So You Want To Go Solar … (!)

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Introduction

Twenty years ago I was working for a solar company, designing solar energy systems for people who want to live "off the grid." The phone would ring all day long and many people had the same questions. To save time, I wrote a short document called *So You Want To Go Solar …(!)* which we mailed out for free to people interested in residential solar systems (this was before there were PDFs and email!).

A lot has changed in the last two decades. People don't live off the grid that much, but many people are putting solar panels on their roofs and running their meter backwards when the sun shines. Tax credits are now available, and the technology has advanced. For me, I no longer work for a big solar company; I run a solar educational project.

But while much has changed, I still find myself answering the same types of questions. It occurred to me that an update and reprint of *So You Want To Go Solar … (!)* would be helpful to the many people out there who would like to know more about "going solar" today.

Gary Beckwith, March 2010

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2. What it Means to "Go Solar"

There are a few different types of solar energy systems. A *solar thermal* system will heat up your water or even your living space, whenever the sun shines. In contrast, a *solar electric* system (also called a *photovoltaic* system) creates electricity that can be used to power appliances. This is the type of system we will focus on in this document. See the resources at the end for more on solar thermal systems.

The exciting new development in solar electric technology is that you no longer have to choose between going solar and using grid power -- you can do some of both and the two sources of power can be integrated. With the grid for backup, batteries are no longer required. And if your solar panels are producing more power than you're using, like on a sunny day when you're at work, you can actually *run your meter backwards* and sell power back to the power company!

A basic system consists of a *solar array* (one or more solar panels) and an *inverter* that connects your solar panels to grid power (your local utility company). Whenever the sun shines on the panels, they make electricity that is clean, renewable, and free! When you use your appliances, the electricity comes directly from the panels. If you need more power than your panels are producing, the extra comes from the power company. At the end of the month, you receive a bill from your power company for the net amount. If you produced more than you used in a month's time, your power company may give you a credit, or even cash.

You can design a system to meet any portion of your electricity demand. Many people have a solar system that provides approximately half of their electricity use.

3. Advantages of Solar Energy

If you're reading this, there's probably some reason you're interested in solar. Maybe you want to do what's good for the planet. Maybe you want to save some money. The reasons for going solar and the advantages of using solar energy are numerous:

1. At a time when global warming and climate change are very real concerns, going solar offers a way for people to reduce their carbon footprint and impact on the planet.
2. Electricity from solar panels is truly clean and renewable. The main ingredient in solar panel manufacturing is sand – one of the most abundant materials on Earth. When the panels make power, there is no pollution.

3. Reliability – if you live in an area where power outages are common, a solar electric system can provide you with steady and reliable power, even when the power company goes down.
4. Cost – at a time when utility rates are increasing, a solar energy system provides a way to lock in at a steady rate for long term.

4. Affordability and Payback

It used to be that only rich people could even think about going solar. But for many reasons, there's never been a better time to go solar and it has become much more affordable:

1. The price of solar panels has declined slowly but steadily.
2. A federal tax credit will pay for 30% of the total cost of a system.
3. Many states have tax credits as well. In some states, as much as 80% of the system cost is paid for by government grants and tax credits.
4. Expensive batteries are no longer needed.
5. A system no longer needs to provide 100% of the household's power use.

The price of a specific system varies greatly because of several factors including: the amount of sunshine, the price for utility electricity, the size of the system, and the amount of financial assistance available from state and local governments. A typical system is described below.

Example System: A typical system in Vermont has about 2,000 watts of solar panels, and provides about half of the electricity demand of a household. After the tax credits and rebates, this system would cost about $10,000 to the homeowner (including installation).

Payback? *Payback* (sometimes called *return on investment*) is defined as the amount of time it takes for an initial investment to pay for itself in future savings. When considering solar, focusing just on payback tends to over-simplify the decision, because economics is not the *only* reason people consider going solar. People make many purchases without considering the payback at all (do we consider the payback when we buy a new car or a television?). A solar system offers many things that can't be measured in a payback calculation – like the knowing that your electricity is coming from a renewable source, and comfort of knowing you have more reliable power.

