



# Deciding if Solar is Right for Your Home

## **What is the first step I should take when looking into solar?**

*Reducing your electricity use will have the quickest and most positive impact on the environment and on your pocketbook. Start with your electricity usage. Pull out your electricity bills. What has your kWh usage been each of the last twelve months? How much are you paying for electricity? What rate plan are you on? The objective is to understand how much electricity you use, what you are using it for and when you are using it. This information is critical to conservation, energy efficiency efforts and to proper sizing of a solar electric system. Armed with this information do an energy efficiency audit.*

*PG&E offers free energy audits to its customers online at [http://www.pge.com/res/energy\\_tools\\_resources/energy\\_tools.html](http://www.pge.com/res/energy_tools_resources/energy_tools.html). Print out the audit results, if you do decide to go solar, a copy of the audit will need to be submitted with your solar rebate application.*

## **Why does it matter when I use most of my energy?**

*A solar electric system that is tied to the electrical grid feeds electricity into the grid when the system generates more electricity than you use. You receive a credit for the electricity that you feed to the grid. You can then draw on electricity from the grid using the credits. Your electrical use is calculated over a twelve month true up period. This is called "net metering".*

*PG&E offers several Time of Use (TOU) rates for which it charges more for electricity during peak hours occurring weekday afternoons, and less for electricity during off peak hours. TOU metering often works well with solar electric systems. These systems generate electricity during peak times crediting the homeowners account at the higher rates. If the homeowner uses most of her electricity during off peak hours, she then draws against those credits at the lower rates, allowing her to use more electricity than her system generated because she is using it at times when the rates are cheaper. If you are home and using power during the afternoon, investigate different rate schedules.*

*A solar contractor can help you determine which rate schedule is best for your electricity usage patterns.*

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

*Shading, roof orientation, the amount of space on a roof and the quality of the roof are all factors which need to be considered. You want to install a solar electric system in a location which is free from shading, ideally on a roof which is oriented south or west. Shading, roof orientation and the angle of the solar electric system will affect the amount of electricity your system produces, and are factors considered in calculating your state rebate. Shading is a significant factor. A fairly small amount of shade on one panel can greatly affect the production of each panel that the shaded panel is electrically connected with (similar to how a kink in a hose slows down the flow through the rest of the hose). Ideally, you should have unobstructed sun from at least 9am-3pm. Make sure your roof is in good condition, solar panels have performance warranties for twenty-five years and systems can last much longer. You don't want to have to take the system down to fix the roof. Oftentimes, you'll want to reroof at the time you put a solar system up.*

*A solar installer will come out to your home to do a site analysis and will take each of these factors into consideration when providing you with a proposal of a system size, the system's estimated performance and installation cost.*

## **Solar Electric System Basics**

### **How does a solar electric (photovoltaic) system work?**

*Simply put, photovoltaics (PV) work by converting light energy into electrical energy. The PV cells consist of a positive and a negative slice of silicon placed under a thin slice of glass. As the photons of the sunlight beat down onto the photovoltaic cell they knock the electrons off the silicon. The negatively-charged free electrons are attracted to the silicon but are trapped by the magnetic field that is formed from the opposing fields. Small wires on the silicon catch these electrons and when connected in a circuit an electric current is formed.*

*For greater detail:*

*· PG&E description of a grid-tied system*

*[http://pge.com/about\\_us/environment/solar/about\\_solar\\_energy.html](http://pge.com/about_us/environment/solar/about_solar_energy.html)*

*· Sierra Club Clean Energy Fact Sheet*

*<http://www.sierraclub.org/globalwarming/cleanenergy/factsheet/sun.asp>*

## **What does installation entail?**

*The installation process is fairly straightforward. The equipment used varies by roof type and installation company but the universal components are the panels, a support structure for the panels, an inverter, electrical pipe called conduit, and AC/DC disconnect switches. As with anything in the construction industry, each installation is unique, but we have provided a generic example.*

*On the roof:*

- 1) Posts called stand-offs are lag-bolted into your roof's supports beams (flashings and sealants are used to protect any roof penetrations).*
- 2) Racking is attached to the standoffs in rows.*
- 3) The solar panels are positioned and bolted to the racking.*
- 4) Panels are wired together and connected to wiring that runs down to the inverter in conduit pipe (depending on your situation, the conduit may go through the attic or on the outside of your home).*

*Ground floor:*

- 5) An inverter that converts the DC power from the panels into AC power for your residential use is mounted (typically in your garage or on an outside wall in a relatively shady position).*
  - a. If required by your city, a disconnect switch is mounted near the inverter.*
- 6) Wires from the roof go into the inverter, then to your main electrical panel or subpanel.*
- 7) System is turned on and net-metering begins.*

