



## SmartSolar Site Report

Client: Client Twenty-five

Phone: 510-555-5555

Visit Date: 9/14/2009

Address: 101 Solar Rd., Berkeley, CA 94708

Email: solarclient@yahoo.com

Report Date: 10/13/2009

Hello Client:

This is your SmartSolar Site Report for 101 Solar Rd., from our September 14, 2009 visit and an analysis of your energy use. The report provides SmartSolar's identified opportunities for energy efficiency and solar projects, guides on how to move forward with these projects, and supporting documents.

The "At-a-glance" chart is a good place to start when reviewing this report. It outlines your opportunities for energy savings and solar production in the general categories of space heating, water heating, appliances and electronics, lighting, solar hot water and solar electricity – these opportunities are not ranked in anyway. The remainder of the report details your specific identified opportunities within these categories.

Upon review of your report, what's next?

- 1) Schedule a time for a SmartSolar representative to discuss the Site Report and energy efficiency and solar project opportunities with you.
- 2) Select a course of action to realize your energy goals and start the process.

SmartSolar is here to assist you throughout your project. I can be reached at 510-981-7774 or [chrisbradt@ebenergy.org](mailto:chrisbradt@ebenergy.org).

The costs, benefits, and savings detailed in this report are estimates and are not guaranteed by SmartSolar. This report should serve as a preliminary assessment of possible projects, and is not a substitute for project proposals from contractors.

I look forward to continuing to work with you, and thank you for your support of SmartSolar!

Best wishes,

Chris



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### Energy Opportunities “At-a-glance”

This table summarizes your energy savings and production potential for the categories of Space Heating, Water Heating, Appliances and Electronics, Lighting, Solar Hot Water and Solar Electric.

Measure	Costs		Year 1 Potential Savings and Benefits					
	Initial	With Incentive	Percentage	Energy	Bill	Pay Back (yrs.)	CO <sub>2</sub> (lbs.)	
<b>Space Heating</b>	\$1,922	\$1,418	natural gas: 15.4%	120 therms	\$192	7.4	1474	
<b>Water Heating</b>	\$90	\$90	natural gas: 4.5%	35 therms	\$55	1.6	429	
<b>Appliances</b>	\$1,020	\$1,020	natural gas: 0.0% electric: 5.9%	0 therms 625 kWh	\$249	4.1	327	
<b>Lighting</b>	\$90	N/A	electric: 7.5%	800 kWh	\$315	0.3	419	
<b>Solar Hot Water</b>	\$4,688	\$3,281	natural gas: 13.4%	104 therms	\$164	22.7	1280	
<b>Solar Electric</b>	\$29,387	\$18,344	electric: 50.0%	5359 kWh	\$1,681	10.9	5895	
<b>TOTALS</b>	<b>\$37,197</b>	<b>\$24,243</b>	natural gas: 33.3% electric: 63.6%	258 therms 6784 kWh	\$2,536	9.6	9827	

In considering the information above, please note:

- Estimated savings and benefits are based upon your home, a home profile similar to yours, typical technology applications, your 2008 energy usage and average PG&E rates during that year. The pay-back calculation *does not* account for future changes in energy costs and may be conservative. Projects may offer benefits, such as increased comfort or improved air quality, which are not quantified by this report. Category estimates may not sum to the totals above.
- Category estimates include only those energy efficiency projects with a pay-back of less than 15 years and those solar projects sized to offer the best pay-back for that specific technology. You may have additional project opportunities identified within this report, including:
  - Energy efficiency projects with pay-backs longer than 15 years.
  - Solar projects with different cost/benefit ratios and environmental impacts.
- Financing may be available – please see the Appendix for an example of the possible monthly costs and savings of financing the projects above with a 10 year home equity loan.
- This report uses information from following resources:
  - PG&E’s SmartEnergy Analyzer: [www.pge.com/myhome/saveenergymoney/analyzer/index.shtml](http://www.pge.com/myhome/saveenergymoney/analyzer/index.shtml)
  - PG&E Energy Efficiency Tips: [www.pge.com/myhome/saveenergymoney/savingstips/](http://www.pge.com/myhome/saveenergymoney/savingstips/)
  - US DOE Energy Savers Program: [www.energysavers.gov/](http://www.energysavers.gov/)
  - ENERGY STAR: [www.energystar.gov/](http://www.energystar.gov/)
  - Home Energy Saver: <http://hes.lbl.gov/>
  - University of California Berkeley RAEL Calculator: <http://berkeley.solarmap.org/calculator3.html>

## A. SITE PROFILE

Building age:	1941	Construction type:	Wood frame/wood shingles
Floors, conditioned:	2	Square footage:	2800
Occupants:	4	Daytime occupancy:	Yes
Utility:	PG&E	Rate:	E1 – Standard Residential

