, and Loans

Solar Leases

A solar lease involves a scheduled payment, usually monthly. With a solar lease, a developer installs and owns the solar system on the home. In return, the homeowner pays a series of scheduled lease payments to the developer. A typical lease term is 15-20 years.

Because a lease agreement can deal with system maintenance in a variety of ways, it is important to clarify who is responsible for maintenance costs as a solar PV system may require maintenance or replacement of parts during the lease contract term. Most solar leases cover maintenance, but may not cover the cost of replacing equipment, such as the inverter.[6] One common option for the homeowner is to make a single payment toward operations and maintenance upfront. That approach could reduce the third-party owner's incentive to provide good maintenance service. This risk can be reduced if the solar lease contains a minimum performance guarantee or the contract clearly states that operations and maintenance are covered by the third party. Such guarantees help ensure that the third-party owner properly maintains the system.

> Solar leases can be attractive to homeowners because of their relative simplicity compared to PPAs.

The benefits of a solar lease include elimination of most or all of the upfront cost of a system and, if indicated in the contract, transferring operations and maintenance responsibilities to a qualified third-party owner. Although homeowners who enter into a lease pay a set price for the equipment (and sometimes maintenance), they do not know for sure how much electricity the solar panels will produce, so cannot know exactly how much money they will save on their electric bills. Ideally, monthly electric bill savings will be greater than the lease payments, making for a cash-positive transaction. Many solar leases come with an escalating (meaning increasing) payment schedule, described in more detail

Ideally, a homeowner's PPA per-kilowatt-hour payments will be less than the retail electricity rate, making the transaction cash-flow positive from day one.

below. Homeowners should thoroughly scrutinize escalating payment schedules when assessing the desirability of a particular lease.

The Solar Access to Public Capital (SAPC) working group, convened by the National Renewable Energy Laboratory, has developed a standardized solar lease template (www.seia.org/research-resources/model-leases-and-ppas), which has been endorsed by the national solar trade organization Solar Energy Industries Association (SEIA). This template can be modified to include different terms and has not been adopted by all solar developers, so you should closely examine a solar lease contract before executing it.

Solar Power Purchase Agreements (PPAs)

Under a residential solar PPA, a solar finance company buys, installs, and maintains a solar system on a homeowner's property. The homeowner purchases the energy generated by the system on a per-kilowatt-hour basis through a long-term contract at rates competitive with the local retail electricity rate. This allows the homeowner to use solar energy at a prescribed per-kilowatt-hour rate while avoiding the upfront cost of the solar system and steering clear of system operations and maintenance responsibilities. Because the homeowner knows how much the solar electricity will cost for the entire term of the PPA, the homeowner is insulated from possible increases in utility electricity rates.

Ideally, a homeowner's PPA per-kilowatt-hour payments will be less than the retail electricity rate, making the transaction cash-flow positive from day one. If you consider this option, you should look carefully at your electricity bill to see how your current rate compares with the rate proposed by the company offering the PPA. You can ask your contractor to calculate the projected per-kilowatt-hour rate and annual savings. For PPAs with an escalating rate, you should consider whether local electricity rates are likely to increase in the future.

As with a solar lease, because you would not own the system, any applicable state or federal tax credits go to the system owner. Not all states allow the use of third-party solar PPAs.

A SAPC working group standardized PPA contract, endorsed by SEIA, can be found at www.seia.org/research-resources/model-leases-and-ppas. As with all solar financing contracts, you should closely scrutinize a PPA contract before executing it because terms vary.

Lenders for solar loans can be banks, credit unions, state programs, utilities, solar developers, or other private solar financing companies.

Solar Loans

Solar loans allow customers to borrow money from a lender or solar developer for the installation of a solar PV system. With this approach, the homeowner owns the installed system. A wide variety of loan offerings are available with different monthly payment amounts, interest rates, lengths, credit requirements, and security mechanisms.[7] Some solar loan products offer bundling of energy efficiency improvements along with the solar PV installation or allow for inclusion of roof replacement or energy-related improvements.

Some loans require an asset to serve as collateral to secure the loan. When the lender takes a security interest in the solar customer's home, it is called a home equity loan. Other loans do not require an asset to collateralize the loan other than perhaps the solar system itself. These are called unsecured loans.

