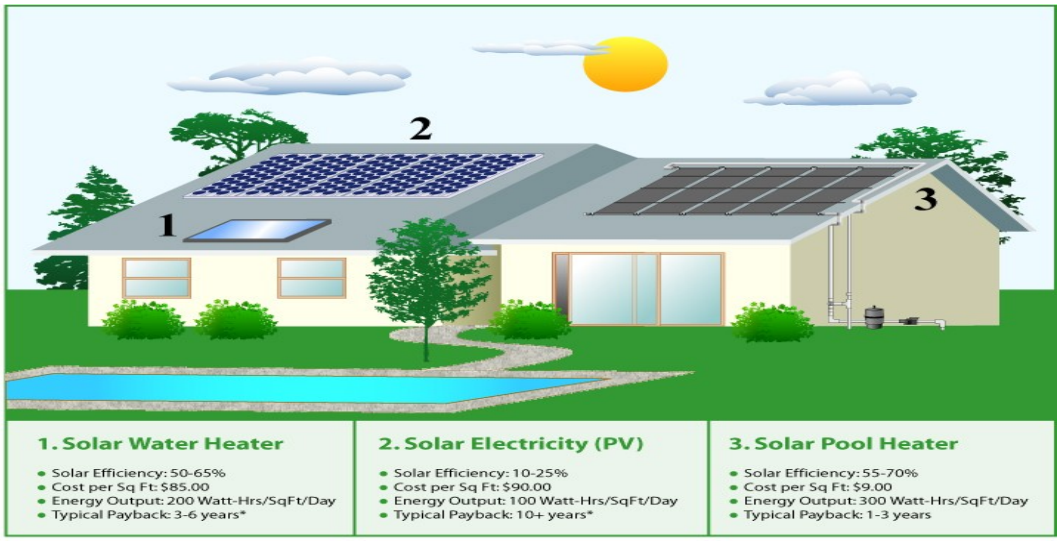
16 Tips on Doing a Solar Home Make-Over in the Sunshine State

Florida has a virtually limitless and nearly untapped natural resource at its fingertips, and on its rooftops. Here Dale Gulden, CEO of Solar Direct, gives homeowners an overview of ways to tap into solar power to reduce utility bills as well as have an environmentally friendly home.



Solar Efficiency – This is the percentage of output of a solar panel compared to the average solar energy hitting the earth from the sun.

Watt-Hrs/SqFt/Day – This represents energy output stated as the amount of Watts [1000 Watts = 1 KW] per hour generated for each square foot of solar panel on a typical day.

Figures are derived from FSEC and Shell Solar. Source: Solar Direct

1. **Q. What is a Solar Home Make-Over?**
   A. Simply stated, a solar home make-over harnesses the power of the sun through the use of solar panels to provide your home with an efficient, clean and renewable energy source. This energy is then converted into a form of heat, such as solar water heating, or as electricity, such as solar photovoltaic, making your home energy independent. Especially for Floridians, using solar energy for your home has particular value during the hurricane season, allowing you to avoid storm-related power outages. Stories are in the news daily regarding homes being built or retrofitted with solar systems. ABC's "Extreme Makeover: Home Edition" presented James Dolan of St. Petersburg, Florida, with a new home fit with a solar system.

2. Q. Why should I consider a Solar Home Make-over?

A. First of all, you will become energy independent. This means that you will have your own supply of energy allowing you to avoid any future sharp increases in fossil fuel-based electricity. Second, there is also an increasing consensus that "green" energy-efficient upgrades such as solar water heating, solar pool heating and solar photovoltaic will add resale value to your home. According to the Green Building Appraisal Journal, for every $1 in annual energy savings, $20.73 is added to a home's resale value. In fact, many mortgage finance companies such as Fannie Mae recognize this idea with "Green Mortgages", where the financing of energy-efficient appliances and solar devices are rolled into the total mortgage. By spending less money on utilities, mortgage companies believe that homeowners will have greater discretionary income to spend on upgrading other aspects of their home.