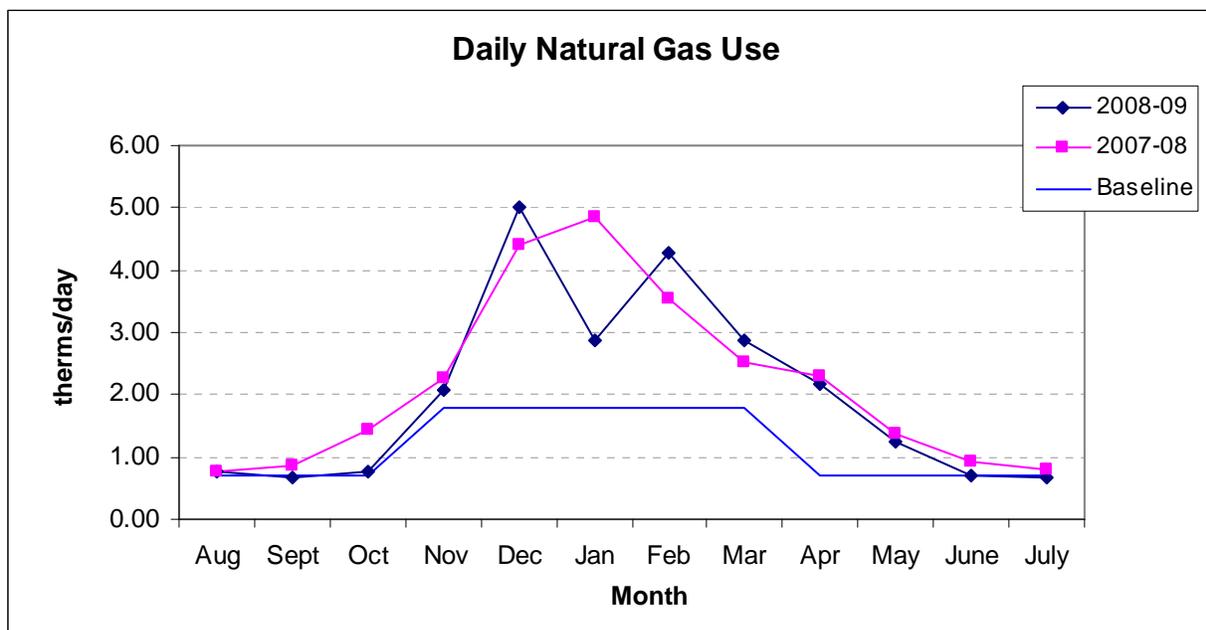
## B. PAST ENERGY USAGE

The following charts summarize your natural gas and electricity usage over the last two years – for complete information on your usage, please see the Appendix. The 2008 calendar year has been separated out as the baseline for energy savings and production potential. The PG&E rate information in this section reflects conditions current as of October 1, 2009.

Year	Total therms	Ave. daily therms (summer)	Ave. daily therms (winter)	Gas Bill	Total kWh	Ave. daily kWh	Electric Bill	Total Bill
2008-09	729	0.72	3.76	\$861	10327	28.29	\$2,634	\$3,495
2008	777	0.76	3.97	\$1,143	10673	29.24	\$2,598	\$3,741
2007-08	792	0.82	3.83	\$1,205	10926	29.93	\$2,639	\$3,844

### B.1. Natural Gas Use and Costs

Your natural gas use by month is depicted in the following graph. Your gas use peaks in the winter due to space heating. Energy projects that can reduce your natural gas use for heating will offer you the greatest savings potential.



Your monthly natural gas costs are based upon the number of therms you use within *each* applicable Rate Tier for that month – applicable Rate Tier(s) are determined by your monthly usage as a percentage of the PG&E Natural Gas Baseline. When considering the bill savings potential of your identified projects, please note the historic volatility of natural gas costs.

**PG&E NATURAL GAS BASELINES AND RATES**

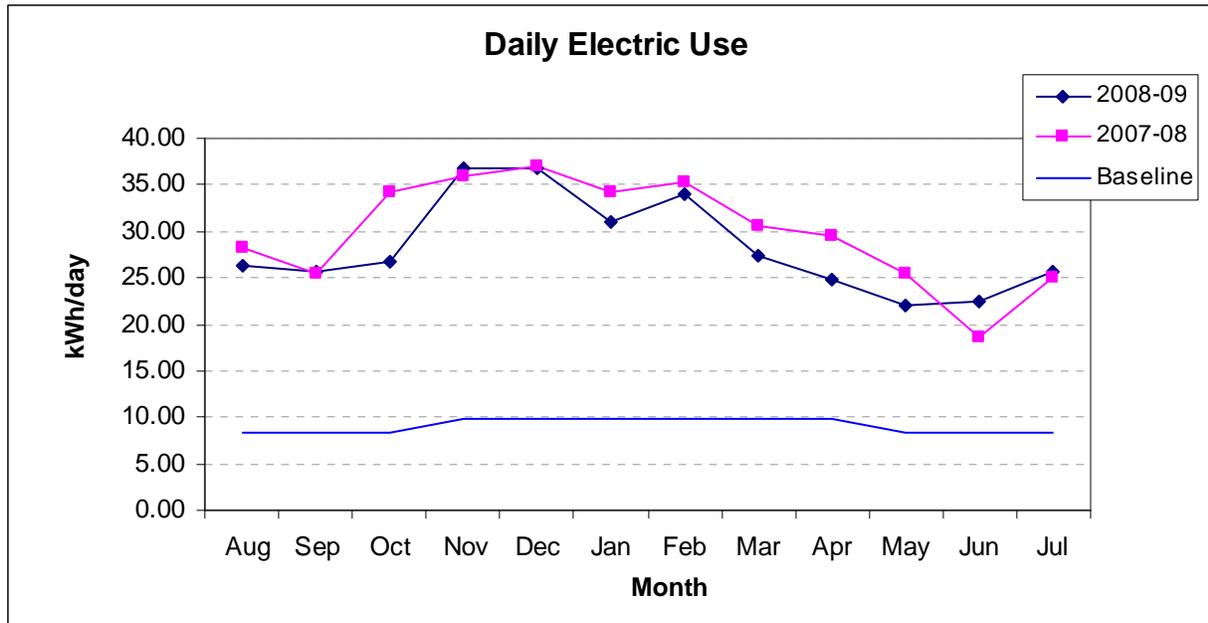
Rate	Daily therms (4/1 to 10/31)	Baseline conditions		Percentage of baseline	Current	Cost / therm	
		Daily therms (11/1 to 3/31)				Last two years Low (5/09)	High (7/08)
Tier 1	less than 0.69	less than 1.79		under 100%	\$0.98463	\$0.8174	\$1.9137
Tier 2	more than 0.69	more than 1.79		over 100%	\$1.23034	\$1.0631	\$2.1449