With many solar loans, the solar PV system can start saving the homeowner money right away by structuring the repayment terms so that the monthly loan payments are less than the resulting reduction in the amount on your electricity bill. Alternatively, paying of the loan sooner and over a shorter duration may delay immediate positive cash flow, but will shorten the time needed to enter the post-loan period when monthly savings will be much greater.

Lenders for solar loans can be banks, credit unions, state programs, utilities, solar developers, or other private solar financing companies. In a few states, on-bill financing through participating utility companies allows solar customers to repay their loans through payments added to their monthly electric bill. In a few jurisdictions, Residential Property Assessed Clean Energy, or R-PACE, programs may be available. R-PACE is a mechanism for financing residential energy upgrades whereby the upgrade is paid off over an assigned term of years through an assessment on the homeowner's property tax bill. An R-PACE assessment attaches to the property rather than to the homeowner, which can make it easier for homeowners to purchase a solar PV system even if they may want to sell their home before the system is fully paid off.

In a handful of states, a state or quasi-state agency offers residential loan programs that cover solar. For information on these state solar loan programs, see the State Loan Programs for Solar Projects map available through the DSIRE website at www.dsireusa.org. Private loans that cover solar may also be available in your jurisdiction.

common terms

in Solar Financing

It is important to scrutinize the contractual elements in a solar lease, PPA, or loan. Here are some common contract terms to look for.

- **Buyout Options:** Many third-party financing contracts allow the homeowner to buy out or pay off the remainder of your payments in one lump sum at any time after a designated period of time. Some contracts provide for an option to buy out at the fair market value of the system. Look to see if there is a buyout option in the contract, under what circumstances a customer can buy out of a contract, and how the buyout price is calculated. Contracts may differ in how they approach this issue, and methods of calculating buyout prices can vary. If a clear buyout option is not included in the offer, the customer can always try to request one.

- **Contract Term:** Contract term, duration, and payback period all refer to the period of time under which a customer's solar financing agreement is operative. Most residential financing contracts last for between 5 and 20 years, and some last even longer. By way of comparison, solar panels typically come with a 20-25 year warranty and their productive lifespan can exceed that. Inverters have separate warranties, which are typically 5-10 years, though some are longer. At the end of a solar lease or PPA term, the homeowner will often have several options: 1) renew the contract and continue the monthly payments, 2) purchase the system at a designated price or the fair market value of the system, which may or may not be negligible after the term of a contract, or 3) have the third-party lender arrange for system removal. In the case of a solar loan, the homeowner will continue to own the system after the loan is fully paid off.

Look for contract terms that clarify the allocation of obligations in the transfer of home ownership.

- **Credit Requirement:** As a prerequisite to entering into most third-party financing contracts, third-party lenders require a credit (or "FICO") score. Many third-party financing arrangements are only available to customers who have a credit score of 680 or higher. Some financing arrangements may be available to customers with sub-680 credit scores, but they may come with higher interest rates. Knowing a credit score at the outset can be a useful way to determine eligibility for third-party financing. A credit score below 650 will preclude most homeowners from most third-party financing options. Some states have developed special loan programs for lower income or lower FICO score customers. Solar loan programs and other state solar incentive programs can be found on the DSIRE website at www.dsireusa.org, or by checking with the state's energy office.

- **Down Payment:** Many third-party lenders offer options for initial customer down payments. Generally, initial down payments range from zero dollars to $3,000. By putting some money down upfront toward the cost of a solar system, the homeowner will likely receive a lower monthly payment, a shorter duration of your contract term (in the case of a solar lease or loan), or get a lower per-kilowatt-hour rate (in the case of a PPA). With a down payment, some third-party lenders will waive or reduce escalators.

