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Solar's Dirty Little Secrets...



By Randy Velker

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What is “Solar” Energy?

The world runs on Solar energy (broadly defined). Energy from the sun heats up the earth every day/month/season/year. This energy is what keeps us warm all spring/summer/fall (utilizing solar thermal energy). This solar energy is what causes all of our food to grow (utilizing photosynthesis). This same solar energy also causes the plankton and algae to grow in the oceans beginning the food chain. To put it plainly, we are constantly using solar energy, but not often giving credit for our use of solar energy.

Fossil fuels are actually condensed [solar energy](#). The current theories of the origin of fossil fuels is that they are condensed, compacted forests and life forms from “pre-history.” We can only use energy from oil and coal that was initially inserted their from previous “prehistorical” solar energy.

Biomass, or the process of burning wood (or waste) for fuel is just taking the energy from plants which was originally put there from the sun (photosynthesis).

So we are already very dependent upon energy from the sun. Stored solar energy (in oil or coal) is limited. We have already taken the large portion of the “easy to get” fossil energy and we are now working our way through the “medium to get” fossil energy. Soon we will be using fossil energy that is “hard to get” and paying dearly for it. Remember how easy it was for Jed Clampet to strike oil? He shot at a rabbit and hit the hillside and “out came a bubblin crude.” Since the easy oil is all gone we are now

drilling wells miles below the sea surface (where humans can not even visit).

Petroleum/Oil used to be a waste product. If a property had oil it was considered damaged goods and a wasteland. It needed to be cleaned up. Human ingenuity found a good use for the oil and have used a lot of energy from what used to be “waste” product.

This next round of energy is using another waste product, “sand” to produce energy. What could be more plentiful than sand? Sand is the base product from which silicon is made. Silicon was initially used in the computer industry (making microelectronics possible), and it is now being used in the solar industry to make photovoltaic modules. Of course this silicon must be purified and processed, but it is silicon, none the less. How interesting that we are now using a plentiful “waste product” to harness the energy of the sun.

When sun causes plants to grow the process is called photosynthesis and it is about 2% efficient. Scientists in the late 1800's discovered the phenomena which they called photovoltaics. This is the production of electricity from materials which are struck by light waves. The material that gets struck by sunlight does not deteriorate or wear out. So theoretically the modules can work indefinitely creating energy whenever the sun shines on them. Today the commercial Photovoltaic modules are about 16% efficient and in the lab they are getting up to 40% efficiencies.

[Solar modules](#) from the 1950's and 1960's are still producing electricity today. Many of them with no discernible loss of production ability. Modules that are produced today have a production warranty of 25 years. They may in fact have a realistic lifespan of closer to 50 years. The modules have no moving parts and are made with very durable components. They are sometimes referred to as a “rock that produces electricity.” Many believe that the primary limiting factor on module length may in fact be vandalism (after 50 years something can get damaged by just people being around it!) Of course, these modules are typically away from foot traffic (on a roof for instance), so the actual longevity can be significant!

[Solar electricity generation](#) has many benefits. One of those is that the electricity generation can be done on a roof by roof basis. This is known as “distributed generation.” The alternative is for one company to build a central power plant, and then transfer the electricity (through wires) out to the end usage point. In the centralized scenario one company has control of the electricity and the “grid”.

This company must invest heavily to create the power plant and the grid and therefore expects long term profits. Of course these utilities can become monopolies (or can be granted monopoly status by “government”) and therefore pricing is not open to the free market. Upgrades to the “grid” or a “power plant” are huge undertakings and will only be done with “guarantees of a profit.”

One of the problems of the current “grid” is that it is so in-efficient. Line losses are so high that in our area to actually burn a 30 watt light bulb (at my house) over 100 watts of electricity must be created (at the power plant). Over 70% of the energy is wasted in transformers, wires, heat, etc.. What a complete waste!

[Solar photovoltaic](#) and distributed generation bypasses many of these issues. Rather than creating electricity at the centralized location which then must be pumped down aging wires a Photovoltaic system creates the electricity at the point of use. No line loss at all! There is no transported electricity. Thousands of distributed Photovoltaic systems will ease the loads on our aging grid and keep us from having to do costly upgrades (which may run in the \$\$Billions).

Another benefit of Solar Photovoltaics is that there is NO fuel cost. Once the initial system is bought and installed there is never any other fuel to purchase. The complete cost of electricity for the complete life of the Photovoltaic system (which could be up to 50 years) is already pre-purchased when the system is installed.

How much will diesel be for the diesel generator in 10 years? How much will gasoline be for the gasoline generator in 15 years? How much will coal be for the coal power plant in 25 years? Nobody can even remotely predict the price of these “fuels.” The free market will determine the prices, and they will probably be much higher than they are today. The average increase in electrical costs (primarily from coal) is over 10% a year (for the

past 10 years). Looking out into the future the cost of ALL fuels will radically increase. Is anyone willing to bet that energy fuel prices will go down? Of course not. Certainly not in the long view!

The cost of solar energy is locked in the moment you purchase the system. From then on you simply reap the harvest of your previous investment. No fuel worries, no worries about escalating electrical costs. No worries about “inflation” as the system is already paid for.

Everyone love [solar power](#). What is not to like? It is totally renewable, it doesn't run out, it has a 100 year history of consistently producing electricity. Conservatives and Liberals both agree that Solar energy is a smart way to generate electricity.

But still there are a few concerns. We are going to deal with some of these concerns. Solar has a few “dirty secrets.” We will look at some of them and see what are the options and opportunities that arise because of these “issues.”

About the Author



Randy Velker is a solar designer/installer in Middle Tennessee. He is the owner of Simple Energy Works LLC which plans, designs and installs commercial and residential photovoltaic systems. They are also pioneering PV leasing in Tennessee. He lives in Crossville with his wife and seven children, and they use electricity produced

by their Grid-Tied Photovoltaic solar system. They also track all of their energy usage using the Current Cost Envi real time [house energy monitor](#).

He is interested in renewable energy and “Green” technologies only when they make sense (financially, environmentally, etc.) - and not a moment before!

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