**MONTHLY USAGE AS PERCENTAGE OF BASELINE**

Year	Usage	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
2008-09	% of baseline	112%	97%	112%	115%	279%	160%	239%	160%	314%	182%	101%	98%
	highest tier	T-2	T-1	T-2	T-1								
2007-08	% of baseline	112%	126%	210%	127%	247%	270%	198%	141%	333%	201%	135%	117%
	highest tier	T-2											

**B.2. Electricity Use and Costs**

Your electricity use by month is depicted in the following graph. Your electricity use peaks in the winter due to increased lighting and general increased time within the home.



Your monthly electricity costs are based upon the number of kilowatt hours (kWh) you use within the applicable Rate Tier(s) for that month – applicable Rate Tier(s) are determined by

your monthly usage as a percentage of the PG&E Electricity Baseline. Energy projects that can reduce your electric use from the higher percentages of baseline will offer you the greatest bill savings. When considering the bill savings potential of your identified projects, please note that since 1980 the cost of electricity in California has increased at an average of 3.1% a year.

**PG&E ELECTRIC BASELINES AND RATES**

Rate	Daily kWh (5/1 to 10/31)	Baseline conditions		Percentage of baseline	Cost/ kWh
		Daily kWh (11/1 to 4/30)			
Tier 1	less than 8.3	less than 9.8		under 100%	\$0.1153
Tier 2	8.31-10.79	9.81-12.74		101-130%	\$0.1311
Tier 3	10.8-16.6	12.75-19.6		131-200%	\$0.2608
Tier 4	16.61-24.9	19.61-29.4		201-300%	\$0.3807
Tier 5	more than 24.91	more than 29.41		301+%	\$0.4435

**MONTHLY USAGE AS PERCENTAGE OF BASELINE**

Year	Usage	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
2008-09	% of baseline	318%	310%	323%	375%	376%	316%	348%	280%	254%	265%	271%	308%
	highest tier	T-5	T-4	T-4	T-4	T-4	T-5						
2007-08	% of baseline	340%	307%	411%	366%	377%	349%	361%	311%	301%	308%	225%	301%
	highest tier	T-5	T-4	T-5									

**C. PROJECT OPPORTUNITIES**

This report offers the following identified project opportunities based upon your stated energy efficiency and solar goals, your energy use and habits, and your household. The estimated potential savings and benefits below are calculated from typical technology applications and your 2008 energy usage. For more information on these and other ways to reduce your energy consumption, including simple low-cost tips, technology overviews, project advice, and additional information on incentives, please see the Project Resources.

**C.1. Energy Efficiency Projects**

A household’s energy consumption can be broken into four categories: Space Heating, Water Heating, Appliances and Electronics, and Lighting. Your opportunities for energy savings in each of these four categories are below. *Category totals* include only those measures which may pay for themselves in 15 years or less. Changes in energy costs will change this pay-back period.

**SPACE HEATING**

You use approximately 20% more natural gas for space heating than an efficient, similar sized Berkeley home according to the Home Energy Saver model. Due to the following conditions noted during the Site Visit, there are opportunities to reduce your natural gas use:

- Inconsistent temperatures within home; house feels cold
- Gaps in building envelope: older home with multiple remodels

- Lack of weatherization at all outside doors/windows
- Insulation levels: Attic – over 60%: less than 3 inches; Wall – 80% : none
- Older duct work insulated by asbestos

Space Heating Statistics		
Natural Gas used in 2008	777	therms
Estimated energy used to heat your home in 2008	501	therms
Estimated heat load per square foot of your home in 2008	0.18	therms / sq. ft.
Efficient space heating load (2 story, 3,000 sq. ft. Berkeley home) <sup>1</sup>	0.13-0.15	therms / sq. ft.