With the current price of electricity and solar panels, the typical $10,000 system outlined above would have a payback of approximately 20 years. But if you add in the increasing trend for the price of utility power, the payback is about 15 years. In fact, every time the utility company raises their rates, your solar system becomes more valuable and the payback goes down. In this way, a solar system is a great hedge against increasing utility rates. To take it a step further, some utility companies (including Green Mountain Power in Vermont) offer an incentive to produce solar energy. Under this program they pay you a better price when you run your meter backwards, than you pay them when it runs forward. This would further reduce the payback to as low as 12 years. *Note:* this payback example is based on the typical system outlined above. A different system in a different location will have a different payback. If your price for utility power is higher, if you have more sun than Vermont, or if you have better state tax incentives, your payback will be shorter than the example. To learn how to calculate the payback on your system, go to the Solar Bus Learning Center.

5. Tax Credits and Other Incentives

One of the biggest factors in determining the bottom line cost of a solar system is the tax credits and other incentives available to you. It is common for half or more of a system to be paid for by the government! All US residents are eligible for the 30% tax credit. To receive this credit, you pay the full amount initially and fill out a simple tax form at the end of the year, showing your cost. The government gives you the 30% back in full – like cash! The simple tax form is available here: www.irs.gov/pub/irs-pdf/f5695.pdf.

Beyond the 30% credit, you may be eligible for more incentives from your state and local government, and even your local utility company. It's important to make sure you get every incentive available to you! The best resource for this is *The Database of State Incentives for Renewable Energy*, at www.dsireusa.org. Check to see what your state offers! Also, call your utility company and see if they have any programs that promote the use of residential solar energy systems.

6. Frequently Asked Questions

1. *Is it really possible to "go solar" even in a cloudy state like Vermont?*
   Yes, absolutely. While there is less sun in some states like Vermont, the sun still shines. Having less sun just means that it takes a few more solar panels to get the same job done. That equates to a higher cost for the system. But if your state offers good incentives, this will bring the price down more than the lack of sun brings it up. So don't let a few clouds discourage you from going solar, no matter where you live. In fact the solar business is booming right now in notoriously cloudy states, like Vermont and Oregon, due to lucrative incentive programs.

2. *Where do solar panels come from? Are they really "green?"*
   There are a few different ways to make solar panels. The most common technique is to grow silicon crystals from melted sand. This does require electricity input and the use of toxic chemicals. But studies show that after just a short period of time in the sun, a solar panel has produced more power than it took to make it. After that it's all free and clean. Some manufacturers even use solar energy to make their panels! The toxic chemicals are carefully recycled and/or disposed of properly. Solar panels are among the cleanest and greenest sources of power available, and are considered "carbon neutral," meaning they do not contribute to global warming.

3. *Where are solar panels mounted?*
   Solar panels can be mounted on a roof, or on a ground mount near the home. The most important thing is to find a sunny place with little or no shading from trees or buildings. A visit from a local solar dealer will help you find the best location for solar panels.

4. *Do I have to replace my appliances?*
   Since you have grid power, you can still use all the same appliances you currently have. However, if you use less power, the same number of solar panels will supply a greater portion of your energy demand. It therefore makes sense to use efficient appliances when you have a solar system.

5. *Can I really have power when the utility company goes down?*
   There are different types of systems available. Some rely completely on the grid for backup and would not operate when the utility goes down. Others have a way to store and save energy for these situations. If you want to have

power when the power company goes down, be sure to discuss this with your local solar dealer and make sure you get this type of system.

6. *How do I find a local solar dealer?*
   It's very important to work with a qualified person when considering a solar energy system. Like other industries, internet scams abound for solar systems. In many cases, your system will not qualify for some of the incentives unless you work with a certified or approved installer. Consider working with a licensed electrician. Your local Yellow Pages will have a listing under *solar*. Most businesses listed here will offer a free site visit. Be sure you feel comfortable working with your solar dealer before you move forward, and make sure they have all the qualifications and certifications required to get the incentives. Word of mouth is one of the best ways to find a good dealer, so if you know someone in your area with solar panels on their roof, ask where they got them, and if they're happy with the service they provided. If you live in Vermont, the Solar Bus is now working with Sherwin Electric – feel free to contact us for a free site visit or if you have any questions not answered here.

7. *Where do I get more information?*
   Be careful with Google, because not all information on the internet is true. If you have any further questions or concerns about solar energy, visit the Solar Bus website for basic lessons on solar energy and links to other trustworthy organizations.