Consumer Protection - Before and After Purchasing a Solar PV System

Online Course
Consumer Protection

Consumer Protection - Before and After Purchasing a Solar PV System

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PG&E

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Goal of Webinar

The webinar will include information on how to:

• Find a solar contractor;
• Compare bids;
• Protect against consumer fraud;
• Implement Energy Efficiency with solar;
• Safely operate and maintain your solar system to maximize your investment.
Is Solar right for you?
Things you need to know before going solar

- Know your energy usage
  - Size and type of system you install will be based on your energy usage
  - The idea is that you want to generate enough power to cover usage, but to not oversize
  - Consider Energy Efficiency Options to reduce PV system size

- Know what to ask – Get everything in Writing!
  - Get a breakdown of costs, materials, installation, taxes, rebates, etc.
  - Timeframe for installation
  - Warranty
  - Valid license

- Know when to say No
  - The first visit is not a done deal, get at least 3 bids
  - Solar is a BIG investment
  - Don’t move forward unless you are comfortable
Solar PV Basics
200 HP engine: means that 200 horsepower is the MAXIMUM it will produce.

4 kW PV system: means that 4,000 watts (4 kW) is the MAXIMUM it will produce in full sunlight.
PV System Performance

- Each 1 kW of PV system capacity typically*…
  - Requires ~100 ft² of roof space
  - Produces ~1,300 – 1,700 kWh/yr.
  - Depends on many factors, including:
    - Location
    - Shading
    - System orientation
    - etc.

* PV production calculators can estimate production for specific PV system types, locations, technologies, configurations, etc.
PV System Types

Rooftop

Solar Roof Tiles ("BIPV")

Ground Mounted

Trackers
PV Shading

“Shade-free from 9 to 3”

Good chance for PV
Orientation

For tilted roof:

- Not good
- Good
- Very good
- OK
# Orientation / Tilt Factors

## Tilt Angle of PV Array & Roof Pitch

<table>
<thead>
<tr>
<th>Orientation / Degrees from South</th>
<th>0° (Flat)</th>
<th>18° (4:12)</th>
<th>30° (7:12)</th>
<th>45° (12:12)</th>
<th>60° (21:12)</th>
<th>90° (Vertical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0° (South)</td>
<td>0.89</td>
<td>0.97</td>
<td><strong>1.00</strong></td>
<td>0.97</td>
<td>0.89</td>
<td>0.58</td>
</tr>
<tr>
<td>23° (SSE, SSW)</td>
<td>0.89</td>
<td>0.97</td>
<td>0.99</td>
<td>0.96</td>
<td>0.88</td>
<td>0.59</td>
</tr>
<tr>
<td>45° (SE, SW)</td>
<td>0.89</td>
<td>0.95</td>
<td>0.96</td>
<td>0.93</td>
<td>0.85</td>
<td>0.60</td>
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<tr>
<td>68° (ESE, WSW)</td>
<td>0.89</td>
<td>0.92</td>
<td>0.91</td>
<td>0.87</td>
<td>0.79</td>
<td>0.57</td>
</tr>
<tr>
<td>90° (E, W)</td>
<td>0.89</td>
<td>0.88</td>
<td>0.84</td>
<td>0.78</td>
<td>0.70</td>
<td>0.52</td>
</tr>
</tbody>
</table>


Bottom line: Tilt is a factor, but not a major one.
Weather

• California climate ideal for solar
• Panels produce in all light
• Fog has cooling effect, which raises efficiency
• Microclimates likely less than 15% loss from normal
Roof Issues

• *Don’t put a new PV system on an old roof!*
  
  — Minimum roof life should be 5 – 7 years.
  — Good idea to do PV and roof at same time
  — Estimate for panel removal/replacement is $1,000 per kW of system size.
Site Screening

• Need ‘solar window”

• Need area facing S, W or E

• Roof Tilt ~is ideal, but even flat is OK

• Weather is typically good in CA

• Need a roof with significant life left (if roof mounted)
Typical System Components

- Array
- Inverter
- Meter
- Loads
- Balance of System (BOS)

Source: Darren Bouton
It works during the day, but what about at night?

