

# SOLAR MAKES CENTS

A Residential Consumer's Guide  
to Harnessing the Sun's Energy



**Office of the Ohio Consumers' Counsel**  
*"Your Residential Utility Consumer Advocate"*

# Table of Contents

---

## **Solar Makes Cents**

Solar works in Ohio .....	4
Benefits of utilizing solar energy .....	6
Are solar panels right for my home? .....	6
Taking full advantage of Ohio solar .....	8
Maintaining a solar panel system .....	8
Other considerations of solar energy use .....	9

## **Costs, financing and savings**

How much does a solar panel system cost? .....	10
Other financing options .....	13
Property Assessed Clean Energy programs .....	14
How much will a solar panel system save me? .....	17
Other solar options .....	20

## **Laws, regulations, agreements and energy credits**

Ohio laws and regulations regarding solar energy use .....	21
About net metering agreements .....	23
What are renewable energy credits? .....	23

<b>Resources</b> .....	24
------------------------	----



## **Office of the Ohio Consumers' Counsel**

*Your Residential Utility  
Consumer Advocate*



# SOLAR MAKES CENTS

**A Residential Consumer's Guide  
to Harnessing the Sun's Energy**

## **Solar Makes Cents**

**A residential consumer's guide  
to harnessing the sun's energy**

The sun is a powerful energy resource that gives the Earth its life. It provides both heat and light energy that are essential to everyday living of plants, animals and humans. Solar energy produces sunlight allowing plant life to grow; it creates the phenomenon of wind; and cycles water and moisture as rain to replenish the Earth.

The sun provides all of this with only a small percentage of its energy reaching the Earth. Even with only that small amount of energy reaching us, this clean and abundant resource, if harnessed properly, could provide all of our power needs many times over.

Scientific innovation has made it possible to use solar energy in high-tech ways. Since the 1890s, the United States has harnessed the thermal energy of the sun with solar water heaters. More recently, science has developed photovoltaic technology that allows us to convert sunlight directly into electricity. These solar panels are composed in an array of tightly woven solar cells which absorb sunlight. When sunlight hits these panels, it excites electrons that can be used as electricity to power our everyday lives.

There are other ways the sun is used. The power of the sun is so intense that it can be used for thermal electric generation. In this technology, parabolic mirrors are used to collect the sun's heat energy. The heat then evaporates water into steam which, in turn, operates turbines to release electricity.

Individual buildings also can use solar energy to passively provide heat. The process uses the building's structure to generate heat through a process called direct gain. The collected heat is then released at night throughout the building.

Although these are larger scale uses of solar energy, there are individual applications as well that range from solar-powered calculators and landscape lighting to solar-powered cars and backpacks that can charge your portable electronics. But one place solar power is only now gaining some traction is in powering our homes.

