

## SOLAR BUYERS GUIDE

If you are thinking about using solar energy this solar buyers guide can be useful. Guide is step by step and easy to follow.

There are different reasons people decide to go into solar solutions: increase their home or business value, save money reducing electricity bill, help preserve the Earth's finite fossil-fuel resources, reduce air pollution, secure energy independence, give a little piece to save the planet... Whatever is your reason – you are on right way, because sun energy is our future! You will use free, clean and unlimited energy source! Start investments will get back sooner that you expect, and you and your family will continue using free energy for a long time after that.

You can use solar energy to produce your own electricity or heat water, pool, space... Technology for producing electricity and heating water are different and according to your wishes there are three sections of solar buyers guide. Sections 3 guide you to other solar products on the market.

US

<http://www.altestore.com>

<http://www.gogreensolar.com>

UK

<http://www.sunshinesolar.co.uk>

<http://www.sharp.co.uk>

1. Solar buyers guide for solar PV system
2. Solar buyers guide for solar heating water
3. Other solar products

### SECTION 1 – SOLAR PV SYSTEM

You can decide to buy PV solar system to produce your own electricity for you home or business use (if your PV system produce more power that you need, excess goes to the utility grid and the meter runs backward). This guide isn't a technical guide to designing and installing a PV system. You'll need to consult an experienced PV provider. A solar system is a substantial but rewarding investment. It can reduce your monthly electricity bill while helping to protect our environment. Being informed and planning carefully will ensure that you've chosen the right system for you and your family.



#### Step 1 – discover your today's home/business electricity bill, research how to make your home/business energy-efficient, reduce energy needs and determine future PV system's size in kilowatts (kW)...

Look at your last electricity bill and see how much you pay for it. PV works best in an energy-efficient building. So, adding insulation, energy-efficient lighting, appliances, and use passive solar energy is a good idea to reduce your home's overall electricity use before purchase and install a PV system. This is very simply – less electricity needs – less solar energy you need – less money you will spend for PV system. Make your home energy-efficient is very important even you do not use or intend to use renewable energy. That is simply natural need to act environment responsible.

After that determine the system's size in kilowatts (kW), a reasonable range is from 1 to 5 kW. Based on your geographic location, contact PV provider and ask about their product efficiency, you area irradiance (measure of the sun's power available at the surface of the earth and it peaks about 1000 watts per square meter).

To begin, consider what portion of your current electricity needs you would like your solar system to meet. Would you like to produce 50% of your needs or even more? Consider battery system to provide energy storage. You can discuss your electricity bills, home position potential, government financial support program, PV system efficiency...with your solar power provider and make decision. Whatever you decide with installing PV system you will increase your home/business value and give a piece to save the planet and future.

#### Step 2 – is your home/business a good place for a PV system, can you locate your system to work well, is your free site shading by trees...what is your roof condition, or maybe you planning to build new home?...

System location

Well designed system needs clear access to the sun's rays. Look yourself around your home and estimate if it is possible. If the location promising, PV provider can determine whether your home/business can effectively use a solar photovoltaic system. South facing system is mostly best solution, but east and west may be also acceptable. Flat roofs work well for PV systems, because PV panels can be mounted flat on the roof facing the sky. PV modules can be mounted also bolted on frames tilted toward the south at an optimal angle. They can also be attached directly to the roof as PV shingles. PV system can be also placed on the ground if possible. Provider and installer can mount PV tracer for following the sun during the day. Good idea is maybe to use solar panels to mount them to create covered parking or that provide shade as window awnings. Ensure that you location secure clear and unobstructed view of the sun for most all of the day (chimney, big buildings, trees...). To be eligible for some rebates, your system must be un-shaded between certain hours during certain times of the year. Your provider can help you to decide what solution is best for your case.