- **Escalation Clause:** Many third-party financing options contain a clause that increases a customer's monthly payment on an annual basis to account for inflation and projected annual increases in electricity rates. This is often referred to as an annual "escalation clause," "escalator clause," or simply an "escalator." In many solar lease and PPA contracts, payments escalate at an annual rate between 1-3 percent. Escalation clauses are not problematic per se—keep in mind that the average annual increase in U.S. residential electricity rates over the past decade was 1.9 percent[8] and the average annual rate of inflation was 1.6 percent[9]—but they should be understood and closely examined for reasonableness. The escalator is a compounding rate, meaning that it applies not just to the initial payment rate but to the increases added after each year due to the escalation charges. For example, if the payment rate for a PPA is 12 cents per kilowatt hour in the first year, with an annual escalator of 3 percent, the customer will be paying 18.2 cents per kilowatt hour in year 15. But if the escalator is only 1 percent, the customer will only be paying 13.8 cents in year 15. It is good to calculate or ask for a table of what each year's payment rate will be.

- **Home Ownership Transfer Provisions:** It is important to look for contract terms that clarify the allocation of obligations in the case of a transfer of home ownership. Under a third-party ownership model, the homeowner can usually transfer the solar lease or PPA to the next home-owner for the remainder of the contract term, provided the new owner is approved (usually a credit score qualifying a person for a mortgage also meets the criteria to take over the third-party lending agreement obligations). Solar panels can add significant value to a home, but third-party solar ownership can also be a complicating factor during the sale of a home. Some buyers may be wary of buying a house with a solar system. If a solar system is third-party owned, a seller may have to buy the system outright before transferring the home, so the system can be removed upon transfer. With a relatively scant history of solar home sales data, it can be difficult to calculate the value of a residential solar system during the home sales process, especially when a system is third-party owned and the buyer would like to assume the remaining lease or PPA payments. Examine the provisions of a contract that relate to ownership transfer to determine what the options would be if the home is sold before the end of the contract term, and have a clear understanding of those conditions with the installer.

- **Minimum Production Guarantees:** Many lease and PPA arrangements offer solar production or output guarantees, usually in terms of a certain number of kilowatt hours of electricity produced per year. With such a guarantee, if an installed system fails to meet the minimum level of production output guaranteed, the third-party owner will compensate the homeowner on a per-kilowatt-hour basis for the electricity production shortfall. Prospective solar lease or PPA customers should check to see if a minimum production guarantee is included in the terms of their contact and what accommodations are provided in the case of a production shortfall, including whether compensation is based on a wholesale or retail per-kilowatt-hour price. When a customer directly owns a solar system, production shortfall risks are incurred by the owner. In this case, no production guarantees are provided unless offered by a panel manufacturer or installer.

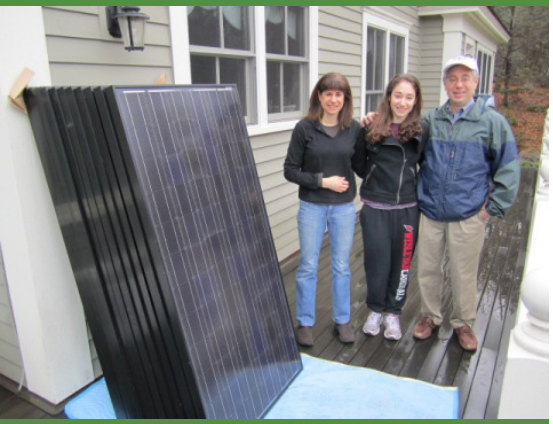
One way to mitigate risk is to purchase an extended warranty.

- **Net Metering:** Net metering, sometimes referred to as "net energy metering," enables solar system owners to use their solar electricity generation to offset their electricity consumption. Customers receive credits for excess electricity generated and sent to the grid and can use those credits to pay for electricity in the future. In some cases, customers can receive a payment or bill credit from the utility for the excess electricity they produce and add to the grid over the course of a certain billing period.[10] Different states treat net metering differently. To learn whether net metering is available and how it works, a homeowner can check a state's incentive programs on the DSIRE website at www.dsireusa.org. It is important to note that a residential, grid-tied PV system will not function in the case of an electricity outage unless the home has an accompanying electricity storage system and the ability to "island" (disconnect from the grid). The reason is that stand-alone PV systems are designed to shut down when the grid goes down, to prevent the system from feeding power back into the grid and causing injury to utility employees working on the power lines.