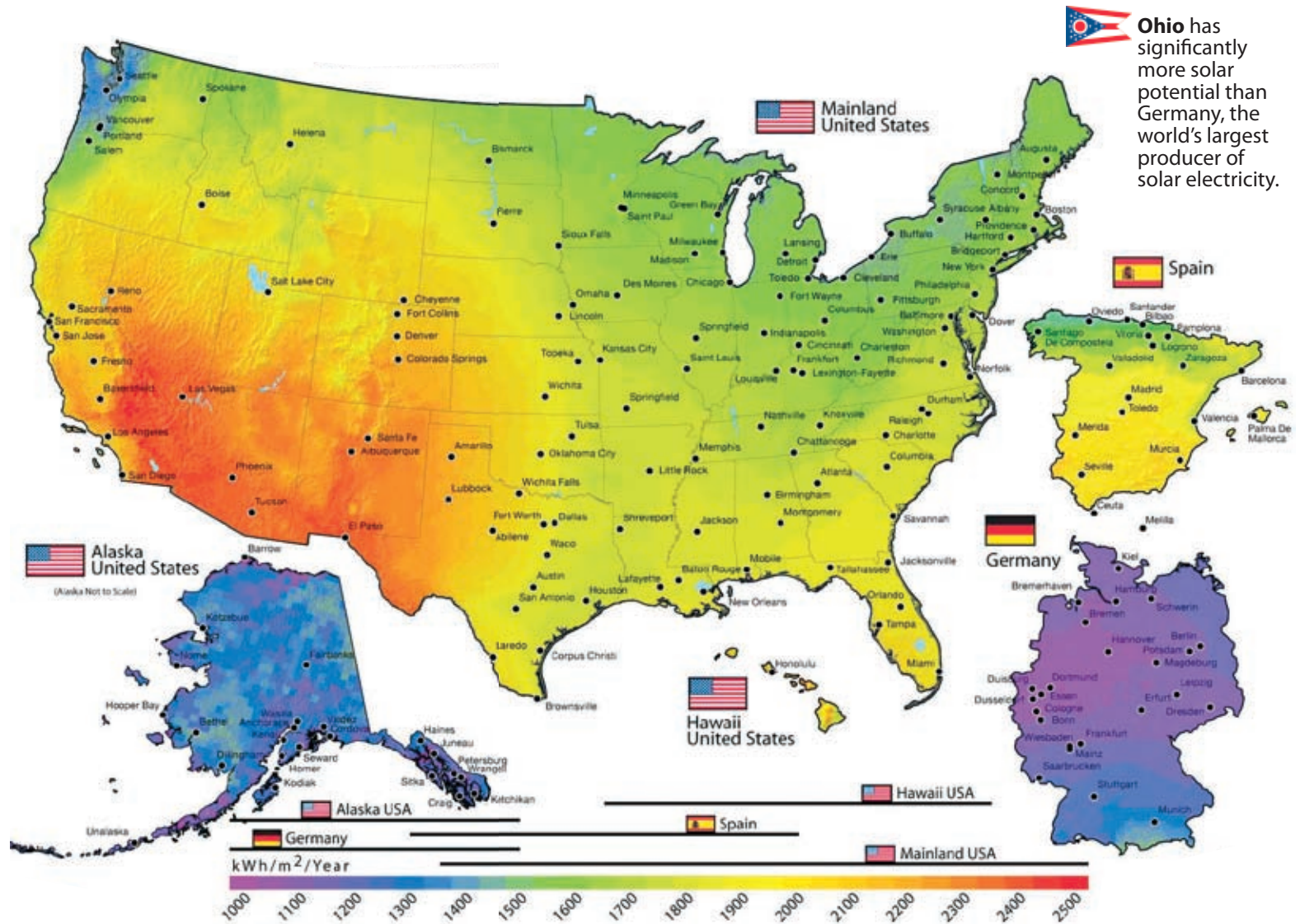



## Solar works in Ohio

Although many people think Ohio would not be an ideal place, the potential for solar energy use is promising. Ohio averages four to five peak sun hours daily. This accounts for the varying weather patterns that occur in Ohio throughout the year. With this level of sun energy, the state gets approximately 60 percent of the energy of Arizona and an estimated 40 percent more energy than Germany, which is one of the world's leaders in solar energy production.<sup>1</sup>

Even when there isn't full sun available, solar panels still generate electricity. Germany is a great example of this. The country is one of the cloudiest nations in the world yet it still produces 1 percent of its total electricity through solar energy. Germany has been able to achieve its more than 3,800 megawatts (MW)<sup>2</sup> of solar energy through a variety of commitments to subsidize solar installations to make them more affordable and encourage its population to embrace renewable energy. The German government also instituted a feed-in tariff which pays residents with solar modules a subsidized price for electricity.

# Photovoltaic Solar Resource: United States, Spain and Germany



 Ohio has significantly more solar potential than Germany, the world's largest producer of solar electricity.

**kWh/m<sup>2</sup>/Year = kilowatt-hours per square meter per year**

This map was produced by the National Renewable Energy Laboratory for the U.S. Department of Energy at [www.nrel.gov/gis](http://www.nrel.gov/gis)

<sup>1</sup> National Renewable Energy Laboratory, "Photovoltaic Solar Resource: United States – Spain – Germany" (2009).

<sup>2</sup> Energy Information Administration, "International Energy Statistics" <http://tonto.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm>.



## What are the benefits of utilizing solar energy?

The rising cost of energy, coupled with several financial incentives is making solar energy an attractive option for homeowners. Solar energy is a clean, renewable resource that does no harm to the environment. It helps reduce Ohio's dependence on fossil fuels for electricity. It may help you keep your electricity running during power outages. With a solar system installed on your home, you can offset the monthly electricity you do use. If you generate more electricity than you use, you can sell the excess power back to your electric utility. Solar energy systems also improve property values. National statistics show that property values increase by

\$20 for every \$1 of annual utility bill savings.<sup>3</sup> Additionally, a homeowner who uses solar energy can obtain renewable energy credits which can be sold to the utility or into the market. This will help offset the cost of installing solar energy on your property. To be able to sell the credits to an Ohio utility, your solar panels must be certified by the Public Utilities Commission of Ohio (PUCO).

## Are solar panels right for my home?

Before you commit to solar energy, there are a number of items you need to consider to determine if it is a feasible option.

1. **Shading** – Tree shading on your property can really affect the efficiency of a solar system. The solar cells in an

array work as a team. We have all heard the anecdote, “You’re only as strong as your weakest link.” That same principle applies to solar panels. Trees casting large shadows on your house will need a trim if a rooftop solar panel is going to be able to produce the amount of electricity it is capable of generating.

2. **Roof attributes** – The condition of a home’s roof is another big consideration before jumping ahead with a solar installation. The best place for a solar panel is on a roof that is facing south. The next best direction is to face the panels southwest. Unfortunately, the further away from due south the solar panels are positioned, the less efficient they become.

The pitch, age and condition of the roof also are important for maximum solar panel efficiency. A certified solar installer can help determine the optimum angle the panels should be installed for maximum solar collection. The age and condition of the roof are a bigger issue because it would not be an ideal situation to install solar panels onto an aged and worn roof. If a roof installation is not possible, a ground-mounted solar unit may be an alternative.