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Available space for system

The amount of space for PV system can vary from 50 to 1000 square feet depending on size of photovoltaic system. Commercial systems can be even bigger. Greater efficiency PV modules means that you need less space on your roof/ground to install system. PV efficiency and space for installing discuss with your potential PV provider.

Kind of roof and its condition

Some types of roofs are simpler and cheaper to work with, but a PV system can be installed on any type. PV installers know about that problems and ask your installer do they have experience with solving that problems and ask how the PV system affects your roof warranty. If you plan to build new home, ask for PV systems that can replace classic roof cover. In that case PV system can reduce your classic roof price.

### Step 3 – how much does a PV system save and cost...

There is no simply answer to that question, but in long term you will be 100% winner. To make PV systems even more affordable, several states offer financial incentives through solar rebates and other programs. Some utilities have net metering programs, which further enhance the economics of PV. Net metering means that when your PV system generates more power than you need, the excess goes to the utility grid and the meter runs backward. This allows you to receive full retail value for the power that your PV system generates.

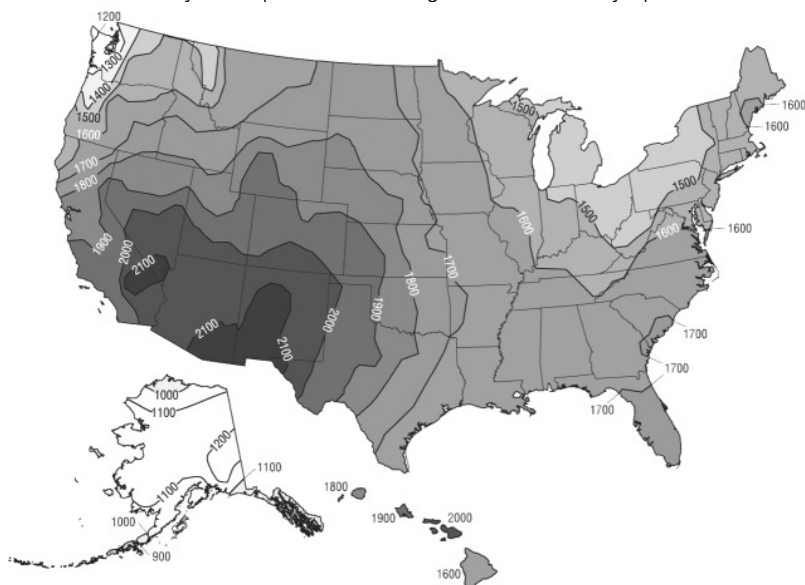
Solar rebates and government incentives reduce the cost of solar systems. The size of your system determine price for PV system. Those prices depend of numerous of factors: manufacturer, retailer, installer, PV efficiency, place of mounting panels, batteries, net metering...Low is - small PV systems cost more dollars per watt then bigger PV system. Prices go down fast and best way to inform about them is to visit PV provider's web site.

How much dollars you will save depends of many factors: is electricity expensive in your area, is there a lot of sun during year, what amount of your electricity needs you intend to replace with solar energy? If your utility offers net metering, you and your utility will pay the same price for each other's electricity. Discuss these issues with your potential PV provider and request a written estimate of the average annual energy production from the PV system and price for that system. Search for more offers and compare them.

Cost of electricity constantly go up, cost of solar systems constantly go down and governments constantly increase financial support for using renewable energy. So decision is easy.

For example, a 2-kW, at a average US residential energy rate 2009. of \$0.12/kWh will save about \$456 per year:

1,900 kWh/kW-year x \$0.12/kWh x 2 kW = \$456/year. [http://www.eia.doe.gov/cneaf/electricity/epm/table5\\_6\\_a.html](http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_a.html)



Note: The uncertainty of the contoured values is generally  $\pm 10\%$ . In mountainous and other areas of complex terrain, the uncertainty may be higher.

### Step 4 – who sell and install PV system. Is that company brand name, reputable, how many years of experience, license...