Previously, there was only one solution:

Store the excess in batteries during the day, then draw off the batteries at night, or when it’s cloudy.

But now?
Net Energy Metering (NEM)

NEM allows customers to receive credit for electricity produced in excess of what is consumed on-site.

- Utility grid acts as “battery”
- Credit is at the relevant retail rate
- Annual true-up
  - AB 920: Credits for excess generation (kWh)
- Can zero out energy portion of bill, but other (minor) service charges still apply
  - Typical customer sizes PV system to ~80% of annual energy (kWh) consumption

NEM is especially valuable for customers on TOU rates because PV system output tends to occur during the most expensive (peak) periods.
Net Metering

The utility grid is a two-way street!
Electricity can be “sent back” to the grid by the customer.

- Eliminates the need for batteries.
- Reduces cost and maintenance.
- Ensures a constant supply of electricity.
- Cannot eliminate electricity bill completely due to “non-energy charges” – like a payment for “storage” service
Benefits of NEM

• Clean energy from your own PV system.

• The reliability and security of the utility company.

• Best of both worlds.
Implement Energy Efficiency
Why Energy Efficiency before Solar?

• Energy efficiency is typically the most cost-effective way to reduce your energy bill
• Energy efficiency also reduces the size of the solar system you need can save thousands of dollars on the cost of the system
• An energy efficiency audit is required to be eligible for some customer-side incentive programs

Residential EE rebates through PG&E: http://www.pge.com/myhome/saveenergymoney/rebates/
Commercial EE rebates through PG&E: http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/
Complete an Energy Audit
www.pge.com/energyanalyzer

- Create a profile of your home and appliances
- Identify how much energy and money you can save
- Create a customized energy plan
Step 1. Conservation Practices (No-Cost)

Keep your thermostat at 68 degrees in the winter and 78 degrees in the summer (health permitting)

Adjust thermostat up/down when you leave home or go to bed

Lower your water heater’s thermostat to 120 degrees F

Only run full dishwashers and loads of laundry

Turn off the water when brushing teeth, washing dishes, etc.

Take shorter showers
Step 2. Strive For High Efficiency (Low-Cost)

Replace regular light bulbs with Compact Fluorescent Lamps (CFLs)

• CFLs lasts up to 10 times longer and use up to 75% less energy than regular bulbs
  – Look for the PG&E sticker and save!

• Dispose of burned out bulbs properly by visiting Earth911.org to find a recycling facility
Step 3. Strive For Higher Efficiency (Investment)

Buy high efficiency appliances (i.e., clothes washers, dishwashers, water heaters)
  • These appliances use 10% to 50% less energy than standard appliances
  • Look for the ENERGY STAR®

Weatherize your home
  • Insulate your attic and your walls

We offer Rebates!
PG&E Offers a Variety of Rebates

Residential

- High-Efficiency Clothes Washers
- ENERGY STAR® Dishwashers
- ENERGY STAR® Room Air Conditioner
- Water Heaters
- Attic and Wall Insulation
- Pool Filtration Pumps and Motors
- Home Lighting

- Cool Roof – Low/Steep Slope
- Whole House Fan
- Central Natural Gas Furnace
- Variable Speed Motor (VSM) Air Handler System
- Variable and 2-Speed Swimming Pool Pump and Motor
Purchasing Options
Purchasing Options

- Cash / Financing
- Power Purchase Agreement
- Lease To Own
Choosing the Right Installer
Contact & Choose an Installer

• Find installers
• Choose which ones to contact
• Obtain bids
• Evaluate bids and pick the contractor you are comfortable working with
• Arrange financing (if necessary)
Find a Solar Contractor

Have a professional installer come out to your home and do a site visit

The purpose of the site visit is to:

• Make sure your roof/location is appropriate for solar
• Determine what kind and size of system you will need
• Provide you with a quote and financing options
Finding a Solar Contractor

Start out by visiting www.gosolarcalifornia.ca.gov for a list of licensed solar contractors.