3. **Repayment period** – Upfront cost is a major factor when installing a solar panel system. Knowing how long it will take to pay it off might be a bigger factor. As the electricity you produce with a solar system offsets the amount needed from an electric company, the saved benefits will help pay down the costs of the solar panel. When researching solar systems and determining how much it will save you, it is important to know that solar systems at homes that use less electricity will have a longer pay back period than homes that use more.
4. **Energy use** – The amount of electricity used in your home can help you determine if solar is the best fit for your home. You should review your utility bills or contact your utility provider to determine the amount of electricity, in kilowatt-hours, you use over the course of a year. With this information, you can consult with a solar professional to determine the amount of electricity you would like to be powered from solar energy. You may not be able to offset your entire yearly kilowatt usage.
5. **Solar Installers** – To qualify for many of the state and federal incentives that help

with purchasing a solar system, it is important that a certified installer be used. The Ohio Department of Development (ODOD) keeps an updated list of certified installers in the state. These installers can help you to determine if solar is right for your home. The list of certified installers can be obtained by contacting the Ohio Energy Resources Division at (614) 466-6797 or online at [www.development.ohio.gov/Energy/Incentives/AdvancedEnergyFundGrants.htm](http://www.development.ohio.gov/Energy/Incentives/AdvancedEnergyFundGrants.htm)

### Taking full advantage of Ohio solar

The last thing you want to do is waste all the energy you have generated from solar panels by using inefficient appliances and lighting. It also is important to ensure your home is properly weatherized to take full advantage of solar energy. A comprehensive approach to improving efficiency is to have a home energy audit performed. A professional audit can cost from \$250 to \$400. The audit will search for areas in the home where energy efficiencies can be improved. This can range from adding insulation and air sealing windows and doors to testing appliances for inefficient use of electricity.

There are several investor-owned utilities that have developed programs that will pay for or deeply discount a home energy audit. Some programs also offer significant discounts for certain cost-effective improvements. Make sure to contact your electric and natural gas utilities to find out what type of energy efficiency programs are available to help you get the most out of solar energy. Contact information for Ohio's major utilities is provided at the end of this guide.

### Maintaining a solar panel system

Dirt, dust, leaves and snow are all culprits that could rob the potential solar energy output of your panels. It is essential solar panels are regularly cleaned so they can produce electricity at their rated output. A simple cleaning with a soft sponge, warm water and dishwashing liquid followed by drying with a cloth that will not scratch the panels will help keep them in prime operating condition for decades. Remember to carefully read all instructions about how to properly clean and care for your solar panels. Also, check with your installer to find out about programs that may be available to help maintain your solar system.

It also is important to remember that the inverter used to convert the direct current produced by solar panels into alternating

current that can be used in your home has a shorter lifespan than the solar panels. It is likely that the inverter will need to be replaced within 10 to 15 years of installing a solar system.

### Other important considerations of solar energy use

There are other items to consider when deciding to install a solar panel system. They include:

- ▶ **Time-of-use pricing** – These options set different prices during various periods of the day, month or year. Prices for electricity are typically cheaper during the morning and evening hours and most expensive in the middle of the day when demand for electricity is at its highest. Solar panels are generating the most electricity during this

time of the day. Consumers with solar panels may be able to take advantage of these pricing options by selling the electricity they do not use, typically in the middle of the day, for profit. These extra payments may be able to help reduce the time required to pay for a solar panel installation;

- ▶ **Storage batteries** – Batteries that store electricity you don't use all but eliminates the concerns about where to get electricity after the sun sets. Battery technology is relatively new so it is currently an expensive investment. As the technology evolves, it could be a smart and more financially feasible investment that will make you less dependent on traditional means of electricity.
- ▶ **Smart grid** – The smart grid will help deliver a variety of benefits for solar energy users as electric utilities begin to make upgrades to their aging infrastructure. It will allow you to respond to real-time prices and better manage, monitor and control energy use. As utilities update their electric grids, it will be easier for you to use solar and other renewable energy as well as make time-of-use pricing and storage batteries more accessible to residential consumers.





## How much does a solar panel system cost?

Costs for photovoltaic solar panel systems will vary in price based on size, manufacturer, installation, inverter and other miscellaneous costs. A typical residential system costs on average \$20,000 to \$35,000 installed. This price could fall significantly as production and competition in the solar energy industry increases and new technologies are developed. For an electric customer using 1,000 kilowatt-hours per month, a 4.5 kW solar system has the potential to reduce monthly bills by about 40 to 50 percent.

Because of the expense of solar panels, there have been several leasing, financing and incentive programs established to encourage more use of the sun's power. These programs are available at the federal, state and local levels as well as through third-party organizations.

## Federal Incentives

- ▶ **Investment tax credit** – This 30 percent tax credit is available to homeowners who install solar panels after Jan. 1, 2008 and before Dec. 31, 2016. There is no cap on the cost of the installed solar system. For a solar system to qualify, it must provide electricity for the home and meet applicable fire and electrical code requirements.

## Local Incentives

- ▶ **Solar financing program** – In the Ohio 2009-2010 biennium budget bill, a solar financing program, known as a Property Assessed Clean Energy (PACE) program, was included that allows the state's municipalities and townships to create special improvement districts to help property owners install and finance ground- and

roof-mounted solar panel systems. The municipality or township would petition interested homeowners to participate in the special improvement district. To pay for the solar project, participating homeowners would be charged an equal payment over the term of the loan on their property taxes up to 25 years. Homeowners would still be eligible for state and federal incentives. If a financing program is properly followed along with the guidelines of state and federal incentives, this could be a very affordable way to start using solar energy. (See Page 14 for a more detailed discussion on PACE programs).