Many of solar providers are solar water heating companies and might not be experienced in photovoltaic design or installation. You have to decide would you like PV system to be grid connected or grid independent – stand alone. Most of providers will offer selling and installing stand alone systems and that is valuable. Very important is how many years they have experience in solar PV technology. Also you should check possession of a solar contactor specialty license, certification in PV system, a letter from the PV system manufacturer stating that the installer has the experience and training needed to install the system properly. It is always better to ask for more providers from your area and compare they offers. Those bids should be on the same basics and clearly state the maximum generating capacity of the system. It is not always the lowest price best solution. Company that plan to stay in business must charge enough for their products and services to cover their costs, plus a fair profit margin. And, on the end you must use your human brain judgment.

Brows these specialized internet sites that can help you with choosing and configuring your PV system...That sites have very god learning sections and offline help by phone and can give you advice and sell you best solar system for your needs.

US

<http://www.altestore.com>

<http://www.gogreensolar.com>

UK

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<http://www.sharp.co.uk>

### Step 5 – how can you finance the cost... financing solar panels

When you decide to financing the cost of purchasing and installing your PV system, there are some special programs particular to financing solar and other renewable energy investments. First and best way is financing your solar system by mortgage loan. Advantages of this solution are long terms and lower interest rates. Also, the interest paid on a mortgage loan is generally deductible on your federal taxes. If you build new home you can add solar energy system cost to your mortgage and you will avoid additional loan applications and fees.

If mortgage financing is not possible, look for other sources of financing. One of solutions is conventional bank loan. Seek for best solution on your area according to interest rate, fees...

For financing your solar PV system is very important to discover financial government support possibilities. You can save up to 30% of your PV system costs. Ask your potential providers about these possibilities and conditions for using that source.

### Step 6 – before you put solar heating to work

If you live where a homeowners association must approve a solar electric system, you or your PV provider may need to submit your plans. You'll need approval before you begin installing your PV system. Some state laws stipulate that you have the right to install a solar electric system on your home. You will probably need to obtain permits from your city or county building department. These include a building permit, an electrical permit, or both. Your PV provider will take care of this, rolling the price of the permits into the overall system price. Make sure the permitting costs and responsibilities are addressed at the start with your PV provider before installation begins.

For grid-connected PV systems your electric utility will require that you enter into an interconnection agreement. These agreements set forth the minimum insurance requirements to keep in force.

Connecting your PV system to the utility grid will require an interconnection agreement and a purchase and sale agreement. Federal law and some state public utility commission regulations require utilities to supply you with an interconnection agreement. Some utilities have developed simplified, standardized interconnection agreements for small-scale PV systems. The interconnection agreement specifies the terms and conditions under which your system will be connected to the utility grid. These include your obligation to obtain permits and insurance, maintain the system in good working order, and operate it safely. The purchase and sale agreement specifies the metering arrangements, the payment for any excess generation, and any other related issues. The language in these contracts should be simple, straightforward, and easy to understand.

Some utilities offer customers with PV systems the option to net meter the excess power generated by the PV system. This means that when the PV system generates more power than the household can use, the utility pays the full retail price for this power in an even swap as the electric meter spins backward, and your PV power goes into the grid. Net metering allows eligible customers with PV systems to connect to the grid with their existing single meter. Almost all standard utility meters can measure the flow of energy in either direction. The meter spins *forward*

*backward*

“signed off” by the local permitting agency (usually a building or electrical inspector)

and most likely by the electric utility with which you entered into an interconnection agreement. Inspectors may require your PV provider to make corrections.