- **Operations and Maintenance:** If the homeowner chooses a lease or PPA model, the third-party owner owns the solar system and will likely cover operations and maintenance over the course of the contract term. It is important to check your contract because some lease contracts may divvy up responsibilities differently. Under most third-party ownership arrangements, the third-party owner also incurs accidental risks associated with panel ownership, including unforeseen destructive events or panel malfunction. Under the solar loan model, the solar customer owns the system directly and therefore incurs the liabilities associated with such ownership. A homeowner who owns a solar system outright or finances through a loan may be responsible for insuring the solar PV system, which could be added to homeowner's insurance or an existing property policy. Because large, third-party financing entities have established relationships with insurance companies, they often receive more favorable rates than do residential customers looking for solar property insurance. In some case, solar leases or PPAs may require homeowners to increase their homeowner's insurance to cover risks associated with the system.

  Another way to mitigate risk is to purchase an extended warranty. Solar panels may come with a manufacturer's warranty guaranteeing at least 80 percent system performance for 20-25 years, but homeowners who direct purchase or finance their system through a loan may want to seek additional protection. While panel manufacturers usually offer extended performance guarantees, other system components such as disconnects, inverters, racking, and wires may come with relatively short warranties or no warranties at all. Homeowners may want to purchase an extended warranty to cover replacement or repair of these components, system installation workmanship defects, or the risk that a panel manufacturer will have undergone bankruptcy by the time a homeowner pursues a manufacturer's warranty claim.

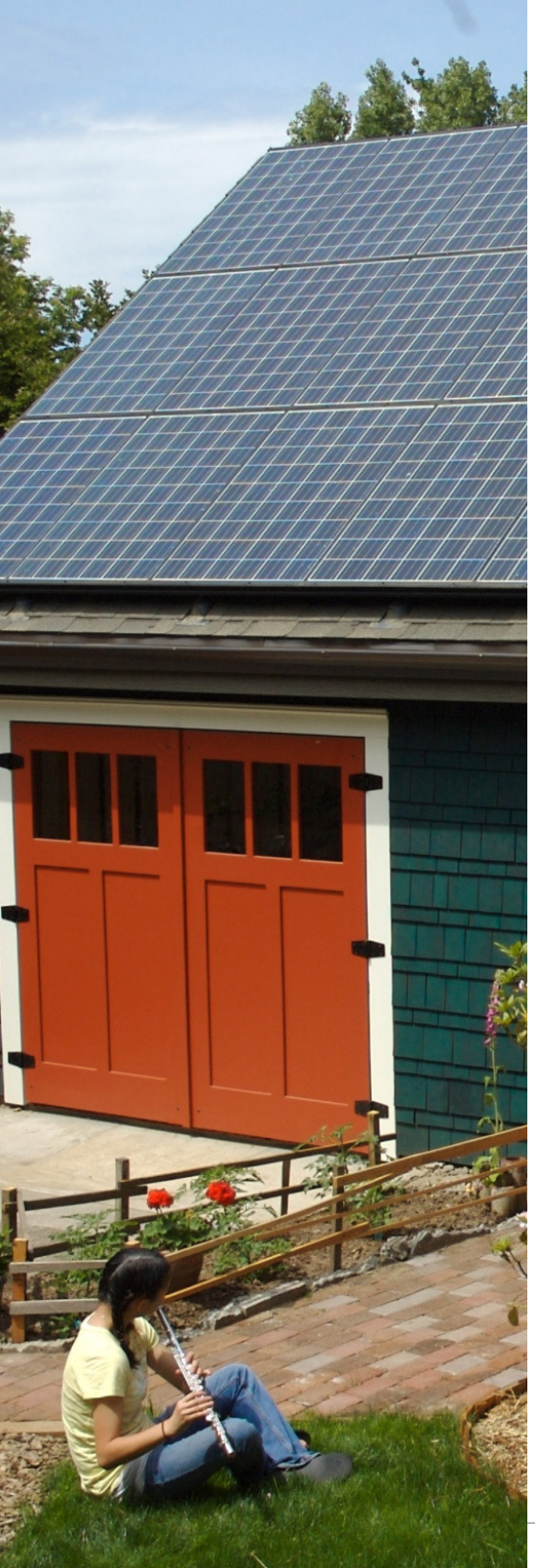
The federal government provides a 30 percent federal investment tax credit (ITC) for the purchase of residential solar systems.