- ▶ **Residential renewable energy credit (REC) programs** – At the time of publication, Ohio's electric utilities, in collaboration with the Ohio Consumers' Counsel (OCC), were negotiating renewable energy credit programs to help them meet the state's new requirements for renewable energy. The program designs vary but can pay residents a fair market price for each REC generated through customer-sited renewable energy or provide an upfront rebate amount

in exchange for future RECs produced. Renewable energy credits represent the social and environmental attributes associated with producing one megawatt-hour of electricity through renewable energy sources. The OCC came to an agreement with FirstEnergy and Duke Energy Ohio to develop a REC program that was approved by the PUCO and is now available for its customers to use. American Electric Power and Dayton Power & Light were both working to create versions of a REC purchase program. You also can talk to your solar installer to learn more about other opportunities to sell your RECs, such as to private brokers or solar installers.

- **FirstEnergy**  
The program offered by FirstEnergy allows customers who have renewable energy on their residential property to sell the RECs created for a market price. The program is available for new enrollments through May 2011. The renewable energy must be certified by the PUCO before it is eligible for REC payments. FirstEnergy will pay for RECs for 15 years.

For each megawatt of electricity created by solar panels, FirstEnergy will pay a market price determined through a competitive bid process that will help it meet its renewable energy requirements. If FirstEnergy does not receive any bids for the RECs, the utility will pay 80 percent of the alternative energy compliance payment established in Ohio's electric energy law. Contact FirstEnergy for an application.

► **Net metering** – Ohio law allows customers who utilize renewable energy to connect to the electrical grid to feed the electricity produced from their systems to the utility. Only the net electricity used by the customer over the billing period is charged and there may be times when the system produces more electricity than used, resulting in a credit for the generation portion of the excess electricity. *(See Page 23 for a more detailed explanation of net metering).*



► **Duke Energy Ohio** – Residential customers who have PUCO-certified renewable energy will be able to sell each REC they produce for 15 years to Duke Energy for \$300 in the first year and at a market price for every subsequent year if they sign a contract in 2010. Customers signing a contract after 2010 can sell their RECs to Duke at the current market price for a total of 15 years. Customers will be able to enter into REC purchase agreements with Duke Energy through Dec. 31, 2012. Contact Duke Energy for an application.



### Other financing options

Discounted financing of a solar system is available from the Treasurer of State's Energy Conservation for Ohioans (ECO-Link) program.<sup>4</sup> Eligible applicants receive 3 percent off a bank loan for five years. The program is offered to Ohioans who own their home and receive approval for a qualifying loan through a participating bank. The loan must be used to install solar energy by a certified contractor. A list of participating banks and certified contractors is available by the ECO-Link's website at <http://ecolink.ohio.gov> or by calling 1-800-228-1102. The discounted financing program also is available for other renewable and energy efficient projects.

Another option available to get solar power started at your home is to lease solar panels. There are several companies that offer leasing programs or lease-to-own arrangements throughout the United States. These companies, such as SunRun and Solar City, are able to lease solar panels to homeowners with minimal to zero-down payments. Once installed, homeowners who lease solar panels only reap the rewards of solar-generated electricity without having to deal with maintenance issues. However, because the Ohio solar market is still in its infancy no companies have committed their leasing business to residential customers.

The wholesale purchase of solar panels could be an option if there are enough people in a community interested in solar energy. Organizations such as One Block Off the Grid, a community organization in Oregon, organize large groups of people to get discounts on solar panels that are then passed on to each member in the group. This could be done with the help of government PACE programs or without. For more information on the One Block Off the Grid group purchasing, visit [www.1bog.org](http://www.1bog.org).

## **In Depth: Property Assessed Clean Energy programs<sup>5</sup> Financing solar energy through property assessments**

Designed to help finance homeowners install solar photovoltaic and solar thermal systems, the PACE program allows Ohio's municipalities and townships to create special improvement districts. These districts have the authority to secure loans or bonds to help participating homeowners pay all of the upfront costs to utilize solar energy.



Homeowners who install solar panels through a PACE program will pay for the improvement through property taxes over several years. The assessment can be levied on the property for up to 25 years making it easier to afford the investment.

With solar panels financed through a PACE program, the system and the tax liability for them remains with the property. The person responsible for paying for the solar panels is the owner of the property – current or successor.

### **How does the program work?**

1. The municipality or township announces its intent to make the solar energy program available or a group of homeowners can petition their leaders to create the program.
2. Property owners who want to participate must sign a petition indicating their intention to install a solar energy system.
3. The petition must contain an initial plan that outlines the solar energy projects of the participating property owners. The municipality or township may create a list of solar manufacturers and installers from which participants would choose.

4. The petition acts as a request for funds to pay for the solar projects. An assessment amount is determined by the local government that would be added to the participants' property tax responsibilities.
5. The local government must approve, by ordinance or resolution, the petition submitted and the tax levy amount.
6. A board of directors is created to carry out the program. The municipality or township may be involved in selecting solar providers and installers and collecting the tax assessment.