Finally, there are immense environmental benefits to consider. Did you know that the energy required by a typical water heater emits **2 TONS** of carbon dioxide per year? A single passenger car driven 10,000 miles per year contributes approximately 1 ton of carbon dioxide per year. Contrary to popular belief, car emissions do not produce the highest amount of carbon dioxide per year. According to the Earth Policy Institute, electricity generation is by far the largest share at 35%. This is due to the fact that heating and cooling buildings constitutes about 14% of all energy use of the building. More reliance on solar energy causes a reduced demand for fossil fuels and will improve the environment by reducing air and water pollution as well as the heat-trapping gases that cause global warming.

3. Q. What can I do to "solarize" my home and what are the primary benefits?

A. There are three main ways to "solarize" your home:

- First of all, you can invest in solar electricity, also known as photovoltaic (PV). Because the media has written a lot about this subject it is the most well-known, but it is also the most expensive. A 3-4 KW [Kilowatt] system for a 3000 square foot home can cost from $24,000 to $40,000. While payback doesn't occur for some 10 years or more, this option is becoming more appealing to Florida homeowners with $400 - $900 per month utility bills. Electric bills can be reduced immediately by 2**0 to 90%.** Plus solar can be used as a backup during power outages, a big plus during hurricanes and storms.

- Solar Water Heating (SWH) is a second option. Hot water heating accounts for 25 to 30% of an average U.S. household's energy usage. Given the upfront costs for a system ($3,000-$5,000), a SWH on a new house provided as part of "Green Mortgage" or conventional mortgage, allows for **immediate** pay-back. (The savings in monthly utility bills exceed the corresponding increase in monthly mortgage payments.) Even as a retrofit, a SWH results in an average 2 to 4 year return on investment. Installing a solar domestic hot water system can reduce your hot water heating bill by 75 to **95%,** potentially saving you hundreds of dollars a year. Using sunshine to heat your water is free, environmentally friendly and cost competitive.

- Finally, you can install a solar pool heating system. Solar pool heaters start at less than $2000 and go up to $6,000, depending on the size of the pool. The cost of heating a pool with conventional fuels ranges from about $500 per season to more than $2000 per year. Most pool owners with electric, fuel oil or propane heaters no longer use them because of high cost. Here in Florida Solar Pool Heating offers the tremendous additional value of doubling your effective pool use season – all for zero operating costs.

  Table 1 shows the considerable payback periods of a solar pool compared to heating with other conventional fossil-fuel based sources.

Table 1: Simple payback periods for solar pool heating

Fossil fuel replaced	Solar savings	System cost of $2,500
Natural gas @$1.39/therm	$1612	1.6 years
Propane LPG @$1.75/gal	$2223	1.1 years
Electricity @$0.089/kWh	$2270	1.1 years
Fuel oil @$1.50/gal	$1243	2.0 years

Source: Florida Solar Energy Center
From http://www.fsec.ucf.edu/solar/APPS/POOLHTG/PoolSzg.HTM#Economics

4. **Q. Which solar upgrade is best to reap maximum energy savings?**
A. Figure 1 compares the efficiencies and costs for photovoltaic solar electricity (PV) versus solar water heating (SWH) versus solar pool heating (SPH). Given the same size solar collector, SPH turns out to be the most efficient in converting the sun's energy into useable energy, with an average output of 300 watt-hours per square foot per day; household solar hot water heating produces 200 to 250, whereas PV's output is only 100. Overall SPH is the best bargain, with a very low cost per square foot of panels, and the shortest payback period of one to three years. The PV systems, although attractive for other reasons, have the highest cost per square foot, and longest payback period. A very important consideration when designing a solar electric system is to reduce consumption through other methods in order to reduce the amount of electric required by the system. Areas such as usage habits, insulation, air conditioning, water heating, lighting and more should be examined for solutions to reduce power consumption.