## **How long will installation take and do I have to be home?**

*A typical residential installation should take 2-5 days and you do not necessarily need to be home as long as the installation crew has the necessary access.*

## **How big of a system will I need?**

*This depends on many things and can be as complicated as you would like it to be. Typically homeowners choose to cover 50-85% of their total electrical bill. There are two very simple ways to estimate a system for your needs.*

- 1) Give a reputable solar company your electric bills. They will use their analysis tools to provide you with a proposed system and corresponding financial analysis.*
- 2) Use an online estimator program such as 'My Solar Estimator'*  
<http://findsolar.com/index.php?page=rightforme>

*Additionally, you'll want to consider any expected decreases/increases in your electrical usage (i.e. a child moving away from home, spa installation, etc.).*

## How long will my system last?

*This can vary and you should definitely talk to your installer about it, but nearly all solar panels are guaranteed to produce for 25 years and most inverters have a 10 year warranty. While inverters will most likely last past 10 years, you should expect to replace the inverter during the life of the system (price range: \$1,500 - \$4,000).*

# The Benefits of Going Solar

## What are the environmental benefits?

*The environmental benefits of solar electricity are many. Most basically, you reduce your dependence on foreign oil imports, reduce your contributions of greenhouse gases to the atmosphere, and reduce local air pollution. For more detail, check out some of the following sites.*

- Vote Solar <http://votesolar.org/why-solar.html>
- U.S. Environmental Protection Agency – Solar <http://www.epa.gov/solar/renew.htm>

## What are the financial benefits?

*Regarding the financial case for solar electricity, many people are surprised about how reasonable the costs can be. In general, the higher your electricity costs, the more solar makes financial sense. Here's why.*

**State and federal incentives:** *California has a rebate program that reduces the upfront cost by ~25% (this rebate will lower over time so if you are considering solar, you should act soon). The federal tax credit is 30% of the total system cost capped at \$2,000.*

- Learn how your PG&E rebate will be calculated: <http://www.csi-epbb.com/>

**Energy savings:** *Many systems are designed to produce 80-90% of a home's power. With net-metering, you can reduce your electric bill to a fraction of the previous cost.*

**Increased property value:** *Installing solar increases the value of your property without increasing your property taxes.*

**Lock in your energy rates:** *A solar electric system locks in your electricity rates for the life of the system allowing you to avoid price increases for electricity. And with*

*global energy demand, who knows how much these prices may rise in the near future? For greater detail:*

- *California Solar Initiative – Cash Back on Solar:*  
[http://www.gosolarcalifornia.ca.gov/csi/cash\\_back.html](http://www.gosolarcalifornia.ca.gov/csi/cash_back.html)
- *OnGrid financial analysis of solar electric system payback:*  
<http://www.ongrid.net/papers/PaybackOnSolarSERG.pdf>

## **Choosing a Solar Provider**

### **How do I find a solar installer?**

*There are many solar companies in the Bay Area. A flashy website and marketing materials doesn't necessarily mean a better company. Here are three links to databases listing solar installers. There are others, but these are a good place to start.*

<http://www.gosolarcalifornia.ca.gov/database/index.html>

*These are solar companies who have listed with the California Energy Commission to sell and/or install solar electric systems.*

[www.findsolar.com](http://www.findsolar.com)

*This is a database of installers. Installers themselves provide the information for this database.*

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

*These are individuals who have met solar installation experience requirements, have passed a rigorous exam and have continuing education requirements to remain certified. Individuals, not companies hold this certification. Individuals who have this certification have demonstrated a sustained professional commitment to solar.*

*Pick several installers and give them a call. Ask them about their experience and their approach from initial site visit through installation and post-install customer care. You will learn a lot in this selection process. Have the installers come out and do a comprehensive site analysis and provide you with a proposal, then compare the proposals.*

*You should focus on asking good questions such as these below.*

### **What licenses/certifications does the company have?**

*A qualified solar company should carry C-10 (Electrical) and C-46 (Solar) California contractor's licenses. You can look at a company's licenses on the CSLB website (*

<http://www.cslb.ca.gov/contractors/default.asp>). Additionally, ask each company if they have personnel certified by the North American Board of Certified Energy Practitioners (<http://www.nabcep.org/>), a renewable energy board implementing industry quality standards.

***What experience and training will the design and installation teams that work on your system have?***

Ask each company if they have personnel certified by the North American Board of Certified Energy Practitioners (<http://www.nabcep.org/>), a renewable energy board implementing industry quality standards. Will a NABCEP certified photovoltaic installer be involved directly with the design and installation of your system? If not, what experience and training will the design and installation teams have?