Tip: You can view the average cost of solar in your area by clicking on “Resources” and “California Solar Statistics”.
Verify the Contractor’s License

Before requesting a bid, verify that the contractor has an active A, B, C-10 or C-46 license through the California State License Board (CSLB) or 1-800-321-2752.

Tips:

• The CSLB provides important tips about hiring a contractor, such as checking references, checking to see if the company has any pending or active judgments or liens against it, requesting for all terms be in writing, etc.

• Upon the contractor’s initial visit, ask the representative to show their photo Id and their CSLB pocket license or their Home Improvement Sales person registration card.
Check for References & Feedback

• **Check References**
  – Consumer Advocacy Groups
  – Better Business Bureau [www.bbb.org](http://www.bbb.org)
  – Utility Consumers’ Action Network [www.ucan.org](http://www.ucan.org)

• **Examine Customer Feedback**
  – Search Internet for customer comments
  – Yelp Reviews
  – Talk to others who have experience with contractors you are exploring
Compare Bids
Comparing Bids

• Interview at least three potential solar contractors
• Obtain and compare their solar system bids before choosing one

Tips:
• Take caution against automatically selecting the contractor with the lowest price. An unusually low price may be a red flag that the contractor is cutting corners. Remember, “You get what you pay for”.
• You could obtain detailed information from the California Solar Initiative about the average project costs at www.gosolarcalifornia.ca.gov. You could see if your bids are approximately within average range.
Bid Comparison

• Utilize PG&E’s Bid Comparison Worksheet which could be downloaded at www.pge.com/solar.

Tip:
PG&E’s Bid Comparison Worksheet should be used when soliciting installation bids for your new PV system. The worksheet helps you track and compare bids.
# Bid Comparison Worksheet

<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>Bid #1</th>
<th>Bid #2</th>
<th>Bid #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Company Name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>License Number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>System Size in DC kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>System Size in CEC-AC kW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Base System Cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>All “Adders”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Monitoring Cost (If Applicable)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Estimated Permit Fees</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Total Cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Financial Rebates, Incentives and Tax Credits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Final Cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Percent of Electricity Covered</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Contractor Financing Options (If Applicable)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Warranty timeframe</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. **Company Name:** Name of the solar contractor who gives you the bid for the purchase and installation of the solar system.

2. **License number:** Issued by the Contractor State License Board (CSLB). Confirm the information about the contractor or sales representative at www.cslb.ca.gov or 1-800-321-2752.

3. **System Size in DC kW:** Capacity rating of the system in Direct Current (DC) kilowatts (kW). DC kW is referred to as the nameplate rating but does not reflect actual power production as DC must be converted into Alternating Current (AC) to power your home. It’s not necessary to see a DC rating on your bid, although some contractors choose to include it.

4. **System Size in CEC-AC kW:** CEC-AC is the most common and accurate rating to determine system size. It is based on the California Energy Commission’s rating of solar equipment in real world conditions. It must be included on your bid – if it’s not, be sure you ask for it.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5. <strong>Base System Cost:</strong> Some companies have a base system cost and then will add charges. Others will simply list total cost. Make sure you are clear on how the costs are listed and what those costs include.</td>
<td></td>
</tr>
<tr>
<td>6. <strong>All “Adders”:</strong> Adders are extra charges for items such as roof costs and trenching. Be clear on whether these have already been included in your bid, if applicable.</td>
<td></td>
</tr>
<tr>
<td>7. <strong>Monitoring Cost (If Applicable):</strong> Monitoring provides the ability to view the system’s electricity production online (at an extra cost.) This may or may not be included in your bid.</td>
<td></td>
</tr>
<tr>
<td>8. <strong>Estimated Permit Fees:</strong> Permit fees should not vary between contractors. Each city or county jurisdiction sets their own permit charges.</td>
<td></td>
</tr>
<tr>
<td>9. <strong>Total Cost:</strong> This refers to the total price of the project, including materials, labor, taxes and any additional charges you have agreed to in the contract.</td>
<td></td>
</tr>
</tbody>
</table>
10. Financial Rebates, Incentives or Tax Credits: This should reflect deduction of any relevant financial rebates or incentives (local or state) and tax credits (state or federal), if applicable.