5. **Q. Which groups receive the most benefit from adopting solar energy sources?**
A. Everybody benefits from the economic savings drawn from solar energy sources – homeowners and businesses.

Homeowners can benefit from all three technologies. Solar Pool Heaters are the most common in Florida – eliminating the high cost of fossil fuel heaters, and extending the season almost year-round. Solar Water Heaters are also very attractive, as the annual savings for a family of four can average $650 – yielding an average tax free return on investment (ROI) of 17-35%. Solar Electric systems are becoming more popular due to the generation of free electricity, plus the added security of power during outages. The immediate results from the installation of a photovoltaic (PV) solar system are a dramatic 20-80% decrease in electricity bills**. One example translates into an actual monetary savings of $6,480 per year for a 3000 square foot home with a monthly utility bill of $900. In 10 years, that savings would be $64,800; 20 years it would be $129,600**. These systems avoid price hikes in electricity, especially attractive to people living on a fixed income such as retirees, who would benefit greatly from a solar energy system's economic savings, Solar energy is very low maintenance, with no operating costs, thus giving you one less monthly line expense to preserve discretionary spending.

Home Owner Associations (HOAs) also would find the economics particularly appealing. Solar water and pool heating adds property value and decreases overall utility bills on common areas supported by membership fees.

Businesses benefit mostly when using Solar Water Heaters to offset the high cost of process water heating. Many industries use large volumes of heated water in various processes, and with the cost of gas increasing 50 to 150% over the last several years, these costs can be greatly reduced using solar energy. Solar Electricity is also a viable alternative in many applications, especially where local utility power is not available, or costly to bring on-site.

6. Q. There are many states that have rebates and tax incentives that can reduce the cost of home solar equipment. What kind of state or utility solar incentives exist in Florida?

A. The 2005 Federal Energy Act contains solar equipment incentives that went into effect January 1, 2006. This legislation increased the previous 10% tax credit for commercial solar installations to 30% for two years. This credit applies to all property placed in service after December 31, 2005 and before January 1, 2008. After that point, the credit reverts to the permanent 10% credit. It also creates a new 30% tax credit for residential solar installations for two years that is capped at $2000. (There is no cap for commercial installations.) Many solar technologies, including photovoltaic electricity (PV), solar water heating, CSP, and solar hybrid lighting, are eligible to claim the credit.

The Florida State Legislature recently voted in several solar rebates to Florida residents who add new solar elements to their homes including solar water heaters and solar photovoltaic (electric) equipment. See Table 2

Table 2. Solar Incentives Available to Floridians

R = Residential C= Commercial	Solar Energy System Incentives Program Maximum	2005 Federal Energy Act Maximum
Solar Water Heater (R)	$300/500[1]	30% capped at $2,000
Solar Water Heater (C)	$5,000[2]	30% with No Cap
Solar Electricity (R)	$20,000[3]	30% capped at $2,000
Solar Electricity (C)	$100,000[3]	30% with No Cap
Solar Pool Heating (R/C)	$100	n/a

[1] $500 for state-manufactured SWH - $300 for out-of-state manufactured SWH
[2] $15 per 1000 BTUs
[3] $4 per watt for first year, decreasing by 50 cents per year over 5 years

Source: Bill Text at: www.myfloridahouse.gov/Sections/Bills - see SB 888
Solar Direct Inc.