***Does the company provide references from previous customers?***

Ask for a contact list of previous customers to find out about past customer satisfaction. Make sure they were courteous, professional, on time, and responsive. Ask to speak with a client that had post-installation questions about the system. Is the company responsive to issues that arose after the installation?

***How quickly can the company install my system?***

Some companies have >6 month waiting times to get your system installed. If you are ready to start now, make sure the company can meet your expectations. Note that it can take six to eight weeks, and sometimes longer, for a rebate reservation to be processed.

***What are the warranty and post-installation service policies?***

The California rebate program requires a solar system to be warranted for ten years. Some solar installers will provide free post-installation visits to ensure your system is performing as expected. How quickly do they come out if a system is not performing as expected?

***How many systems has the company installed and can you see photos of their previous work?***

Select an installer with proven experience and photo documentation of their installations. More specifically, there are definite differences in the precision and overall aesthetic quality of installations and, as you will be looking at your system for many years, it is important that you like the looks of it.

***How do I choose between competing bids?***

Deciding between multiple bids is not as simple as choosing the lowest bid. Sometimes, the lowest bid means there are hidden costs. Cautionary advice that applies to other purchases also applies to solar. Be sure that you are not

*comparing apples to oranges. Ask to see the EPBB calculator print out – all solar installers must submit this form with the rebate application. It will allow you to compare the different systems using one methodology. There are a few things to look for when comparing bids.*

***Does the proposal list your system size in AC or DC kilowatts?***

*Make sure that each proposal is given in AC kilowatts. Solar electric panels produce DC (direct current) electricity but your home appliances use AC (alternating current) electricity. As electrical energy is changed from DC to AC in the inverter, there is some loss. So, a contractor that lists your system size in DC kilowatts is simply adding up the wattage of all the panels, rather than giving you an estimate of actual production. The rebate is based on the AC rating. You will find both the AC and DC rating on the EPBB calculator print out.*

***Does each proposal give estimated production based on the same number of sun hours per day?***

*Make sure that the estimated production (in kilowatt hours per year) on each proposal is based on the same number of sun hours per day. Because actual energy production depends on the amount of sunlight (based on latitude and local weather conditions), a solar contractor can use a higher figure of sun hours per day to make their proposed system look like it will produce more power than it actually will. San Francisco receives about 5.5 peak sun hours per day. The EPBB calculator will provide an estimated annual production amount.*

***Which contractor do you feel comfortable with?***

*Does the contractor have a philosophy and approach that coincides with your expectations? Personal attention and responsiveness are important. If you find that it one solar contractor seems to be communicate more clearly and is more responsive than others, you may want to take this into consideration when making your choice.*

***Resources:***

*About Solar Energy – The Basics*

[www.pge.com/about/environment/pge/solar/aboutsolarenergy.shtml](http://www.pge.com/about/environment/pge/solar/aboutsolarenergy.shtml)

*PG&E classes on residential solar electric systems*

<http://www.pge.com/solarclasses/>

*Buying a Photovoltaic Solar Electric System: A Consumer Guide*

[http://www.energy.ca.gov/reports/2003-03-11\\_500-03-014F.PDF](http://www.energy.ca.gov/reports/2003-03-11_500-03-014F.PDF)

*Installing solar at your home – solar rebate program through PG&E for existing residences*

[www.pge.com/about/environment/pge/solar/installingsolaratyourhome.shtml](http://www.pge.com/about/environment/pge/solar/installingsolaratyourhome.shtml)

*Installing solar at your home – solar rebate program through California Energy Commission for new residential construction*

[www.gosolarcalifornia.com](http://www.gosolarcalifornia.com)

*Understanding your net metering bill – residential*

[http://www.pge.com/includes/docs/pdfs/b2b/newgenerator/understandingyourbill\\_residential.pdf](http://www.pge.com/includes/docs/pdfs/b2b/newgenerator/understandingyourbill_residential.pdf)

*SF Department of the Environment Solar Map Website*

<http://www.sf.solarmap.org/>

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This “Homeowners’ Guide to Going Solar” was generously written on behalf of the Sierra Club’s San Francisco Bay Chapter by our friend and colleague Jeanine Cotter. Jeanine is co-owner of Luminalt Solar, a San Francisco-based solar design and installation company, dedicated to installing environmentally responsible solar electric and solar hot water systems in the San Francisco Bay Area.

Luminalt can be reached at:

4000 Irving Street (cross 41<sup>st</sup> Avenue)

San Francisco, CA 94122

Contact: Jeanine Cotter, co-owner

Phone: (415) 564-7652

Email: [jeanine@luminalt.com](mailto:jeanine@luminalt.com)

[www.luminalt.com](http://www.luminalt.com)

\* The Sierra Club does not endorse any particular solar provider and has not received funds in connection with this guide.