

## Sunrise County Solar: solar design, energy audits & education

Solar energy is a viable way to generate energy in Washington County. Solar cells last forever unless physically broken. It may or may not be expensive to install. Either way, over time, nothing will beat solar. It is the truly renewable energy. As with the ecology chant of 'reduce-reuse-recycle', the place to start in monetary savings is with energy reduction.

1) **Conservation** is the first step in any energy-saving initiative.

- Lighting – LEDs are the way to go, inside and outside. CFLs contain mercury which is bad for our fisheries. The light is offensive to some people. I suppose there are exceptions, but most have a lessened life if they are not left on for at least 3 hours. A lighting person can help design the correct way to use LEDs, even for street lights. Let's do this "green". Don't rip out every light all at once and fill up the landfill to replace them with LEDs. Wait till they break first. Daylighting for offices is also a consideration. Are there areas where installing a window would negate the need for the use of electric lights?
- Timers/Thermostats – most outdoor lights are on timers, indoor can be as well. Hot water systems should also be on timers. A study should be done to see how much hot water is used at what time of day. Dishes, laundry and showers are the main items. Most of the municipal buildings probably only need it for hand-washing. Facilities, such as the jail, can adjust their laundry and shower schedule to fit within a certain time. My water heater timer is set for between 6 and 9 AM & PM. It has not only cut down tremendously on the electric bill, but has also elongated the life of the water heater. No heating source should be in operation without a thermostat.
- Windows – thermal imaging can tell you how badly a window is performing. Again, if a window isn't doing too badly, leave it alone. Don't just stick it the landfill. What is the actual problem? Was it installed correctly? Did the installer use spray foam to fill the voids and prevent air flow before he put the trim on? A thermal imager can help with this. As for the windows, themselves:
  - **New windows should have fiberglass frames.** The expansion and contraction coefficient of fiberglass is closer to that of glass than vinyl. This means lessening of air gaps between glass and frame.
  - **New windows should be insulated.** This means they are, at least, double-paned. There is an air gap to help insulate. Fancy-schmancy gasses are not necessary! The gaskets will eventually sever and it will leak out, and the money you would have paid for it is gone.
  - **Do your homework on the type of glass used!!!** Don't just walk into any place and talk to a salesperson. They will sell you what they have. Traditional low-e glass means low emissivity. That means it doesn't let a lot of heat in. That's wonderful if you live in Florida and are trying to cut back on your air conditioning bill. We happen to live in Maine and want all the solar gain we can get! Don't bounce the heat back out!
  - **The world's most energy-efficient windows are made at Thermotech Fiberglass Fenestration** in Ottawa. They will teach you

to install fixed windows where you can.  
<http://www.thermotechfiberglass.com/>

2). **Insulation** is the next step in an energy-saving project. Actually, unless you have severely gappy windows, more heat is lost through walls than through the windows.

- Thermal imaging will tell you what you have and don't have for insulation.
- Do your homework on insulation. You want the product with the greatest R-value. This is usually a rigid insulation. (For areas where you can't use rigid, cellulose is not a bad choice.) It's important to use either sheathing tape or to foam the edges to prevent air leakage. If you have to use fiberglass batts, or already have it installed, again the edges should be taped to prevent wind washing. That is phenomenon of air movement driven by wind pressures, wind passing through or behind the thermal insulation within enclosures, causing significant loss of heat flow control and potentially causing condensation. This typically occurs at exposed building edges, such as at the outside corners and roof eaves because of the large pressure gradients at these locations. This can be thought of as the "wind blowing through the insulating sweater" effect.
- Spray foam or use sheathing tape on all gaps.
- At the current time, best practices say that it is best to glue blueboard on exposed foundations, then, 2 feet under grade, and then go out 2 feet on a 45 degree downward turn to catch any heat rising from the soil and channel it towards your building. Surface bonding cement adheres to blueboard and gives it the appearance of being concrete. This insulation method is the best for new construction, but if this isn't possible or is cost prohibitive, blueboard can be affixed to interior basement walls and then finished with the surface bonding cement. In Maine, insulating basement walls gives high return on energy savings.
- The building envelope envelopes the interior and separates it from the exterior. If there are sections of a building which don't need to be heated, they can be removed from the building envelope. This is often done with insulation. Attic floors and doors can be insulated. Basement ceilings can be insulated or even have radiant tubing run in between the floor boards and the insulation.

3). **Energy source choice** is the next consideration. Making use of existent buildings is the most responsible way to go, but if there will be new construction, plans should be made on passive solar principles.

- Wood and bio-mass, although carbon neutral to burn, unless harvested on foot, have had the added carbon footprint of getting to the site and transporting it back, as well as using chain saws, skidders, etc. Of course, if it is a bi-product of another industry, you are using a more sustainable method.
- Hydropower is not a viable option since it ruins anadromous fish habitat.
- Individual, roof-mounted windmills will be a way to go, but the technology isn't quite ready, yet.
- In my opinion, solar is the best option. People who are planning to go this route need to first analyze how much electricity they use in order to match their need. You do not want to acquire more than you will use and lifestyle changes, such as doing laundry on sunny days rather than when one feels like it, may be in order. There are two types of solar power, passive and active. Passive solar makes use of nature to design edifices to need the least amount of man-made energy. Active solar power uses mechanical devices to create energy. There are three main areas of technology to consider when you are discussing active solar power.

- The least common is solar air. The sun heats up air in a device and it is moved to cooler areas to heat them.
- The most common is solar thermal technology. Water is heated by the sun and stored to be used at a later time. The greater expense is the storage. Solar thermal technology is often used in radiant heating. These units can be inexpensive.
- Most people think of photovoltaics when they think of solar, using solar cells to create energy. All PV modules are not created equal. For example, monocrystalline cells will hold their original output, while amorphous units will lose 20% of their output over their first two months and then lose an additional 20% over their lifetime.

4) Lastly, **education** is an important component of any energy-saving mission. Unfortunately, most of us grew up being told there was no bottom in the fossil fuel barrel.

- Both businesses and offices can benefit from occasional energy training to remind people of best practices.
- Schools may be the most important place. How ingraining for students to be involved in hands-on lowering of energy use in their facility! How exciting for them to get hands-on opportunities in class.
- Education for our contractors and construction workers is an imperative. They learned to build the way their fathers taught them. Building science demonstrates that many of the old ways are not the best ways. Particularly, passive solar technology principles need to be taught to builders so they understand the principles and are adequately trained to explain to their clients why these things are important and helpful to them. In reality, passive construction is cheaper than traditional if done correctly.

Seneca, the Roman philosopher who lived from 4 BC to 65 AD, said that only barbarians build their structures not facing the sun.