



Sizing Your Photovoltaic (PV) System

To size your solar photovoltaic (PV) system you need to take a look at your roof and your electricity bills. For your PV system to work best, your system should face south or southwest. PV systems in San Francisco work most efficiently when they are sloped at about 38°, but they also work well on flat roofs and any sloped roof that faces south/south-west. In addition to roofs, parking lots or other open spaces make good locations for PV systems. Your roof should have minimal to no shading from trees, mechanical equipment, or other buildings. The shade-free area of your roof will limit how large your PV system will be, and your electricity usage (as measured by your electricity bill) will dictate how much solar power you need. Once you know your electricity usage and your available roof area, you can size your PV system.

The following resources can help you size your solar PV system:

San Francisco Solar Map (<http://www.sf.solarmap.org>) --

Provides information on the amount of solar potential your home or building has and includes case studies of what other home and business owners are doing to support solar energy.

Local Solar Installer (<http://www.gosolarcalifornia.ca.gov/retailers/search-new.php>) --

Search for renewable energy retailers in your area who can help determine an optimal PV system and design for your facility. Soliciting at least two to three bids from different solar installers is preferable. All installers should provide you with a free site visit and quote.

PV Calculators (<http://www.consumerenergycenter.org/renewables/estimator/index.html>) --

Calculators provide California residential and commercial electric customers a personalized estimate of the costs and benefits of investing in a photovoltaic (PV) solar. It will also allow you to plug in a system capacity in kW, view your savings, and see how much of your own electricity you can generate.

San Francisco Department of Building Inspection (http://www.sfgov.org/site/dbi_page.asp?id=18633) --

Provides details on the city's **permitting requirements**.

Before soliciting bids it will be helpful for you to know:

- What is your budget?
- Do you have a summary of your annual electricity usage or copies of at least a year of your PG&E electricity bills?
- What PG&E electricity tariff do you pay (E-1, A-1, E-19, etc.)?
- During what hours of the day do you consume the most electricity?
- Have you made efforts to improve your energy efficiency?

For more information please visit SFEnvironment.org or call (415) 355-3780.

SFEnvironment is a department of the City & County of San Francisco.

Questions to Ask Your Solar PV Installer

- Q: Is the installer NABCEP certified? You can also check <http://www.cslb.ca.gov> to make sure that your installer is in good standing with the State.
- Q: How many years has the installer been in business? Does the installer specialize in residential or commercial systems? Your installer should have experience with grid-tied systems and should be familiar with local codes, regulations, and rebates.
- Q: Can the installer provide you with a portfolio or a list of recent projects as well as several references for you to contact?
- Q: What kind of system warranty does the installer provide? California rebates require at least a 5-yr warranty for all system components. Your solar panels should have a manufacturer warranty of at least 25 years. Some panels are now warranted for 30 years. You should expect your inverter to have at least a 5-year warranty, but a 10-year warranty is not uncommon. You should ask your installer about your PV system's "minimum warranted" power, compared to its peak system rating. Minimum warranted power guarantees that your system actually performs according to its design.
- Q: What happens if the installer goes out of business before the system warranty expires and something happens to your PV system?
- Q: What kind of operation and maintenance training does the installer provide? Dust and bird droppings can negatively affect system performance. How do you keep your PV system clean? Will the installer clean and maintain your system or will you have to climb up on your roof to clean your PV panels?
- Q: What types of PV panels does the installer use and how do they compare to other technologies? For detailed information about different solar energy technologies, go to <http://www1.eere.energy.gov/solar/photovoltaics.html>.
- Q: Are the installer's PV panels and inverters proven and reliable? Your installer should use **California Energy Commission-approved technology** (<http://www.gosolarcalifornia.org/equipment/index.html>) to qualify for State rebates.
- Q: How will the installer mount the solar panels to the roof?
- Q: Will the solar panels cause leaks in your roof?
- Q: What happens if you have to repair or replace your roof once you have solar panels installed?
- Q: Which GoSolarSF (www.solarsf.org) City solar incentive does the installer qualify for?

Understanding Bids from Solar Installers

Solar installers should give you a range of system sizes, costs and savings that are appropriate for your building. You should try to compare bids by similar parameters, such as nameplate system power (DC) rating (in kilowatts or watts) and expected annual energy (kWh) production. Be sure to clarify all assumptions used in the bids you receive, such as electricity price escalation, discount rate reflecting the time value of money over the lifetime of the system, and other financial considerations such as interest rate and term of a loan if your system will be financed.

Your bid should include at least the following costs and benefits:

- Total cost from start to finish of design and construction. A detailed estimate might include:
 - Equipment
 - Labor
 - Permits
 - Tax
 - City incentive
 - State rebate
 - Federal tax credit
 - Renewable Energy Certificates (RECs), if applicable
- Make and model number of equipment
- Warranty information
- Expected operation and maintenance costs
- Projected monthly, annual, and lifetime costs and savings
- Finance options: cash, loan, lease, or power purchase agreement