- **Pre-Payment:** A pre-payment option can be similar to a buyout option and allows homeowners to pay some or all of the payments for a PV system before the payments become due. Pre-payment can range from zero to full pre-payment. Full, upfront pre-payment can allow a homeowner to reap some of the benefits of third-party ownership, such as maintenance coverage, while avoiding ongoing interest payments.

- **Production Estimates:** Residential solar systems usually come with electricity production or output estimates. System underperformance of a production estimate can be costly for a solar homeowner. Under the lease model, system underperformance can be particularly problematic because a homeowner owes the solar developer a fixed payment regardless of the amount of electricity produced by the leased system. On the other hand, the homeowner gains if the leased solar system overproduces. Under a PPA model, the homeowner only pays for the amount of electricity actually produced by the system. Thus, when actual system output falls below the production estimate, homeowners leasing their solar system may do worse than PPA customers.

- **Solar Incentives:** The federal government provides a 30 percent federal investment tax credit (ITC) for the purchase of residential solar systems. The ITC will decline to 26 percent in 2020 and 22 percent in 2021. There will be no federal tax credit available to residential customers beginning in 2022.[11] States, too, often offer incentives for going solar. In some states, for example, Solar Renewable Energy Certificates (SRECs), which are valuable, tradable commodities representing the green attributes associated with solar energy generation, are available to solar system owners. Additionally, it is important to note that the 30 percent ITC and most other state incentives such as SRECs are only available to the owners or purchasers of a solar system. In other words, if the homeowner agreed to a solar lease or PPA with a third-party system owner, the homeowner will be unable to take advantage of these incentives. Instead, the third-party owner will realize the incentive benefits. Under a loan arrangement where a solar customer owns the solar system, the solar customer will be able to take direct advantage of most incentives. Solar installers should be able to provide an estimate of the payback period for a direct purchase, taking into account all of the available incentives. Make sure they explain all of the payback calculation assumptions. Interest paid on solar loans that are secured through a home equity loan may also be tax deductible. It is important to consider the impact of the available incentives on the economic benefits based on the homeowner's tax bracket before deciding whether third-party ownership (such as a solar lease or PPA) or direct ownership (either through a loan arrangement or through outright purchasing) makes more sense.



Weighing the benefits

of Direct Ownership versus Third-Party Financing

A direct, upfront, cash purchase of a residential solar system is typically the least expensive option in terms of total dollars spent, because no interest costs or finance fees are incurred. In many cases, however, a homeowner will not have the cash available to pay for a system outright. And, even when a homeowner does have enough cash to pay for a solar system, it may still be financially advantageous to finance the solar system and invest the cash elsewhere.

It is important to note that with a lease, PPA, or loan, homeowners will have an additional monthly bill to pay beyond their regular monthly electric utility bill. However, the utility electric bill should be greatly reduced.

A homeowner financing solar through a lease or PPA generally will have fewer concerns about maintenance and operation of the system.

A homeowner financing solar through a lease or PPA generally will have fewer concerns about maintenance and operation of the system. Maintenance, monitoring, insurance, and warranties are usually provided through a solar lease or PPA arrangement. For example, the replacement of most system parts in order to maintain a solar system's production performance will be covered by the third-party developer over the term of the contract under a lease or PPA arrangement. Some homeowners may feel more comfortable knowing that they do not bear these maintenance and operation responsibilities. Others may prefer to control and manage a system sited on their property.

With a third-party ownership arrangement, a homeowner will not be able to take advantage of federal and state incentives.

Solar systems generally require little maintenance. They should be inspected periodically and may need to be cleaned for optimized performance. If a homeowner lives in an area where snow buildup occurs, the panels may need to be cleared of snow from time to time. Other maintenance issues which can occur over the lifetime of a system may include loose wiring connections, loss of inverter function, or breaking or cracking of the panels themselves.

When a homeowner directly owns the solar PV system, either through upfront cash purchase or a solar loan, and the system is not covered under any other insurance policy or covered under a warranty, the homeowner will bear the risk of system malfunctions, accidents or any other unforeseen circumstances that result in the loss or curtailment of the solar system's output. Under a solar lease or PPA arrangement, these risks are borne by the third-party owner rather than the homeowner.