The City of Athens, for example, is in the process of creating a solar energy improvement district. The city sought the creation of the district after being approached by local residents who were interested in ways to finance solar energy affordably and utilize more mainstream ways to produce electricity. After researching several ways to make this possible, Athens became the driving force to create solar energy improvement districts in Ohio. It was successful in doing so when House Bill 1 in the 128th General Assembly was passed in 2009.

By developing a solar energy improvement district, Ohio cities and townships will be able to help

<sup>5</sup> "Property Assessed Clean Energy (PACE) Policy Framework Developed to Assist Local Governments Implement PACE Financing Programs," Bricker & Eckler, LLP, [www.bricker.com/publications/articles/1615.asp](http://www.bricker.com/publications/articles/1615.asp).

residents overcome obstacles such as high upfront costs; and because the payback responsibility stays with the home, the issue of who pays for the panels if another person buys the home is already decided.

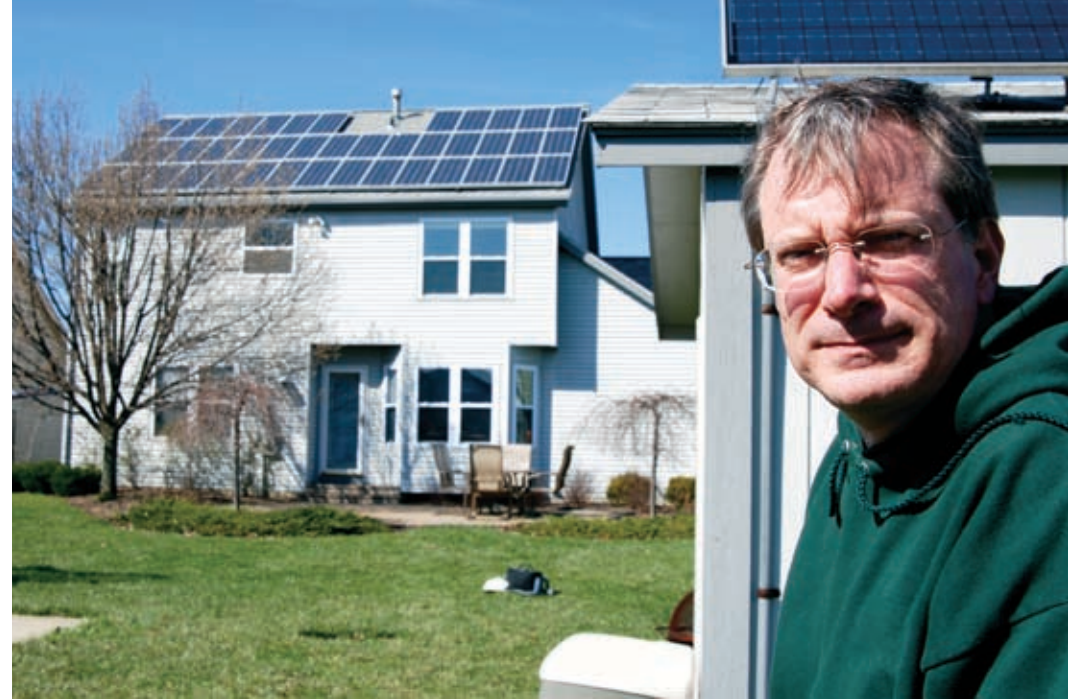
Local governments, such as Athens, also are able to offer this financing option for other renewable energy and efficiency projects beyond solar panels after a bill was signed into law in June 2010. The bill expands PACE projects to wind energy, geothermal energy, biomass energy, gasification and energy efficiency projects.

If you are looking to install solar energy on your property, the City of Athens recommends carefully considering the following before moving ahead with the investment through a solar energy improvement district or other financing option:

- ▶ How long do you plan on staying at your property;
- ▶ What is the most appropriate size solar panel for your home;
- ▶ How is your personal credit rating in terms of obtaining financing; and
- ▶ What will be the interest rate on any financing you obtain to pay for the solar panels?

Remember, not one size fits all for solar panels or financing options. A solar energy district may not be the best financing option for you. It is important for you to consider all of your options before deciding the best way to pay for your solar panels.

*NOTE: The Federal Housing Financing Agency (FHFA), Fanny Mae and Freddy Mac challenged PACE programs because of the way home loans are structured. If a homeowner defaults on his or her mortgage, outstanding property taxes are paid first, then the lender. PACE programs are paid through property taxes. Fanny Mae and Freddy Mac, which are regulated by the FHFA, own 53 percent of all U.S. mortgages and do not want to risk any more losses. The two mortgage lenders have said they would refuse loans associated with PACE programs. The issue was still outstanding at the time of publication.*



### How much will a solar panel system save me?

The amount a solar panel will save you depends on a number of factors. Because solar energy is an intermittent power source, it can only produce electricity during daylight hours. The electricity produced is also affected by weather patterns and the angle of the sunlight. The price you currently pay for electricity per kilowatt-hour also affects the amount of savings you will see from a solar panel. Time-of-use pricing, smart grid upgrades and more options to store solar energy as battery technology evolves could make solar panels more profitable and help pay back the cost sooner.