Warranties are key to ensuring that your PV system will be repaired if something should malfunction during the warranty period. PV systems eligible for some solar rebate programs must carry a full two-year warranty, in addition to any manufacturers' warranties on specific components. This warranty should cover all parts and labor, including the cost of removing any defective component, shipping it to the manufacturer, and reinstalling the component after it is repaired or replaced. The rebate program's two-year warranty requirement supersedes any other warranty limitations. Be sure you know who is responsible for honoring the various warranties associated with your system—the installer, the dealer, or the manufacturer. The vendor should disclose the warranty responsibility of each party. Know the financial arrangements, such as contractor's bonds, that ensure the warranty will be honored. Find out whom to contact if there is a problem. Under some solar rebate programs, vendors must provide documentation on system and component warranty coverage and claims procedures. To avoid any later misunderstandings, be sure to read the warranty carefully and review the terms and conditions with your retailer/vendor.

### Step 7 – photovoltaic getting help...

Energy efficiency and clean renewable resources will mean stronger future for our planet and many states support using that energy source. Look at these sites for more information about photovoltaic systems. Check sites for your state energy office. The office might offer technical support and general information to resident/business energy consumers on renewable energy applications and resources. Many of these sites have a state chapter of the national organization. It is always a good idea to find specific information for your state and ask for help for more information. They also have excellent phone offline help.

Official government help

NASEO – National Association of State Energy Officials – [www.naseo.org/members/states.htm](http://www.naseo.org/members/states.htm)

NARUC – National Association of Regulatory and Utility Commissioners – [www.naruc.org](http://www.naruc.org)

SEIA – Solar Energy Industries Association – [www.seia.org](http://www.seia.org)

DSIRE – Database of State Incentives for Renewable Energy – [www.dsireusa.org](http://www.dsireusa.org)

Solar Energy Technologies Program – [www.eere.energy.gov/solar](http://www.eere.energy.gov/solar)

National Center for Photovoltaics – [www.nrel.gov/ncpv](http://www.nrel.gov/ncpv)

You also can ask for help these providers. They have enough solar experience and can provide useful information

Resellers online and offline help

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UK

<http://www.sunshinesolar.co.uk>

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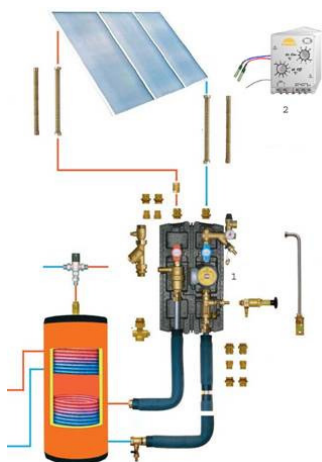
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**Or maybe you are simply DIY MAN (Do It Yourself)**

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## SECTION 2 – SOLAR HEATING WATER

You can decide to buy thermal solar system for water heating... Learn more about how the sun can help meet your home's water heating needs. Today's solar heating systems can warm your home's water and interior space or swimming pool. Their popularity is increasing, for many reasons. Solar heating systems are adaptable, reliable, and pollution-free because they use free energy from the sun. Solar heating systems work well in many different climates. Some applications, such as pool heating, are widely cost-effective today. The cost-effectiveness of other applications depends on different circumstances, such as the type and cost of your usual source of energy. Today, special financing is available to help you purchase the system that's right for your home. If you'd like to find out more about solar heating for your home or pool, this buyer's guide is a good place to start. Here, you'll learn how solar water heating systems work, their benefits, how they're used, and how to purchase one yourself. This guide isn't a technical guide to designing and installing a system. You'll need to consult an experienced solar heating provider. A solar heating system is a substantial but rewarding investment. It can reduce your monthly heating bill while helping to protect our environment. Being informed and planning carefully will ensure that you've chosen the right system for you and your family.