On the other hand, when a homeowner finances his or her solar purchase through a lease or PPA, the financing contract may limit the homeowner's ability to alter the property if doing so would negatively impact solar access or solar system performance. For example, construction of a chimney could pose a problem if it would cast a shadow on the solar system. When homeowners directly own their solar system, they are not bound by a third-party owner's restrictions.

As noted above, with a third-party ownership arrangement (lease or PPA), a homeowner will not be able to take advantage of federal incentives such as the ITC and state incentives such as Solar Renewable Energy Certificates (SRECs), where available. However, the fact that the third-party company will receive these valuable incentive credits should allow it to offer more favorable financing arrangements to the homeowner than would otherwise be the case. Under the direct-ownership model, whether a system is financed through a loan or purchased outright, the homeowner will be able to realize these incentives directly.

The following table summarizes the similarities and differences between the different arrangements.

Table 1. Comparing Residential Solar PPAs, Solar Leases, & Solar Loans/Direct Purchases

	Solar Leases	Residential Solar PPAs	Solar Loans/Direct Purchase
Who buys the system?	Third-party developer	Third-party developer	Homeowner
Who owns the system?	Third-party developer	Third-party developer	Homeowner
Who takes advantage of most of the federal and state incentives available for solar?	Third-party developer	Third-party developer	Homeowner
Who is responsible for operations and maintenance of the solar system?	Usually the third-party developer	Third-party developer	Homeowner, though some state incentive programs require installers to provide a workmanship warranty for a set period of time such as five years, thereby reducing the risk of immediate issues related to improper installation.
Who incurs the risk of damage or destruction	Third-party developer	Third-party developer	Homeowner
What happens if the home-owner sells the home where the solar system is located?	Depends on the contract.	Depends on the contract.	If the homeowner finances the system through a loan, the homeowner remains responsible for loan payments after the transfer unless negotiated with the buyer.
Are financing payments fixed?	Yes, payments are pre-set but may include an annual escalator, increasing payments each year.	No. Payments to the third-party developer/owner are on a per kilowatt-hour basis based on electricity generated by the solar array. Per kilowatt-hour payments may include an annual escalator.	If the homeowner finances the system through a loan, the loan payments will be fixed. If the homeowner decides to purchase a system outright, a contractor may sometimes offer several payment installments instead of one lump sum.
What contract duration terms are available?	Terms can vary.	Terms can vary, but are often in the range of about 20 years.	If the homeowner finances the system through a loan, the loan terms can vary.

Table 1. Comparing Residential Solar PPAs, Solar Leases, & Solar Loans/Direct Purchases (continued)

	Solar Leases	Residential Solar PPAs	Solar Loans/Direct Purchase
Do contracts provide minimum production guarantees?	Yes, usually. Solar lease providers commonly provide minimum production guarantees.	Yes, usually. PPA providers commonly provide minimum production guarantees.	A loan contract does not include production guarantees. However, a solar panel manufacturer or developer/ installer may provide a production guarantee.
Are there escalator clauses in the contracts?	Sometimes. Check the contract for specific terms.	Sometimes. Check the contract for specific terms.	If the homeowner finances the system through a loan, interest rates may increase over time depending upon the specific terms of the loan.
Is insurance coverage provided?	Yes	Yes	No. Homeowners who directly own their solar system and want to be covered will need to find coverage either through a homeowner's existing insurance policy or through the purchase of a new or expanded policy. Homeowners may decide to forgo insurance coverage altogether and bear the risks of solar system ownership. Some state incentive programs require installers to provide a workmanship warranty for a set period of time such as five years, thereby reducing the liabilities associated with proper installation.

questions to ask

As you go through the process of deciding whether to purchase or finance solar panels, below are some questions to ask yourself and the companies you are interviewing. Good luck in your decision making—going solar is an exciting option and one that can give you many years of satisfaction.

Questions Related to Making the Decision to Go Solar

☐ yes ☐ no ☐ notes Are there financial incentives available in your state for residential solar systems?

☐ yes ☐ no ☐ notes Have you received quotes from at least three solar installation companies?