Based on current electric rates (as of January 2010) and the average yearly electricity use of 10,200 kilowatt-hours, consumers in Ohio might expect to save about 33 percent off their electricity bill if they install a three kW solar system on their homes. With a lifespan of about two to three decades, solar panels can produce significant savings year after year.

In Columbus, a solar system has the potential to produce more than 3,300 kilowatt-hours (kWh) per year. With electric rates averaging 12 cents per kWh, a solar system can save about \$402 per year. If electric rates increase, the potential savings a solar system can achieve also will increase. This will, in turn, help pay off your solar system quicker.

Selling your RECs to Ohio's electric utilities or a REC broker also will save you money and contribute to a shorter payback as illustrated in the example below:



## Solar System Simple Payback - Example

*Disclaimer: This example is for illustrative purposes only. Assumptions are subject to change*

### Assumptions - Average Customer

<b>Size of System (kW)</b>	3
Installation cost (per peak kW)	\$7,000
Installation cost (Total)	\$21,000

### Discounts

ODOD grant payment (\$3,000 per peak kW)	\$9,000
Federal tax incentive (30 percent credit) <sup>1,2</sup>	\$3,600
Total discounts	\$12,600

**Total Out-of-Pocket Cost for Customer (prior to REC Payment)** \$8,400

### Plan to Finance Your Project?

Discounted interest rate with Ohio Treasurer of State	
ECO-Link 3 percent buy down	0.05
Interest charges on 5-year, \$8,400 loan	\$1,111
Total cost	\$9,511

**Simple Payback (Years)** 23.7

There are several incentives consumers can take advantage of to help reduce the payback time of a solar panel installation. Once the solar system begins generating electricity, consumers will start saving on electric costs. Other options to help reduce the payback time include selling the renewable energy credits created by using solar energy and signing up for a time-of-use rate provided by a local utility. Follow the rest of the example to get an idea of just how quickly a solar installation could be paid.

### Solar Panel Savings

Total annual energy use (kWh)	10,200
Average annual energy savings from solar (kWh) <sup>3</sup>	3,347
Average residential rate (per kWh) <sup>4</sup>	\$ 0.13
Average annual energy savings from solar	\$435.11

### Sample REC Payment<sup>5</sup>

Average annual RECs produced (MWh)	3.4
Average per REC payment 15 years	\$200
Present value of 15-year total	\$7,058

**Discounted Payback with REC Payment (Years)** 6.1

Optional time-of-use rate <sup>6</sup>	
Rate per kWh	\$0.19

**Discounted Payback with REC Payment & Time-of-Use Pricing (Years)** 3.8

<sup>1</sup> Federal tax incentives are applied after all other eligible discounts, grants, etc. are applied.

<sup>2</sup> Assumes the residential customer will have a sufficient tax liability.

<sup>3</sup> PVWatts Estimator Southeast Ohio

<sup>4</sup> PUCO Utility Rate Survey – June 2010

<sup>5</sup> There are a number of ways an electric utility can pay customers for RECs. Please check with your electric utility to verify how you would be paid for the electricity produced by your solar panels. Not all utilities offer REC payment agreements at this time.

<sup>6</sup> Time-of-use rate example is an offer from Duke Energy Ohio. Check with your local electric utility for availability of similar rates.

Below are regional differences in what Ohioans can expect a solar installation to produce. Keep in mind that these are averages and that year-to-year differences in weather patterns, sunlight angle, orientation of the solar panels and quality of the components and installation may increase or decrease solar panel output.

Estimated Annual Output (kWh per year)				
Location <sup>7</sup>	Size of solar panel			
	1kW	2kW	3kW	4kW
Central	1,124	2,249	3,373	4,497
Northeast	1,123	2,245	3,368	4,490
Northwest	1,213	2,426	3,639	4,852
Southeast	1,116	2,231	3,347	4,462
Southwest	1,208	2,416	3,624	4,832

Source: National Renewable Energy Laboratory: PV Watts Calculator v.2

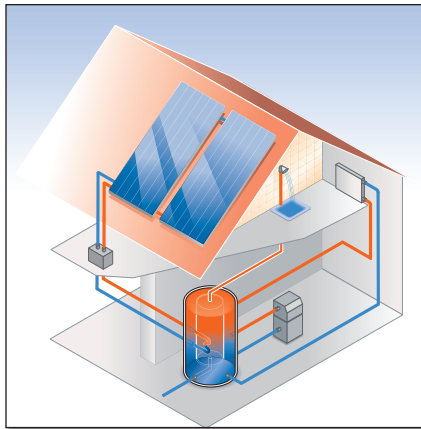
<sup>7</sup> To get a more precise performance estimate for the region of Ohio you live in, consult the PVWatts calculator created by National Renewable Energy Laboratory at [www.nrel.gov/rredc/pvwatts](http://www.nrel.gov/rredc/pvwatts).

## Solar electricity is too expensive for my budget. Are there any other solar options available for me?

Yes. A less expensive route to take advantage of the sun's energy is with a solar thermal system. These systems harness the energy of the sun to heat water for household use, swimming pools and heating.

As the third most expensive source of energy use behind space heating and air-conditioning, heating water can account for up to 25 percent of your monthly energy costs when heated with electricity or natural gas, according to the U.S. Department of Energy.<sup>6</sup> With a solar thermal system, the costs of fuel no longer become a factor when using hot water.