### Step 1 – solar thermal system introduction, basic components, how it works...

Solar system, provide environmentally friendly heat for domestic water, space heating, and swimming pools. The systems collect the sun's energy to heat air or a fluid. The air or fluid then transfers solar heat directly or indirectly to your home, water, or pool. Solar water heaters, may be a good investment for you and your family. Solar water heaters are cost effective for many applications over the life of the system. Solar water heaters cost more initially than conventional water heaters, but using sun energy is free. Solar heating technologies can be used in any climate. To take advantage of solar energy, you usually need to have an un-shaded area that faces south, southeast, or southwest, such as a roof. In some cases, a solar professional may recommend west facing roofs for solar collectors. The type of system you choose, depends on several factors: your site, the climate you live in, installation considerations, cost, and how you would like your solar heating system to be used.

Solar water heaters and solar space heaters are made up of solar collectors, and all systems except pool heaters have some kind of storage. In pool systems, the swimming pool itself is the storage, and the pool's filtration pump circulates the pool water through the collectors. Active systems also have circulating pumps and controls. Passive systems work without this added equipment. Three types of solar collectors are used for residential applications: flat-plate, integral collector-storage (ICS), and evacuated-tube collectors.

**Flat-plate collectors** are the most common type. Glazed flat-plate collectors essentially are insulated, weatherproofed boxes that contain a dark absorber plate under one or more glass or plastic (polymer).

**Integral collector-storage systems**, also known as ICS or "batch" systems, are made of one or more black tanks or tubes in an insulated, glazed box. Cold water first passes through the solar collector, which preheats the water, and then continues to the conventional backup water heater. ICS systems are simple, reliable solar water heaters. However, they should be installed only in mild-freeze climates because the outdoor pipes could freeze in severely cold weather.

**Evacuated-tube solar collectors** are usually made of parallel rows of transparent glass tubes. Each tube contains a glass outer tube and metal absorber tube attached to a fin. The fin is covered with a coating that absorbs solar energy well, but which inhibits radiative heat loss. Air is removed from the space between the glass tubes and the metal tubes to form a vacuum, which eliminates conductive and convective heat loss. In the United States, evacuated-tube collector systems are used most frequently in commercial applications. Most solar water heaters require a well-insulated **storage tank**. Solar storage tanks have an additional outlet and inlet connected to and from the collector. Active solar systems usually include a storage tank along with a conventional water heater. In two-tank systems, the solar water heater preheats water before it enters the conventional water heater. In a one-tank system, the backup heater is combined with the solar storage in one tank.

**Active solar water heaters** use pumps to circulate water or a nonfreezing heat-transfer fluid from storage tanks through the collectors.

**Direct circulation systems** use a pump to circulate household water through the collectors and into the home; they work well in climates where it rarely freezes.

**Indirect circulation systems** use pumps to circulate a non-freezing heat-transfer fluid through the collectors and a heat exchanger. This heats water that then flows into the home. Indirect systems are popular in climates prone to freezing temperatures.

**Passive direct solar water heaters**, move household water or a heat-transfer fluid through the system without using pumps or electricity. Passive systems work during power outages, but they should not be used in climates where temperatures often go below freezing. Passive systems are typically less expensive to purchase and maintain than other types of solar systems. They are also inherently more reliable and may last longer. However, passive systems are not usually as efficient as active systems. **ICS** passive solar systems may be best in areas where temperatures rarely go below freezing. They are also good in households with significant daytime and evening hot-water needs.

**Thermosyphon** systems work because water flows through the system when warm water rises as cooler water sinks. In this system, the collector must be installed below the storage tank so that warm water will rise into the tank. Thermosyphon passive solar systems are usually less expensive than active systems, but more expensive than ICS systems.

### Step 2 – why should I invest in a solar thermal system?

The first question many people ask when considering a home expense is, "How much will it cost and how much will it save?" The answer depends on the type of system, how you want to use it (domestic water, pool heating, interior space heating), and your geographic location. This way of

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energy is usually more than the cost of a conventional gas or electric system. Today's solar heating systems are cost competitive when you consider your total energy costs over the entire life of the system. Your monthly gas or electricity bills will usually be lower and more predictable for as long as you own the house. Also, solar heating systems will insulate you from rising fossil fuel costs and protect you from fuel-price inflation over time. Investing in a solar thermal system could also increase the resale value of your home. Often, the entire initial cost of the system can be recovered when you sell your property. In addition, you will be earning an annual 6% to 25% tax-free rate-of-return on your investment, depending on how much hot water you use and how much energy you save. Another important reason to invest in solar systems may be less tangible. When you purchase a solar heating system, you support technologies that are good for the environment. You are making a conscious, responsible decision to help reduce harmful emissions from fossil fuels, while maintaining your quality of life.