☐ yes ☐ no ☐ notes Will the solar developer install the system directly or will that be done by a sub-contracted installer?

☐ yes ☐ no ☐ notes How long has the solar developer and/or installer been in business? What is the solar developer/installer's reputation and financial standing? Do you know anyone who has used this solar developer/installer before? Have you received references?

☐ yes ☐ no ☐ notes Does the solar installer have the proper state certifications and licenses, if required?

☐ yes ☐ no ☐ notes Will an on-site visit be performed to assess whether your house is a viable site for a solar system?

☐ yes ☐ no ☐ notes Will you be able to monitor the electrical production of your solar system once it is installed?

☐ yes ☐ no ☐ notes Will the electricity produced by your system cover all of your electrical needs at home? On average, will your system produce excess electricity? How much will you be compensated for excess electricity production if your state has net metering in place?

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Questions Related to Financing

☐ yes ☐ no ☐ notes Have you asked the solar developer to calculate the payback and walk you through the contract and any assumptions?

☐ yes ☐ no ☐ notes Given your personal tax situation, does it make more sense to own (through a loan or direct purchase) your solar system to take advantage of all the federal and state tax incentives?

☐ yes ☐ no ☐ notes What is the interest rate and duration (in years) of the financing agreement? Have you shopped around to compare other financing packages?

☐ yes ☐ no ☐ notes Will you have to make a down payment? Do you have the option to make a down payment to reduce monthly fixed payments (lease) or kilowatt-hour rate (PPA)?

☐ yes ☐ no ☐ notes Will your monthly loan payments be equal to or less than the savings on your electric bill? (You'll want to factor in how much of your electricity needs will be met by your solar PV system as that will impact the reduction of your electric bill. If the system doesn't cover a significant portion of your electricity needs, then your savings may not be substantial enough to justify the payments for your PV system.)

☐ yes ☐ no ☐ notes Is there an escalation clause included in the financing agreement? If so, what is the annual escalation rate?

☐ yes ☐ no ☐ notes If you are financing through a PPA, is the electricity rate you are being offered lower than what you are currently paying?

☐ yes ☐ no ☐ notes If you are financing through a lease or PPA, is there a pre-payment option under which you can pay some or all of your lease or PPA payments before they become due?

notes

Questions Related to Financing (continued)

☐ yes ☐ no ☐ notes If you are financing your system through a lease or PPA, what happens at the end of the contract term? Does the contract require you to buy the system at the end of your term? If so, how is the buyout amount determined?

☐ yes ☐ no ☐ notes Can you buy out your financing contract? Under what circumstances? At what rate? At what point? How is that rate calculated?

☐ yes ☐ no ☐ notes What happens if you sell your home before the end of your solar contract term? For instance, what happens if the buyer does not qualify to assume your solar lease or PPA? What if the buyer does not want the solar system included in the property sale?

☐ yes ☐ no ☐ notes If you are financing your system through a lease or PPA, what happens if you need to replace the roof during the contract term?

☐ yes ☐ no ☐ notes Could the system be removed or repossessed if the lender goes out of business or gets into financial trouble?

☐ yes ☐ no ☐ notes Can the lender sell the contract to a new entity? Will you be notified if that happens?

notes

Questions Related to the Operations of the Solar PV System

☐ yes ☐ no ☐ notes Who will perform operations and maintenance on the system? If the third-party owner performs operation and maintenance, who specifically would you contact if there is a problem? Are you obligated to notify someone within a certain timeframe if there is a problem? How quickly will that person respond to your request for help? Will there be any charges for parts and labor? What services does the operations and maintenance contract cover?

☐ yes ☐ no ☐ notes Does the contract contain minimum production guarantees? If so, what accommodations are provided in the case of a production shortfall? Will shortfall compensation be based on a wholesale or retail per-kilowatt-hour price?

☐ yes ☐ no ☐ notes What are the insurance requirements? Who insures the system? Do you have to pay for any damage? Are there damage reporting requirements? Is there a minimum insurance coverage requirement for the house in order to install a solar system on it? What will your current home insurance policy cover with respect to your solar system?

☐ yes ☐ no ☐ notes Who is responsible for warrantying the system? If there is a warranty, is it with you or the solar company? Will you receive a copy of the warranty agreement?