### Opportunities

Measure	Costs		Year 1 Potential Savings and Benefits						
	Initial	With Incentive*	Percentage	Energy	Bill	Pay-back (yrs.)	CO <sub>2</sub> (lbs.)		
1) Improve building envelope	\$7,146	\$5,147	natural gas: 14.1%	109 therms	\$176	29.2	1347		
a. Control air leakage	\$300	N/A	natural gas: 4.5%	35 therms	\$55	5.5	432		
b. Add insulation: attic	\$1,092	\$588	natural gas: 5.4%	42 therms	\$71	8.3	519		
c. Add insulation: wall	\$5,754	\$4,007	natural gas: 4.1%	32 therms	\$51	78.6	395		
2) Replace windows/ install storms	\$6,400	\$4,900	natural gas: 7.4%	57 therms	\$90	54.4	706		
3) Improve duct sealing/insulation	\$530	N/A	natural gas: 6.5%	50 therms	\$79	6.7	618		
<b>SPACE HEATING (measure 1a, 1b, 3)</b>	<b>\$1,922</b>	<b>\$1,418</b>	<b>natural gas: 15.4%</b>	<b>120 therms</b>	<b>\$192</b>	<b>7.4</b>	<b>1474</b>		

\* Reflects applicable PG&E rebates and the \$1,500 cap on federal income tax credits for all qualifying energy efficiency upgrades purchased in 2009 and 2010.

### Improve Building Envelope

A properly sealed and insulated home helps keep your home the temperature you want it to be. This can save energy by reducing the amount of conditioned air that is lost through your building envelope (the foundation, walls, roof, windows, and doors that are your home's barrier to outside conditions). In addition to energy savings, these projects could offer other benefits such as greater comfort and improved air quality within your home.

Costs and Incentives: The costs to control air leakage are typically low due to the low costs of weather stripping, caulking, and other necessary materials. Attic insulation costs are typically \$0.50-0.65 per square foot self installed. If you decide to work with a licensed contractor for these projects, labor will add to these costs. Wall insulation is best installed by a licensed contractor – costs can run \$2.00-\$5.00 per square foot of wall space. The following incentives are available for this project:

<sup>1</sup> Home Energy Saver: <http://hes.lbl.gov/>

Incentive	Measure	Qualifying Specification	Cost Savings	Notes
PG&E Rebate	Insulation	Must be new, installed between conditioned living area and unconditioned space	Rebate: \$0.15/sq. ft.	For attic and wall insulation only.
Federal Income Tax Credit	Insulation	Meets 2009 IECC & Amendments	Tax Credit: 30% of cost, up to \$1,500	For insulation to qualify, its primary purpose must be to insulate

### Replace Windows; Install Storms

Your remaining single pane windows offer an opportunity to address winter heat loss and summer heat gain in your home. Energy efficient windows can help to maintain interior temperatures by offering increased insulation and reflecting infrared light. Replacing windows may offer benefits in addition to energy savings, such as appearance, convenience, protection from ultraviolet light, sound reduction, and improved comfort. Windows in your home that are not of standard size may require custom order replacements.

Costs and Incentives: Replacement windows are a relatively large investment, and the savings alone may not justify such expenditure. The project cost included above is based on cost of \$400 per replacement window and the number of windows in your home. Custom made windows will increase project costs. The following incentives are available for this project:

Incentives	Measure	Qualifying Specification	Incentive
Federal Income Tax Credit	New Window / Door	U factor $\leq$ 0.30 SHGC $\leq$ 0.30	Tax Credit: 30% of cost, up to \$1,500
	Storm Window / Door	In combination with the exterior window over which it is installed, the unit has a U-factor and SHGC of 0.30 or below. Storm must meet the IECC.	Tax Credit: 30% of cost, up to \$1,500

### Improve Duct Sealing/Insulation

Ducts that are appropriately sealed and insulated will deliver heat efficiently through the house, provided the air intake, filter, and registers are open and clear. Many duct systems are leaky even when newly installed, and as systems age additional leaks can develop. The benefits above represent gains that may be possible by upgrading your current duct system; replacing your duct system may offer greater benefits. In addition to energy savings, sealed and insulated ducts will help to ensure more even distribution of heat throughout your home.

Costs and Incentives: The costs to seal and insulate ducts vary depending upon the total area needing improvement and the accessibility of these areas. The project cost included above is an estimation based upon upgrading a typical heating system of similar size and age to yours. If you decide to work with a licensed contractor and/or replace your duct system, these costs will increase. Currently, there are no incentives for this project.

## WATER HEATING

Your current natural gas use for water heating is efficient (compared to the average for PG&E customers using natural gas storage water heaters) due to your use of a tankless on-demand gas water heater. However, based upon the following conditions noted during your Site Visit, it may be possible to reduce your natural gas use for water heating:

- Low-flow water fixtures not installed at all water outlets

Water Heating Statistics	
Estimated energy used to heat water in 2008	195 therms
Average water heating load (3 person family) <sup>2</sup>	183 therms

### Opportunities

Measure	Costs		Year 1 Potential Savings and Benefits				
	Initial	With Incentive	Percentage	Energy	Bill	Pay-back (yrs.)	CO <sub>2</sub> (lbs.)
Install low flow fixtures	\$90	N/A	natural gas: 4.5%	35 therms	\$55	1.6	429

### Install low flow fixtures

Low-flow showerheads and faucet aerators can offer energy savings for water heating by reducing your overall hot water consumption by 25%–60%. Even if your fixtures have been upgraded to meet the City of Berkeley's RECO (Residential Energy Conservation Ordinance) standards, improvements can be made over these flow-rates as illustrated by the following table:

Flow rates in gallons per minute (gpm)				
Location of fixture	Conventional fixtures	Existing RECO standard	Current federal standard	Lowest available flow rate
Showerheads	5.0 gpm	3.0 gpm	2.5 gpm	<b>2.0 gpm</b>
Kitchen faucets	4.0 gpm	2.75 gpm	2.5 gpm	<b>1.0 gpm</b>
Bathroom faucets	4.0 gpm	2.75 gpm	2.5 gpm	<b>0.5 gpm</b>

Costs and Incentives: You can purchase quality, low-flow fixtures and aerators for between \$10-20 each. The project cost included above is an estimation based upon the average number of fixtures that could be upgraded in a home like yours. The following incentives are available for this project:

Incentives	Measure	Qualifying Specification	Incentive
EBMUD free water conserving devices	Shower head	2.0 gallons per minute	Free for EBMUD customers
	Kitchen aerator	1.5 gpm	
	Bathroom aerator	1.0 gpm	

<sup>2</sup> PG&E: <http://www.joinclimatesmart.com/>

## APPLIANCES AND ELECTRONICS

Your appliances and electronics account for both natural gas and electricity use. In addition to the opportunities below, the usage tips found in the Project Resources can provide opportunities for further energy savings.

### *Opportunities*

Measure	Costs		Year 1 Potential Savings and Benefits					
	Initial	With Incentives	Percentage	Energy	Bill	Pay-back (yrs.)	CO <sub>2</sub> (lbs.)	
Reduce plug load	\$20	N/A	electric: 1.6%	171 kWh	\$68	0.3	89	
Upgrade 2 <sup>nd</sup> refrigerator	\$1,000	\$965	electric: 4.3%	454 kWh	\$181	5.3	238	
<b>APPLIANCES</b>	<b>\$1,020</b>	<b>\$1,020</b>	natural gas: 0.0% electric: 5.9%	0 therms 625 kWh	<b>\$249</b>	<b>4.1</b>	<b>327</b>	

### Reduce Plug Load

Reducing plug load saves the electricity used by appliances and electronics when they are not in use but still plugged in. A number of tools and practices can help to reduce plug load, including the use of power strips with manual on/off switches, timers, and “sleep modes”. Unplugging charging cords, such as for laptops and cell phones, will also reduce plug load. Finally, by managing your use of large appliances (such as your second refrigerator) that are not needed every day, you can enjoy additional energy savings.

**Costs and Incentives:** The costs of reducing plug load vary widely. Simple power strips and timers can cost between \$5-10 each, with more expensive models available with additional protections. Utilized appropriately, these measures can pay for themselves in less than a year. Currently, there are no incentives for this project.

### Upgrade to Efficient Appliances

You can achieve savings by upgrading any appliance or electronic item to an ENERGY STAR rated product when it comes time to replace that item. In particular, the age of your second refrigerator means you could achieve significant savings were you to replace it. Compared to typical models over ten years old, a new ENERGY STAR rated refrigerator can use 50% less electricity.

**Costs and Incentives:** The costs of upgrading appliances and electronics to ENERGY STAR and other high efficiency models vary based upon the specific product. The increased cost of that ENERGY STAR/high efficiency product is generally paid for by the associated energy (and, if applicable, water) savings within the first few years of service. The following incentives are available for this project (additional incentives may be available for other appliance upgrades – please see the Project Resources for more information):

Incentive	Measure	Qualifying Specification	Cost Savings	Notes
PG&E Rebate	Recycle refrigerator	Must be 10 to 30 cubic feet in size, empty and operational at the time of pickup	Rebate:\$35/unit	Limit of two refrigerators per customer, per year

## LIGHTING

Your electricity use for lighting presents an opportunity for savings. During the Site Visit, it was noted that most of your lighting is currently provided by incandescent and halogen lights.

Lighting Statistics <sup>3</sup>			
Estimated energy used by your home's lighting	15%	of electricity	1600 kWh
Typical savings with energy efficient lighting	50%	of electricity used for lighting	800 kWh

### Opportunity

Measure	Costs		Year 1 Potential Savings				
	Initial	With Incentives	Percentage	Energy	Bill	Pay-back (yrs.)	CO <sub>2</sub> (lbs.)
Upgrade lighting	\$90	N/A	electric: 7.5%	800 kWh	\$315	0.3	419

### Upgrade to Efficient Lighting

Efficient lighting involves the light bulb and the lighting fixture. Compact fluorescent light (CFL) bulbs and Light Emitting Diodes (LEDs) are both more efficient – offering electric savings of up to 75% – and longer lasting than incandescent bulbs, and come in an increasingly wide range of options. As you upgrade lighting fixtures, use “ENERGY STAR” rated products to further increase your savings. Purchasing quality lighting products can help to ensure that you enjoy the benefits of efficiency and longer product life – resources for such products are found in the Project Resources.

**Costs and Incentives:** The costs to upgrade light bulbs are typically low. The project cost included above is an estimation based upon the average number of bulbs that could be upgraded in a home like yours. Costs to upgrade light fixtures are not included in this estimation. Currently, there are no after-purchase incentives available for lighting. Certain lighting products (those bulbs and fixtures with a PG&E “Save” Sticker on the product box) have a rebate from PG&E already included in the purchase price.

## C.2. Solar Projects

You have project opportunities for solar hot water and electric.

### SITE INFORMATION

The location considered for a solar installation was your main roof. This location is well suited for solar due to the characteristics listed in the following chart.