Depending on the type of conventional fuel used, replacing an electric water heater with a solar heater can offset the equivalent of 40% to 100% of the carbon dioxide emissions of a modern passenger car. Carbon dioxide traps heat in our atmosphere, contributing to the greenhouse effect, which alters our planet's climate and ecological systems. Using solar energy in place of nonrenewable fuels may also reduce nitrous oxides and sulfur dioxides, which are components of smog. Simply in a word you are god guy and everybody wants to be god guy!

### Step 3 – how much money will my solar thermal system save, and how much will it cost?

Your savings depend on how your solar system will be used, as well as the size and type of your system. Other factors can include the climate, the contractor, and the system rating. Your state may offer solar rebates or other incentives that will reduce costs.

#### **Savings and costs for solar domestic water heating**

#### **Savings and cost for solar swimming pool heating**

1.5 and 7

years, depending on the cost of the fossil fuel your system replaces. The actual cost and payback depends on your site, the type of system you choose, financing, and the length of the pool season. A solar system allows people to swim in a pool that was previously too costly to heat and too cold to use.

#### **Savings and cost for solar space heating**

The cost of a solar space heating system depends on many factors, including the size of your house, how airtight it is, how much of your heat will be supplied with a conventional backup, the system you choose, and your site. In general, solar space heating systems can provide 40% to 60% of your space heating needs. These systems are most economical for consumers who would otherwise be heating with electricity, rather than with natural gas or other fuels. But solar space heating is needed most when sunlight is least available, during the winter and at night and needed least when sunlight is most available, during the summer and the daytime. So today's solar technologies are not likely to be a cost-effective solution for active solar space heating in most homes, but with improving solar technology it is going to be better very soon.

### Step 4 – what kind of thermal solar system you want to use? Sizing solar thermal system...

#### **Is my home a good place for a solar heating system?**

The first consideration when building a solar thermal system is the site. If your site has un-shaded areas and generally faces south, it is a good candidate for a solar thermal system. A professional installer can evaluate your roof as a location for collectors. If your roof doesn't have enough space, you can also install the system on the ground. Please refer to the system-sizing section of this booklet for more information on space requirements. The amount of sun that your site receives, how often temperatures dip below

#### **How big should my solar thermal system be, and which features should I look for?**

Some of the answers to questions about system size and features depend on how you plan to use the solar system. Here, you'll find general information on sizing systems for water heating, swimming pools, and space heating.

#### **Sizing a solar thermal system for heating domestic water**

Just as conventional water heaters come in different sizes, so do solar water heaters. Solar equipment experts use worksheets and computer programs to help determine system requirements and collector sizing. Contractors usually follow a guideline of about 20 square feet (2 square meters) of collector area for each of the first two family members. For every additional person, add 8 square feet (0.7 square meters) if you live in the Sun Belt area of the United States, or 12 to 14 square feet (1.1 to 1.3 square meters) if you live in the northern United States. For active systems, the size of the solar storage tank increases with the size of the collector—typically 1.5 gallons per square foot of collector. A small, 66-gallon system is usually big enough for one to three people; a medium-size, 80-gallon system works well for a three- or four-person household; and a large, 120-gallon system is appropriate for four to six people. In recent years, homebuilders have begun including solar water heating systems as standard features in some subdivisions. The systems are the same size for every home, and they all work equally well. However, large families with greater hot-water demand find that a smaller percentage of their hot water is provided by the solar energy system.