11. Final Cost (After Rebates, Tax Credits): This refers to your out-of-pocket costs, after all applicable rebates and credits have been deducted. Make sure the contractor is passing down these savings to you.

12. Percent of Electricity Covered: The system will cover a percentage of your monthly electricity needs – prior to the installation and bid selection, it’s important to understand how much.

13. Contractor Financing Options (If Applicable): Some contractors may offer financing methods, such as system leasing. If this is of interest to you, inquire with the contractor before soliciting a bid.

14. Warranty Timeframe: In order to qualify for the California Solar Initiative rebate, the system must come with a minimum ten-year warranty.
Signing an Installation Contract

What an Installation and Purchase Contract should include

- Name, address and contractor’s license number for the company installing the system
- Installers must have a valid A, B, C-10 or C-46 contractor’s license
- Site address of the system installation
- A clear description of the quantity, make and model number of the PV modules, inverters, and system performance meters (as shown on the California Energy Commission lists of eligible equipment)
- The total purchase price of the system installation before applying the incentive including payment terms (payment dates and dollar amounts)
- Warranty information
- Description of the work to be performed with estimated installation dates
- Printed names and signatures of the purchaser and equipment seller/contractor
- Designation of the CSI rebate (do you or the contractor receive the rebate?)
CSI Incentives

- STEP 1: Complete an Energy Audit
- STEP 2: Contact and Choose an Installer
  INSTALLER HANDLES THE REST
- STEP 3: Complete and Submit Applications for CSI
- STEP 4: Install System
- STEP 5: Schedule Final Building Inspection
- STEP 6: Schedule Final Utility Inspection
- STEP 7: Claim Your Incentives
Operations & Maintenance
Operations and Maintenance Costs

- PV Module Washing
  - Cost related to hiring a service to perform this maintenance twice a year
- Inverter replacement
  - Typically every ten years
- PMRS (Performance Monitoring and Reporting Service)
  - Additional monthly cost -offset by owner’s awareness of system performance
Performance Monitoring and Reporting Service

• Service that provides system performance information and/or alerts to customers

• Required for eligibility under the California Solar Initiative (CSI) Program

• PMRS meters and providers must be listed by the CEC to be eligible

• Inverter integrated or stand-alone meter
Typical Metering and Monitoring System

PV Panels at Project Site

Inverter (with Integrated meter +/- 5%)

Performance Monitoring and Reporting Service (PMRS)

Customer

NEM Utility Meter (Bi-directional)

For Billing

Pacific Gas and Electric Company
PV Monitoring – How it Works

• Extra hardware sends inverter data to internet
• Inverter company or 3rd party hosts website
• Customer can view system from home or remotely

Can cost extra but some companies are offering it as standard package.
Value of PMRS

• Real time monitoring and alerts
  • Simple web based views
  • Downloadable data for consumption
• Tracking of power production and usage, both real time and historical data
• Reduce long term operations and maintenance costs
• Optimize energy production
  • Increase return on investment (ROI)
Understanding Your Warranty

- CSI Requirement
  - Solar systems must have a minimum 10 year warranty
    - Cover solar generating system only (PV modules and inverters)
    - Must include no-cost repair and replacement and any associated labor to the customer
  - Warranty ensures that the solar system produces the target amount of electricity
    - Achieve energy production levels
  - Systems should be monitored to ensure a long operating life
### Warranty for PV Modules and Inverters