A handful of Florida utility companies have designed programs to reward consumers for upgrading to solar. For example, the Jacksonville Electric Authority (JEA) launched the Solar Incentive Program to provide financial incentives to residential and commercial customers who install new and retrofit solar hot water heaters on homes and businesses. There is a maximum award of $25,000 for each new installation and up to 30% of total cost (up to $500) to restore an existing solar water heating system to working order. Additionally, Gainesville Regional Utilities customers are privy to a $300-$450 rebate for new solar water heating systems. Florida Power and Light (FPL) consumers are encouraged to take part in the Sunshine Energy program where consumers elect to pay an extra $9.95 per month to offset the cost of purchasing renewable resources for the program. However, the customer demand for these resources and the portion of the monthly cost used to procure renewable resources can help spur the development of new resources nationwide -- and new solar generation in Florida. Finally, Lakeland Electric pioneered the most innovative program of all, offering solar water heater systems free to residents who only pay for the 20-30% of electricity needed to heat their home water.

7. **Q. How do I know if my home can support solar upgrades?**
A. Generally, unless densely covered by trees, most homes can use a solar solution. While the general rule is that "South facing" roofs work best, (for obvious sun exposure), you can also use roofs facing East, West and even flat roofs. Where limited or steep roofing presents an issue, many find ground-based systems workable, providing there is enough property to support the panels**.** Undoubtedly, the best time to consider installation is while the house is still in design phase to maximize the sun exposure and roof placement. However, systems can generally be retrofitted to most homes.

8. **Q. Can I install a Solar System myself?**
A. Many Solar Pool Heaters are available as do-it-yourself kits with easy to follow instructions and readily available customer service support. At Solar Direct, over 50% of our solar pool heaters are installed by homeowners. Solar Water Heaters can also be self installed by an experienced handyman, but are often best installed by a licensed solar contractor due to plumbing intricacies. Solar Electric PV systems are more complex, and generally require a licensed contractor – do-it-yourselfers will often install some part of the system, and then hire a Solar or Electrical Contractor to complete the wiring and electronic components.

9. **Q. Will solar equipment obscure and devalue the property value of my home?**
A. Solar has increasingly come to be aesthetically acceptable and even has an "Eco-Chic" value. Traditional solar panels are not the only variety currently available. There are low relief profiles that mold with your roof contour as well as solar tiles and even solar patios in the market. Property values of "green homes" actually have a 5% premium value increase according to Environmental Building News (EBN).

10. **Q. What does a homeowner want to look for in a solar system?**
A. There are many types of solar water heaters available, but for a highly reliable, care-free system, a passive-type system known as Integral Collector Storage (ICS) should be given strong consideration. These systems contain the water storage and collector all in one simple unit. The system has no moving parts for near-zero maintenance. ICS systems are also low profile, aesthetically pleasing and many of these systems have a 30-year life. Active-type systems are also popular, but have higher maintenance costs due to mechanical parts, so replacement costs can lower the savings benefit.

Solar Pool Heaters have very similar efficiencies, so important considerations would include the quality, warranty and price. SPH panels are typically made from plastic, and like roofing shingles, eventually wear out in the brutal Florida sunshine – so look for heavy grade panels with a proven track record for extended life expectancy.

Solar Electric PV systems are relatively new in the market, so they all tend to be state of the art. Look for features that give added value like monitoring readouts to let you know how much you are saving, or battery backup options for power during outages.