Location 1 – SW facing Roof	
Estimated Space Available	215 sq. ft.
Orientation	240 degrees SW
Pitch of Roof	35 degrees
Shading	None
Condition of Roof	Good
Size/Spacing of Rafters	2x6 / 16 inch spacing
Electric Main	125 amps / slots available

<sup>3</sup> US DOE Energy Savers Program: [www.energysavers.gov/](http://www.energysavers.gov/)

<b>Location 2 – NE facing Roof</b>	
Estimated Space Available	120 sq. ft.
Orientation	60 degrees NE (modules to face opposite – SW)
Pitch of Roof	12 degrees
Shading	None

<b>Location 3 – SE facing Roof</b>	
Estimated Space Available	120 sq. ft.
Orientation	150 degrees SE
Pitch of Roof	35 degrees
Shading	None

Concerns for this proposed location include the following:

- For solar hot water: integrating solar hot water with your on-demand water heater may have additional costs.
- For solar electric: space constraints across multiple orientations on your roof may require a complex system design, the use of high efficiency modules, or the use of modules with micro-inverters, impacting project costs.

### **SOLAR HOT WATER (SHW)**

A solar hot water installation could be designed to provide for a portion of your hot water use, reducing your natural gas consumption to a lower percentage of the PG&E Natural Gas Baseline.

<b>Solar Hot Water Statistics</b>	
Average therms produced per square foot of installed SHW	2.6 therms / sq. ft.
Recommended installation size for family 3-4	64 sq. ft.
Estimated annual production of 64 sq. ft. SHW installation	166 therms

### *Options*

	<b>System A*</b>	<b>System B</b>
SHW system size - area of collectors (sq. ft.)	40	64
Estimated annual production (therms)	104	166
System price	\$4,700 - 5,950	\$7,500 - 9,500
Federal tax credit	\$1,410 - 1,785	\$2,250 - 2,850
Total cost with incentives	\$3,290 - 4,165	\$5,250 - 6,650
Projected Year 1 Natural Gas Bill w/o SHW	\$1,143	\$1,143
Projected Year 1 Natural Gas Bill w/ SHW	\$979	\$882
Projected Year 1 Natural Gas Savings	\$164	\$261
Pay-back (yrs.)	22.7	22.8
Potential Annual CO <sub>2</sub> Emissions Offset (lbs.)	1,280	2,050

\* System A is the system included within the “At-a-glance” chart.

### Project Explanation

The system sizes above are based upon the total area of solar hot water collectors that could be installed. Different types of collectors and system designs could be utilized but note that freeze protection is a design feature that is critical to protecting your solar hot water system.

SHW System A is sized to meet a significant portion of the hot water needs for a family of 2. This target was selected because of the number of long term residents within your household.

System A typically needs an auxiliary hot water storage tank with a capacity of at least 50 gallons. SHW System B is sized to meet a significant portion of the hot water needs for a household of 3-4 adults. This target was selected because of the current number and age of residents in your household and your current hot water use. System B typically needs an auxiliary hot water storage tank with a capacity of at least 80 gallons.

Costs and Incentives: The cost of a typical solar hot water installation like System A can range from \$4,700 to \$5,950, including equipment and labor. Additional installation costs as noted above may be necessary. The following incentives are available for this project:

Incentive	Measure	Qualifying Specification	Cost Savings	Notes
Federal Income Tax Credit	Solar Hot Water	Homeowners may only claim spending on the solar water heating system property, not the entire water heating system of the household. The system must be certified by the Solar Rating and Certification Corporation (SRCC).	Tax Credit: 30% of cost, no limit.	Must be placed in service before 12/31/2016

### SOLAR ELECTRIC (SE)

A solar electric installation could be designed to reduce your electric consumption to a lower percentage of the PG&E Electric Baseline.

Solar Electric Statistics	
Average Watts produced per square foot of installed solar	10 W / sq. ft.
Area needed to produce 1 kW of electricity	100 sq. ft.
Estimated annual production per 1 kW DC of installed solar	1,425 kWh

### Options

	System A*	System A with EE Upgrades	System B	System B with EE Upgrades
SE system size (kW DC - PTC)	3.76	3.26	4.51	3.91
Adj. capacity (kW AC - CSI)	2.89	2.51	3.47	3.01
Area of SE modules (sq ft)	376	326	451	391
Annual production (kWh AC)	5359	4644	6431	5573
Price per watt	7.50	7.50	7.50	7.50
System price	\$29,387	\$25,624	\$35,024	\$30,509
CSI rebate	\$3,181	\$2,756	\$3,817	\$3,308
Federal tax credit	\$7,862	\$6,860	\$9,362	\$8,160
Total cost with incentives	\$18,344	\$16,007	\$21,845	\$19,041
Projected Year 1 Electric Bill w/o SE	\$2,598	\$2,045	\$2,598	\$2,045
Projected Year 1 Electric Bill w/ SE	\$917	\$726	\$710	\$560
Projected Year 1 Electric Savings	\$1,681	\$1,319	\$1,888	\$1,485
Pay-back (yrs.)	10.9	12.1	11.6	12.8
Estimated Year 1 CO <sub>2</sub> Offset (lbs.)	5895	5108	7074	6130

\* System A is the system included within the "At-a-glance" chart. All systems reflect the costs of a second inverter.