<table>
<thead>
<tr>
<th>Warranty Period</th>
<th>PV Modules</th>
<th>Inverters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warranty Period</td>
<td>20 - 25 year limited warranty</td>
<td>5 – 10 year limited warranty</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Details</th>
<th>PV Modules</th>
<th>Inverters</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ 1-10 years for material defect and workmanship</td>
<td>✓ Repair and replacement of defective components</td>
<td></td>
</tr>
<tr>
<td>✓ First 12 years at 90% minimum power output*</td>
<td>✓ Within 25 years at 80% minimum power output*</td>
<td></td>
</tr>
<tr>
<td>✓ Within 25 years at 80% minimum power output*</td>
<td></td>
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</tr>
</tbody>
</table>

*This is an example of SunPower PV panel warranty and should not be construed as standard for all manufacturers. Please check with your Solar Contractor for details on panel warranties.*
PV Module Maintenance

Maintenance is easy
• No moving parts

Probable lifetime 25 years or more

Accumulation of dirt on solar modules (‘soiling’) can have a significant impact on performance
• One of the largest losses under the control of the Owner

Factors affecting soiling
• Rainy / dry seasons
• Dust from dirt roads or agricultural facilities
• Close to road surface of busy street
• Soot from airport flight path
• Bird waste
PV Module Maintenance – Cont’d

Estimated degradation of PV modules due to soiling

- Washed as often as necessary ~ 1.0
- Washed once in July ~ 0.96
- Never washed ~ 0.93

Economics of system cleaning need to be taken into consideration

- Cost of cleaning vs. production (kWh)
- Differs by region and environment

Bottom line: Washing panels helps, but is not crucial unless area is particularly dusty or there are other unusual factors (birds).
Inverter Maintenance

Maintenance is easy
• No moving parts

Probable lifetime 15 years or more

Trend in electronics is to get smaller and cheaper

Items to check for
• Inspect air duct and external cooling fans
• Ensure fans are operating
• Check wiring
• Check output of inverter vs. expected production
## Information Resources

<table>
<thead>
<tr>
<th>Applicable Technology</th>
<th>Resource Type</th>
<th>Resource</th>
<th>Link</th>
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</thead>
<tbody>
<tr>
<td><strong>PV</strong></td>
<td>California PV resources</td>
<td>Go Solar California website</td>
<td><a href="http://www.gosolarcalifornia.org/">www.gosolarcalifornia.org/</a></td>
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<td></td>
<td>PV incentives</td>
<td>PG&amp;E’s California Solar Initiative website</td>
<td><a href="http://www.pge.com/csi">www.pge.com/csi</a></td>
</tr>
<tr>
<td></td>
<td>Current CSI incentive rate</td>
<td>CSI Trigger Point Tracker</td>
<td><a href="http://www.csi-trigger.com/">www.csi-trigger.com/</a></td>
</tr>
<tr>
<td></td>
<td>PV calculator</td>
<td>Clean Power Estimator website</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other financial opportunities for renewable energy projects (CA and federal)</td>
<td>Database of State Incentives for Renewables &amp; Efficiency</td>
<td><a href="http://www.dsireusa.org/">www.dsireusa.org/</a></td>
</tr>
</tbody>
</table>
Solar Noon Webinars

The PG&E Solar Group will continue its popular "Solar Noon" webinar series in 2012, presenting no-cost webinars on timely solar topics on selected Tuesdays and Fridays from noon to 1:00 pm. Details and log-in information can be found on the PG&E Pacific Energy Center website at www.pge.com/pec/classes.

You do not need to pre-register for these webinars. Simply look them up on the PEC website given above at the appropriate day and time and log in as directed.

• Friday, June 22: Making Your Solar Net Energy Metering Interconnection Application and Process Easier
• Tuesday, June 26: Understanding Your Net Energy Metering Bill
Thank You

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