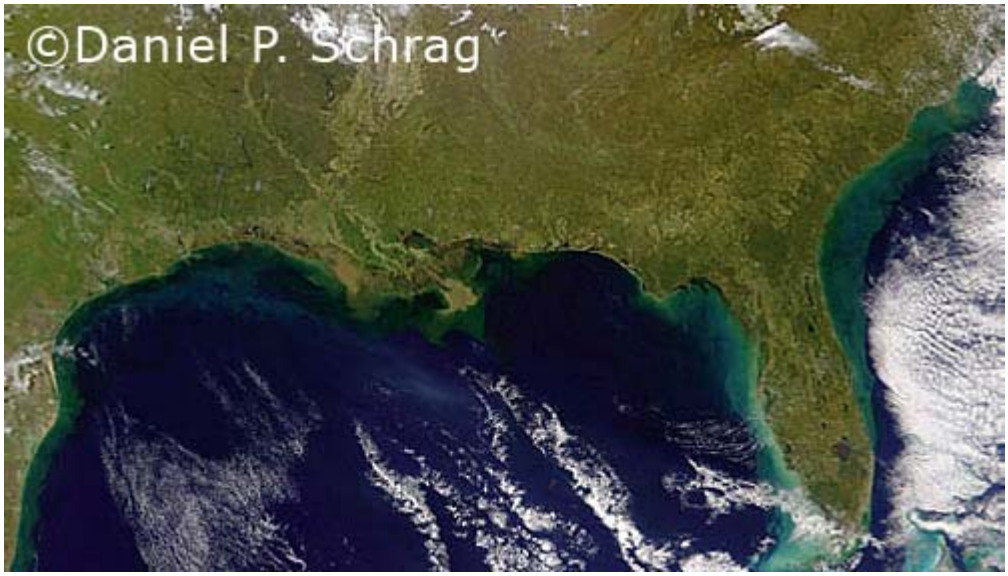
11. **Q. How do I know if the solar equipment is reliable? What kind of warranties can I get?**
A. Florida requires that all solar equipment be certified by FSEC (Florida Solar Energy Center). FSEC tests all equipment and publishes output and efficiency ratings. The Florida Solar Energy Industry Association (FlaSEIA) publishes a member directory, including trained and certified installers. To further insure that you are getting reliable equipment, FlaSEIA has created a program for homebuilders called SunBuilt. The SunBuilt Program is an incentive-based solar program, designed to give builders and potential clients the opportunity to interact with solar water heating technologies. In order for a SunBuilt provider to receive an incentive, they must follow strict guidelines to install reliable equipment. In addition, most solar equipment has an exceptional 10 year warranty. Many solar water heaters have a 30 year warranty.

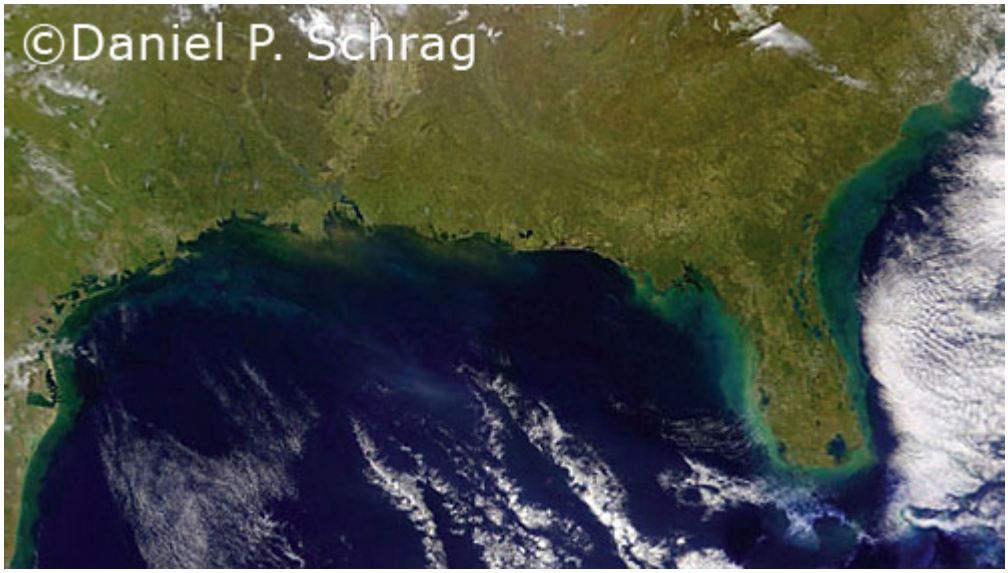
12. **Q. How am I contributing to the environment by using solar water heating and solar pool heating?**
A. Solar energy equipment does not pollute. For instance, by investing in a solar water heater you will be avoiding carbon dioxide, nitrogen oxides, sulfur dioxide, and the other air pollution and wastes created when your utility generates power or you burn fuel to heat your household water. By installing a solar water heater, a family of four, who currently use an electric water heater and consume an average of 80 gallons of hot water per day, will prevent 3,400 pounds of greenhouse gas emissions each year. This represents a reduction in household greenhouse gas emissions of 20% or more for a typical household. Considering the fact that monthly solar savings would exceed the impact of its cost on your mortgage payment; this is something no new Florida home should be without.