Solar Financing resources for Homeowners

- Rooftop Solar Financing 101 (video) and Will Solar Panels Save You Money? (video)

  These two short videos were produced by the George Washington University Solar Institute for the Clean Energy States Alliance (CESA). The first video, "Rooftop Solar Financing," introduces three common solar financing methods: loans, leases, and power purchase agreements (PPAs) and briefly explains some of the advantages and disadvantages of each. The second video, "Will Solar Panels Save You Money?," discusses key questions homeowners should explore when assessing whether going solar makes financial sense, including how the cost of solar compares to savings from solar, how the federal tax credit works, and the extent to which a homeowner's electricity bill can be offset by solar.

- Financing Your Solar System, EnergySage: www.energysage.com/solar/financing.

  EnergySage, an online marketplace that provides price quotes from multiple PV installers, has a webpage dedicated to solar financing. This webpage provides information homeowners navigate their solar financing options.

- The Homeowner's Guide to Solar Financing, Let's Go Solar: www.letsgosolar.com/solar-panels/financing.

  The Let's Go Solar website has helpful information and infographics about solar financing options for consumers. The website is managed by an offshoot of a for-profit media group, but the site does not seek to bring in revenue to the company directly.

endnotes

[1] Homeowners who want to generate their own electricity through a solar PV system and hook up to the larger electrical distribution grid must go through an interconnection process. Each state establishes interconnection standards regulating the process by which an electricity generator can connect to the distribution grid.

[2] See www.seia.org/policy/distributed-solar/net-metering; www.eia.gov/tools/faqs/faq.cfm?id=97&t=3. Note that state incentive programs and utility interconnection rules may influence system sizes because incentives may only be provided up to a certain system size, and interconnection complexity and fees may increase for larger systems.

[3] Among other things, the full cost of an installation may vary depending on system size, PV module and inverter type and brand, equipment options (for example, solar tracker panels, microinverters), geographic location, the age and quality of the existing roof or the need to install a ground or pole-mounted system, available incentives, labor costs, permitting fees, participation in a group purchasing program, etc.

[4] Solar PV system costs are often reported as per watt (W) or per kilowatt (kW) to allow for cost-comparison across different system sizes. For more information about solar PV pricing trends over time, see https://emp.lbl.gov/sites/default/files/tracking_the_sun_2018_edition_final_0.pdf.

[5] Although solar costs in the United States have been dropping, there is some indication that this trend may not continue depending in part on importation tariffs placed on foreign-made solar panels. In addition, some states have begun to reduce their solar rebates and other incentives as solar PV has become more cost competitive.

[6] An inverter converts the electricity generated from solar PV panels in the form of direct current (DC) into alternating current (AC), a form which can more readily be used for electrical consumption in the U.S. and can flow into a larger electrical grid.

[7] A security mechanism for a solar loan could be a legal interest in property, which may allow the lender to repossess the property in the case of a default.

[8] EIA Short Term Energy Outlook: www.eia.gov/forecasts/steo/report/electricity.cfm.

[9] You can learn more about U.S. inflation at www.usinflationcalculator.com/inflation/current-inflation-rates/.

[10] To see if your state offers net metering, see www.seia.org/research-resources/net-metering-state.

[11] The residential ITC is scheduled to end in 2022. A similar solar tax credit for businesses will step down on the same schedule, except that in 2022 it will permanently revert to 10 percent rather than sunset entirely. Companies providing leases and PPAs to residential solar customers may be eligible for the business tax credit and may be able to pass along the financial savings to their customers.

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Clean Energy States Alliance (CESA) is a national, nonprofit coalition of public agencies and organizations working together to advance clean energy. CESA members — mostly state agencies — include many of the most innovative, successful, and influential public funders of clean energy initiatives in the country.

CESA works with state leaders, federal agencies, industry representatives, and other stakeholders to develop and promote clean energy technologies and markets. It supports effective state and local policies, programs, and innovation in the clean energy sector, with an emphasis on renewable energy, power generation, financing strategies, and economic development. CESA facilitates information sharing, provides technical assistance, coordinates multi-state collaborative projects, and communicates the views and achievements of its members.