Solar thermal systems are able to heat water in a variety of ways, but the most common includes a well-insulated water tank and an array of solar panels on the roof. A nontoxic antifreeze fluid is circulated through the panels and is warmed by the sun. The fluid then travels through insulated piping to a heat exchanger in the water tank which heats the water.



This cycle continues to keep hot water available for use.

It should be noted that a backup system may be needed to provide hot water on cloudy days. Possibilities to keep hot water available on overcast days are an electric or natural gas element integrated into the water tank or a separate on-demand water heater which heats water only when needed.

These solar thermal systems are a fraction of the cost of solar electric systems. Costs range from about \$2,000 to \$10,000 and can be significantly reduced through state<sup>7</sup> and federal incentives.<sup>8</sup> Green Energy Ohio also offers a rebate for solar water heating systems for which consumers can apply.

### Green Energy Ohio Solar Thermal Rebate Incentive

Up to \$2,400 may be combined with other state and federal incentives. To apply, contact an eligible installer who can determine the best system for your home and help in submitting an application for the rebate. For more information, contact: **Green Energy Ohio, (614) 985-6131, [www.greenenergyohio.org](http://www.greenenergyohio.org)**

## Ohio laws and regulations regarding solar energy use

Solar energy has been making considerable gains in the United States over the past 10 years. With the growing interest in renewable energy, it is predicted that the United States will surpass Germany as the leading user of solar energy. In Ohio, the progress has been slower but with the signing of Ohio's electric energy law in May 2008, solar and other renewable energy technologies will become a bigger part of the electricity generated in the state.

<sup>7</sup> The Ohio Department of Development's (ODOD) Ohio Energy Resources Division is offering grants on a first-come, first-served basis for the installation of solar thermal technologies for new construction and retrofits of multi-family housing and single-family developments of 10 units or more in Ohio. To qualify, the project must be served by the following investor-owned utilities: American Electric Power, Dayton Power & Light, Duke Energy Ohio and FirstEnergy. The incentive is \$30 per kBtu/day or 50 percent of the system, whichever is lower.

<sup>8</sup> The federal tax incentive that helps lower the cost of a solar thermal system 30 percent is available through Dec. 31, 2016. The incentive is \$30 per kBtu/day or 50 percent of the system, whichever is lower.

The advanced energy portfolio standard requires 12.5 percent of new electric generation come from renewable energy. Included in this standard is a 0.5 percent reservation for the development of solar energy. The law requires that all investor-owned electric utilities meet this standard by the year 2025, with annual benchmark requirements.

Ohio's electric utilities have started to develop plans about how to meet this requirement. One way has been to help make it more affordable for residential customers



who wish to install solar energy or other forms of renewable energy on their properties.

There are several things you must know before you are ready to install your solar panels. These include local permits, interconnection and net metering agreements with your local electric utility and renewable energy credits. Your solar installer can help with the requirements needed to use solar panels.

### What is an interconnection agreement?

Interconnection is the physical connection of a consumer's electric generation to the local utility's distribution lines. An interconnection agreement is required for a customer to receive the benefits of net metering. Interconnection allows the electric utility to provide any extra electricity or back-up power that the panels do not provide. The agreement also assures that safety protocols are adhered to for the safety of utility linemen.

Interconnection processing fees for small residential projects vary from utility to utility:

- ▶ **Duke Energy Ohio:** No charge for most residential systems;
- ▶ **Dayton Power & Light:** \$95 is the average cost;
- ▶ **Columbus Southern Power:** \$50 to \$80 is the typical range;
- ▶ **Ohio Power:** \$50 to \$80 is the typical range;
- ▶ **Cleveland Electric Illuminating:** Application fee is based on actual costs per one-tenth of an hour of time spent on the simplified review;
- ▶ **Ohio Edison:** Application fee is based on actual costs per one-tenth of an hour of time spent on the simplified review; and
- ▶ **Toledo Edison:** Application fee is based on actual costs per one-tenth of an hour of time spent on the simplified review.

Make sure to check with your local utility for the technical standards required to execute an interconnection agreement.

### What is a net metering agreement?

Net metering is a program offered by a utility company for customers who use renewable energy systems to generate their own electricity. Under a net metering agreement, any excess energy generated by the customer during a monthly billing cycle would be sold to the utility company and credited to the customer. To utilize net metering, the customer's generation must be interconnected to the utility grid with a meter that can register the amount of electric energy that is used and produced during the billing cycle.

Any customer living in a region served by American Electric Power, Dayton Power & Light, Duke Energy Ohio or FirstEnergy has the opportunity to enter into a net metering agreement. Certified retail electric providers also may offer net metering contracts to their customers but are not required to do so.

Net metering requires a meter that can register the flow of electricity in both directions. Electricity used from the utility makes the meter rotate forward and electricity generated from solar panels makes

the meter turn backward. At the end of the billing cycle, the meter is read and only the net electricity used from the utility is billed to the customer. This results in lower bills. Any credits created from producing excess electricity will be applied to the next billing cycle. If after 12 months a credit still remains, a refund is issued to the customer. This can help offset the cost of your solar system, reducing the total payback period.