A Renewable Portfolio Standard (RPS) is a policy that requires those who sell electricity to have a certain percentage of "renewable" power (i.e. wind, solar, biomass, geothermal) in their mix. Some 22 U.S. states support a Renewable Portfolio Standard (RPS), Florida does not. This means our state utilities have no incentives to convert to renewable energy sources. Consumers should urge their state representatives to enact more incentives to use the most abundant resource Florida has, the sun. Beyond the National Renewable Energy Laboratory's identifying Florida as an ideal candidate for biomass, other energy reports have identified solar and wind energy as good candidate energy sources for the Florida geography.

Most scientists are in good concordance that man-made activities are contributing to climactic change, specifically to Global Warming or the "greenhouse gas effect". Fossil fuels provide 80 percent of the energy that powers civilization. The more fuel we burn, the more heat-trapping greenhouse gases we produce, principally carbon dioxide (CO_2). Carbon is coming from fossil-fuel combustion as indicated in isotopic fingerprinting of the carbon.

Daniel Schrag, Director of the Harvard University Center for the Environment, commissioned sea-level rise simulations showing what would happen to South Florida if sea levels rose 3.5 meters – equivalent to the volume of water produced if half the Greenland ice sheet melted. As shown in the figures below, all of South Florida, as far north as Lake Okeechobee, would be under water. Schrag has estimated that, given the measured rise in atmospheric CO_2, such an ice melt could be possible as early as within 100 years.





Sea-level rise simulations by Jared T. Williams. Copyright © Daniel P. Schrag. Source: Fueling Our Future. Harvard Magazine, May 2006.

13. Q. Can my utility meter "spin backwards" using solar power? Will my utility give me credit for my solar-based energy usage?

A. Net Metering is a method of crediting customers for electricity that they generate on site in excess of their own electricity consumption. If such customers generate more than they use in a billing period, their electric meter turns backwards to indicate their net excess generation. In some areas of Florida, customers are indeed selling back and getting credit for excess electricity.

14. **Q. Is using solar energy for electricity and hot water heating a new concept?**
A. No, it is not a new concept. Although the use and acceptance of solar energy in this way has gone through many cycles of popularity as new fossil fuels were discovered, solar water heating has been a common use of solar energy for more than 100 years. Today, more than one million buildings in our country alone use state-of-the-art solar equipment to heat water, and over three hundred thousand families use solar for heatings of their swimming pool.

15. **Q. Don't solar panels require a lot of maintainence?**
A. Your solar-electric system requires little to no maintenance. Photovoltaics have no moving parts and the system needs as much maintenance as your home's main electrical panel. In fact, normal weather such as rain and wind clean the panels sufficiently to maintain efficiency. Solar water heating collectors such as the Integral Collector Storage (ICS) system has been known to perform flawlessly for 20-30 years without maintenance. Solar pool system collectors of the heavy duty variety can last 15-20 years or more and only require an occasional simple check-up to be sure that they are securely fastened. Last season's hurricanes had little affect on well installed solar systems.

16. **Q. Where can I find more information on solar upgrades to my home?**
A. Go to www.SolarDirect.com for more information on a wide variety of solar upgrades for your home. To view approved systems visit the Florida Solar Energy Center at www.fsec.ucf.edu. Solar Direct provides installations state-wide in Florida; find a detailed list of other contractors at the Florida Solar Industries Association website at www.flaseia.org.

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