### Project Explanation

The system sizes above are based upon the total production capacity (in direct current – DC – kilowatts) of the solar electric system that could be installed. This capacity could be met by different types of solar modules and system designs.

SE System A is sized to meet approximately 50% of your annual electric use. This target was selected because it could reduce your electric usage for most months (8 out of 12) to below 200% of PG&E Electric Baseline. Using high efficiency modules, a system of this size should be able to fit within Locations 1 and 2 as detailed above, though this arrangement may require a second inverter, increasing system costs. System B is sized to meet approximately 60% of your annual electric use. This target was selected because your roof (Locations 1, 2 and 3) has the area to accommodate a system of this size and it would offer you the greatest energy savings and environmental benefits. This arrangement would require a second inverter, increasing system costs. System B could reduce your electric usage for most months (7 out of 12) to below 130% of PG&E Electric Baseline. High efficiency modules may be able to increase the size of a system that utilizes all 3 locations details above.

Each system profile is also updated (“System A/B with EE Upgrades”) to meet a similar percentage of an annual electric load that has been reduced by your recommended electricity specific efficiency upgrades.

*Costs and Incentives:* The cost of a solar electric installation, including all equipment and labor, can range from \$7.50 to \$9.00 per watt of DC electricity installed. Additional installation costs as noted above may be necessary. Over the life of the system (typically 25 years), you can also anticipate to replace the inverter (which should have a warranty of 10 years) at least once, at an additional cost of approximately \$1,200. The following incentives are available for this project:

Incentive	Measure	Qualifying Specification	Cost Savings	Notes
CA Solar Initiative Rebate	Solar Electric	System must be installed at a property served by PG&E. Equipment must on the CEC “Eligible Equipment List”.	Rebate: \$1.10 per CSI Watt installed *	One time rebate paid when the system is connected to the PG&E Electric Grid.
Federal Income Tax Credit	Solar Electric	System must provide electricity for the residence, and must meet applicable fire and electrical code requirement.	Tax Credit: 30% of cost, no limit.	Use <a href="#">IRS Form 5695</a> . Must be <a href="#">placed in service</a> before December 31, 2016.

\* As of October 1, 2009. For more information on this rebate and its conditions, please see the Project Resources.

*Costs and Incentives:* Due to the large cost of solar electric, you may choose to finance an installation. An example of the benefits of financing such costs through a 10-year home equity loan has been provided in the Appendix. Solar installation companies may also offer leasing or other similar financing options that do not provide you with ownership of the system but can provide you solar electricity at a monthly payment that is less than a monthly loan payment.

## D. NEXT STEPS

Based upon your project opportunities, you now need to determine if, and how, you want to move forward. There are several things to consider in relation to this process.

*Do you anticipate changes in how you use energy?*

If you anticipate a major change in your life (an additional person staying in your home, adding a major appliance or an electric vehicle, etc.), it is important to be aware of how this might impact your overall usage.

*What is your budget? What is the likelihood that project costs will change?*

Decide what your project budget is, and prioritize your projects accordingly. Changes in project costs can be difficult to predict as they are based on a number of market factors. Incentive programs however generally have very specific conditions, including their dates and rates of availability. It is important to be aware of these conditions, as incentives can have a significant impact of your final project cost.

*How will you carry out this project?*

Do-it-yourself projects, such as upgrading light bulbs, always cost less as you are providing the labor. For other projects, you may choose to work with a licensed contractor. If you think that you are going to pursue financing for your project, begin researching the available options so you can include financing costs (down payments, interest, etc.) into your planning.

*When is the best time to start a project?*

The sooner a project is pursued, the sooner you can enjoy the benefits of reduced or offset energy usage. In general, space heating projects are best pursued in the summer months.

## **D.1. Additional Project Resources**

### **INFORMATION AND PRODUCT**

The Project Resources document offers additional information and examples of products that may assist you in carrying out your project. Many other resources are available from PG&E, the United States Department of Energy, ENERGY STAR, and independent companies.

### **INDEPENDENT COMPANIES AND CONTRACTORS**

It is possible that many different companies may sell the equipment and materials you may want to use in your project. Shop around to learn about the product options and costs that are most appropriate for your needs.

A licensed contractor can also help you to plan and carry out your project. It is a good idea to request project proposals from at least three different contractors for any one project. Specific contractor guidelines can be found in the Project Resources.

### **SMARTSOLAR SERVICES**

SmartSolar can offer you with additional advising in the course of your project. We are happy to help you compare project bid proposals from contractors and answer specific questions you may have about the equipment and products you may want to use in your project.



## SmartSolar Site Report - Appendix

Client: Client Twenty-five  
 Phone: 510-555-5555  
 Visit Date: 9/14/2009

Address: 101 Solar Rd., Berkeley, CA 94708  
 Email: solarclient@yahoo.com  
 Report Date: 10/13/2009

### ENERGY USAGE

The following chart displays your electricity and natural gas usage over the last eighteen months. The italicized information has been estimated from typical Berkeley energy statistics and PG&E rate information.