Heating your swimming pool with solar energy requires a collector that is 50% to 100% of the surface area of your pool. Your geographic location and other factors determine the exact size. For example, a 15-by-30 foot swimming pool in Florida typically requires a collector that equals 100% of the pool's square footage, which translates to 450 square feet of unglazed flat-plate collectors. This is because many Florida swimming pool owners use their pools year round. In contrast, in northern California, most pools are used only 6 to 8 months per year, so systems are typically sized at 60% to 70% of the pool's surface area. In general, adding more square footage lengthens the swimming season and allows owners to use the pool in colder weather. A pool cover or blanket reduces heat loss and helps maintain warm temperatures for a longer period.

In contrast to solar water heating, solar space heating usually requires a larger, more complicated system. Space-heating systems have to store heat for use when solar energy is least available and your house is coldest at night and during the winter months. Solar space-heating systems are usually combined with water heating, and they are sized to accommodate both uses. The amount of solar collector area needed to heat your home depends on many factors. These include the available solar energy, collector efficiency, local climate, and heating requirements. Heating requirements are based on insulation levels, the house's air tightness, and the lifestyle of the residents. Generally, the area of solar collector is about equal to 10% to 30% of the floor area of the house.

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Step 5 – financing solar thermal system.

**Financing**

**Incentives**

*Has your company installed solar thermal systems for solar water heating, pool heating, or space heating?*

*How many years of experience does your company have with solar heating installation?*

*Is your company licensed?*

- Possession of a solar contractor specialty license issued by a local building jurisdiction
- Certification in solar thermal systems by a group such as the state chapter of SEIA
- A letter from the solar heating manufacturer that indicates that the installer has the necessary experience and training to install solar systems.

*Does your company have any pending or active judgments or liens against it?*

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## 8 – thermal solar getting help...

Energy efficiency and clean renewable resources will mean stronger future for our children and many countries support using that energy way. Look at these sites for more information about that support and other possibilities. Check next sites for your state energy office. The office might offer technical support and general information to resident/business energy consumers on renewable energy resources and applications. Many of these sites have a state chapter of the national organization. It is always a good idea to find specific information for your state and ask for help for more information.

Official government help

ASES – American Solar Energy Society – [www.ases.org](http://www.ases.org)

NASEO – National Association of State Energy Officials – [www.naseo.org/members/states.htm](http://www.naseo.org/members/states.htm)

SEIA – Solar Energy Industries Association – [www.seia.org](http://www.seia.org)

DSIRE – Database of State Incentives for Renewable Energy – [www.desireusa.org](http://www.desireusa.org)

Solar Energy Technologies Program – [www.eere.energy.gov/solar](http://www.eere.energy.gov/solar)

You also can ask for help these providers. They have enough solar experience and can provide useful information. If you prefer they have phone offline help.

Resellers online and offline help

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[Or maybe you are simply DIY MAN \(Do It Yourself\)](#)

## SECTION 3 – OTHER SOLAR PRODUCTS

You can decide to buy other solar product...

### Step 1 – find more different solar products...

Solar technology is now everywhere and you can find wide range of solar technology products on today's world's market. Solar products can solve human's energy needs from battery charging to the large scale solar plants for producing electricity for sell. Internet today allows finding and buying different solar products from your chair. There is list of some solar products you can find on the market. You can order these products from internet on very easy way and low or free cost of delivery.

Find books about solar energy on [www.amazon.com](http://www.amazon.com) whatever you want to learn more about solar energy or you are Do It Yourself man and would like to do your own solar and save your budget.

Or you can visit [www.ebuy.com](http://www.ebuy.com) to find and bid for cheap solar energy products. Ebay is easy to find product you need. Easy fast reliable...

Wide range of solar energy products (solar battery chargers, camping solar panels, solar garden lights, solar panels kits...) you can also find on next sites.

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