### What are renewable energy credits?

RECs represent the social and environmental attributes associated with producing one megawatt-hour of electricity through renewable energy sources. A market has been established for these credits. Utilities or other entities may be willing to purchase them because the electricity is produced without releasing any emissions, pollution or other negative elements associated with traditional electric generation.

For a utility in Ohio to purchase the credits, a solar system must be certified by the PUCO. Detailed instructions about how to become certified as a renewable generating facility in Ohio are on the PUCO's website at [www.puco.ohio.gov/PUCO/Forms/Form.cfm?id=9464](http://www.puco.ohio.gov/PUCO/Forms/Form.cfm?id=9464). An installer may be able to help you with this as well.



## RESOURCES

---

### Ohio Consumers' Counsel

10 W. Broad St., Ste. 1800  
Columbus, Ohio 43215  
(877) 742-5622  
[www.pickocc.org](http://www.pickocc.org)

### Department of Development – Ohio Energy Resources Division

77 S. High St.  
P.O. Box 1001  
Columbus, Ohio 43216  
(866) 728-6749  
[http://development.ohio.gov/  
Energy](http://development.ohio.gov/Energy)

### Public Utilities

**Commission of Ohio**  
180 E. Broad St.  
Columbus, Ohio 43215  
(800) 686-7826  
[www.puco.ohio.gov](http://www.puco.ohio.gov)

### Ohio Treasurer of State - Department of Economic Development

30 E. Broad St.  
Columbus, Ohio 43215  
(800) 228-1102  
<http://ecolink.ohio.gov>

### National Renewable Energy Laboratory

1617 Cole Blvd.  
Golden, CO 80401  
(303) 275-3000  
[www.nrel.gov](http://www.nrel.gov)

### Green Energy Ohio

7870 Olentangy River Road, Ste. 209  
Columbus, Ohio 43235  
(614) 985-6131  
[www.greenenergyohio.org](http://www.greenenergyohio.org)

### Solar Energy Industries Association – Great Lakes Renewable Energy Association

257 S. Bridge St.  
P.O. Box 346  
Dimondale, MI 48821  
(800) 434-9788  
[www.glrea.org](http://www.glrea.org)  
[www.seia.org](http://www.seia.org)

### U.S. EPA

**ENERGY STAR Hotline (6202J)**  
1200 Pennsylvania Ave. NW  
Washington, D.C. 20460  
(888) 782-7937  
[www.energystar.gov](http://www.energystar.gov)

### U.S. Department of Energy – DSIRE

[www.dsireusa.org](http://www.dsireusa.org)

### Tax Incentives Assistance Project

Email: [tiap@aceee.org](mailto:tiap@aceee.org)  
<http://energytaxincentives.org>

## UTILITIES

---

### Electric utilities

**American Electric Power**  
(800) 277-2177  
[www.aepohio.com](http://www.aepohio.com)

### FirstEnergy Corp.

The Cleveland Electric  
Illuminating Co.  
(800) 589-3101  
Ohio Edison Co.  
(800) 633-4766  
The Toledo Edison Co.  
(800) 447-3333  
[www.firstenergycorp.com](http://www.firstenergycorp.com)

### Dayton Power & Light

(800) 433-8500  
[www.dpandl.com](http://www.dpandl.com)

### Duke Energy Ohio

(800) 544-6900  
[www.duke-energy.com/ohio.asp](http://www.duke-energy.com/ohio.asp)

### American Municipal Power – Ohio

(614) 540-1111  
[www.amppartners.org](http://www.amppartners.org)

### Buckeye Power

(614) 846-5757  
[www.buckeyepower.com](http://www.buckeyepower.com)

### Natural Gas utilities

**Columbia Gas of Ohio**  
(800) 344-4077  
[www.columbiagasohio.com](http://www.columbiagasohio.com)

### Dominion East Ohio

(800) 362-7557  
[www.dom.com](http://www.dom.com)

### Duke Energy Ohio

(800) 544-6900  
[www.duke-energy.com/ohio.asp](http://www.duke-energy.com/ohio.asp)

### Vectren Energy Delivery of Ohio

(800) 227-1376  
[www.vectren.com](http://www.vectren.com)



**NOTES**

---

---

Photo Credits:

Bill Ferriot: pg. 3

Green Energy Ohio: pg. 6

Paul E. Kostyu: pgs. Front Cover, 9, 17, 21

## About OCC

The Office of the Ohio Consumers' Counsel (OCC) the residential utility consumer advocate, represents the interests of 4.5 million households in proceedings before state and federal regulators and in the courts.

The state agency also educates consumers about electric, natural gas, telephone and water issues and resolves complaints from individuals.

To receive utility information, brochures, schedule a presentation or file a utility complaint, residential consumers may call 1-877-PICKOCC (1-877-742-5622) toll free in Ohio or visit the OCC website at [www.pickocc.org](http://www.pickocc.org).



### **Office of the Ohio Consumers' Counsel**

10 W. Broad St., Suite. 1800  
Columbus, OH 43215-3485  
1-877-PICKOCC toll free  
[www.pickocc.org](http://www.pickocc.org)

The Office of the Ohio Consumers' Counsel is an equal opportunity employer and provider of services.