Month	Gas Usage (therms)	therms/day	% of Baseline	Gas Charges (\$)	Elec Usage (kWh)	kWh/day	% of Baseline	Elec Charges (\$)	Bill Total (\$)
Jul-09	21	0.68	98%	\$23.19	793	25.58	308%	\$202.80	\$226
Jun-09	21	0.70	101%	\$22.82	674	22.47	271%	\$165.61	\$188
May-09	39	1.26	182%	\$42.53	682	22.00	265%	\$168.87	\$211
Apr-09	65	2.17	314%	\$78.00	747	24.90	254%	\$175.28	\$253
Mar-09	89	2.87	160%	\$104.33	852	27.48	280%	\$209.56	\$314
Feb-09	120	4.29	239%	\$100.37	955	34.11	348%	\$250.54	\$351
Jan-09	89	2.87	160%	\$118.62	959	30.94	316%	\$249.73	\$368
Dec-08	155	5.00	279%	\$190.32	1142	36.84	376%	\$313.30	\$504
Nov-08	62	2.07	115%	\$74.08	1102	36.73	375%	\$295.66	\$370
Oct-08	24	0.77	112%	\$33.41	831	26.81	323%	\$224.80	\$258
Sep-08	20	0.67	97%	\$29.75	773	25.77	310%	\$187.13	\$217
Aug-08	24	0.77	112%	\$43.88	817	26.35	318%	\$190.76	\$235
Jul-08	25	0.81	117%	\$52.56	774	24.97	301%	\$171.27	\$224
Jun-08	28	0.93	135%	\$52.94	560	18.67	225%	\$107.59	\$161
May-08	43	1.39	201%	\$75.73	792	25.55	308%	\$185.11	\$261
Apr-08	69	2.30	333%	\$119.42	886	29.53	301%	\$200.41	\$320
Mar-08	78	2.52	141%	\$116.56	945	30.48	311%	\$228.48	\$345
Feb-08	99	3.54	198%	\$139.96	990	35.36	361%	\$231.74	\$372
Jan-08	150	4.84	270%	\$214.15	1061	34.23	349%	\$261.80	\$476
Dec-07	137	4.42	247%	\$205.41	1144	36.90	377%	\$298.91	\$504
Nov-07	68	2.27	127%	\$93.94	1076	35.87	366%	\$273.68	\$368
Oct-07	45	1.45	210%	\$65.99	1058	34.13	411%	\$278.83	\$345
Sep-07	26	0.87	126%	\$35.88	764	25.47	307%	\$184.99	\$221
Aug-07	24	0.77	112%	\$32.13	876	28.26	340%	\$216.63	\$249

## PROJECT FINANCING EXAMPLES

1) All project opportunities summarized in the “At-a-glance” chart from page 2 of your Site Report.

Financial Savings for Energy Efficiency and Solar Projects		
LOAN AMOUNT: \$37,570	Years 1-10 (average)	Years 11-25 (average)
PG&E bill (without upgrades)	\$4,400	\$7,000
- Estimated PG&E bill (with upgrades)	\$1,500	\$3,700
= Savings in gas and electricity costs	\$2,900	\$3,300
Savings in gas and electricity costs	\$2,900	\$3,300
+ Tax savings from interest payments	\$1,100	\$730
+ Federal income tax credit: 1-time credit of \$4,800	\$1,100	
- Financing (cost) from loan	(\$3,800)	(\$2,600)
= Savings or (cost) to "go green"	\$1,300	\$1,400
Year 1 average monthly savings/credits	\$392	per month
Year 1 monthly loan (payment)	(\$319)	per month
Average annual savings or (cost) over 25 years	\$1,400	per year
Net present value of investment	\$18,000	

Note: Sums may not be exact due to rounding. Savings for years 11-25 includes inverter replacement in year 12.

2) Solar Electric “System A” – the solar electric system included in your “At-a-Glance” chart.

Financial Savings for System A purchased through Financing		
LOAN AMOUNT: \$26,210	Years 1-10 (average)	Years 11-25 (average)
PG&E Electric Bill (w/o SE)	\$3,000	\$4,300
- Estimated PG&E Electric Bill (w/ SE)	\$1,200	\$1,900
= Savings in electricity costs	\$1,800	\$2,400
Savings in electricity costs	\$1,800	\$2,400
+ Tax savings from interest payments	\$770	\$510
+ Federal income tax credit: 1-time credit of \$5,900	\$790	
- Financing (costs) from loan	(\$2,700)	(\$1,800)
= Savings or (costs) to “go green”	\$660	\$1,100
Year 1 average monthly savings/credits	\$270	per month
Year 1 monthly loan (payment)	(\$222)	per month
Average annual savings or (costs) over 25 years	\$920	per year
Net present value of investment	\$11,000	

Note: Sums may not be exact due to rounding. Savings for years 11-25 includes inverter replacement in year 12.

Both financing examples are based upon the following assumptions for a home equity loan. Other financing options with different terms may offer lower monthly payments.

Key Assumptions	
Federal income tax rate (%)*	30.00%
State income tax rate (%)	9.30%
Loan rate	6.99%
Administrative Fee	\$0
Loan term (years)	10
Down payment	0%
Assumed annual increase in electricity price (%)**	3.0%
Assumed annual increase in gas price (%)	5.0%
Annual performance degradation of solar electric system	1.0%
Yearly O&M costs of solar hot water and electric systems	\$0
Replacement Inverter in year 12 for solar electric system	\$1,177

\* Federal and state income tax rates are used to calculate how much you can save by deducting the interest on your loan.

\*\* The rate of increase of electricity price determines how quickly solar will start saving you money. From April 2007-April 2008, electricity prices increased 4.7%.