

Thurston County Confronts
Climate Change

South Sound Solar

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Abstract

South sound solar is a local installer of solar systems. They use a combination of photovoltaic and solar hot water heaters to harness energy from the sun to make your house consume less energy from the national grid system. Using a collection of Washington made and other American made hardware, South Sound Solar will install and maintain your solar energy production devices at your home or office. This is advantages for someone looking to cut their Co2 contribution and save a little money on their energy bill. A standard photovoltaic system will produce about third of your household energy needs and a solar hot water heater will reduce your hot water energy needs by sixty percent. These systems can be expanded to cover one hundred percent of your energy needs but only at massive cost increase. There are far more cost effective ways of reducing your carbon production than the use of solar systems. A solar system is only practical as a supplemental energy form for the time being.

Findings

South Sound Solar offers a range of green, sustainable solar energy solutions for the home. The primary products are installation of photovoltaic and solar hot water heaters. Both draw their energy from the sun, a free and inexhaustible source of energy for our planet. According to the company solar energy works perfectly in Washington sighting Germany, where they get marginally more sun than Washington, but have managed to successfully deploy solar energy systems. Currently serving Olympia, Lacey and Tumwater and the greater Thurston, Lewis, Mason area South Sound Solar holds an eighty percent market share in solar installation and plan to keep that share as the market for photovoltaic and solar hot water grow.

Being an installer, South Sound does not make their own solar cells; rather they buy panels and other hardware from local companies like Silicon Energy, Itek Energy, Heliodyne and Velux. Depending on where you buy your panels from can affect how much you get paid by the PUD. But it seems that the closer they are made the more they cost, a Washington made panel from Silicon Energy causes your cost of instillation from South Sound to go from around five thousand dollars up to nineteen thousand just to use local panels. But this is what you want to do if you want the greatest return on your money. This is because the PUD scales their pay back for energy generated for grid use. Right now they charge around seven cents a Kwh for energy delivered to your home, they will pay you fifteen cents for solar energy produced, thirty-four cents for using Washington made panels, and then fifty

four cents if your system is entirely from locally produced equipment, all of these max out at five thousand dollars a year. This incentive system is scheduled to last until 2020.

When thinking of solar panels we usually thinking Photovoltaic systems, which generate our beloved electricity. Photovoltaic panels (PV) have a longer history and development time then one might initially think. French physicist Edmund Bequerel first witnessed a PV phenomenon in 1839. His initial observation was that certain materials could generate a small electrical current after being exposed to light. In 1905 Albert Einstein mathematically described the photoelectric effect and the nature of light in a paper titled "*On a Heuristic Viewpoint Concerning the Production and Transformation of Light*". This became the bases for photovoltaic technology; it also earned Einstein a Nobel prize in physics.

The first step in a PV energy generation system is making sure that the materials used are photovoltaic such materials include: crystalline silicon modules, thin-film solar cells, and polysilicon. There are a number of other experimental materials as well, but these are less popular for commercial endeavors. After choosing the appropriate material the semiconductor wafer is treated to enable it to create an electrical field; one side being positive and the other negative. This allows for the PV to generate power in the form of a DC current. As light energy hits the PV it knocks electrons out of the magnetic field, as long as the PV is hooked up with a positive and negative anode, the electrons can be captured and stored as electrical current.

PV electrical systems have can have a wide range of regulations depending in which state you live. In general most states have agreed to comply with the interconnection standards framework that was set up by the IEEE. This framework includes regulations from National Electric Code (NEC), National Electric Safety Code (NESC), The Standards of the institute of Electrical and Electronics Engineers (IEEE), The Standards of the North American Electric Reliability Corporation (NERC), and and approval by the Washington Utilities and Transportation Commission (UTC).

Most of these standards have to do with appropriate power generation for a site, proper installation and grid connection, and regulation of materials used for energy production. In the case of Washington State, we are compliant with the Interconnection Standards framework and our renewable energy options are thus regulated by these standards.

These regulations impact South Sound Solar but are not detrimental to their business operation. In general building and power regulations are the normal regulatory obstacles to deal with. Not usually anything major to prevent an installation. South Sound Solar also goes out of their way to work with each jurisdiction to make sure they are compliant with the current laws. South Sound Solar builds above the regulatory code, as code changes and they want to insure a baseline that will keep up with potential changes.

The average Washington State home uses 13032 kWh of electricity a year or roughly 1082 kWh a month. The average cost of 1 kWh of electricity is .075 cents equating to a power bill of roughly \$81.89 for a family of four. The average PV panel

offered by South Sound Solar generates about 1000 kWh in a year. The company offers a two tier install options; grid tied solar electric power and made in Washington power. The grid tied solar panel set up is their most common it starts at \$8,000 for install of 3-6 PV panel system, the made in Washington option is for larger installs and starts at \$19,000. Both options offer a federal tax credit, \$2,400 for the grid tied system and \$5,700 for the made in Washington system. This helps offset the total costs for purchasing a system. A typical install for most residential homes is the \$5,000 option that comes with 3-6 panels and can provide up to 6,000 kWh per year. Furthermore energy produced by these systems can be sold back to the grid at .54 cents a kWh for a maximum of \$5,000 a year, this incentives the customer and helps the system pay for itself. The average customer pays back the initial \$5,000 install (including parts, labor, and sales tax) within 2-5 years depending on the amount of electricity generated and sold on the grid.

Solar hot water heaters operate via heat transfer. It starts like any solar system by placing a panel on your roof that collects energy from the sun. Instead of a photovoltaic panel, which turns electromagnetic radiation into electric current, hot water heater panels have a "Solar Fluid" which collects the heat and transfers it into your hot water tank via a heat exchanger. This only happens when there is sufficient heat in the solar panel to do so, other wise the hot water heater will run off of its default source of energy. The system that South Sound Solar uses for their installations is from a company called Heliodyne, their claims say that a solar hot water heater from them will at best reduce water heating bills by sixty percent. With hot water heating being about thirty percent of a house holds energy consumption, a

solar hot water heater operating at its peak efficiency will save you about eighteen percent on your annual energy bills. And a system like this is expected to last for twenty or more years with minimal maintenance.

This system is a good thing with the expected increase in energy cost, and the reduction in carbon production from your house having a solar hot water heater. However there is a catch and that is what a solar hot water heater saves you over alternatives. South Sound Solar charges sixty three thousand dollars, after tax rebate, for a hot water system designed for a three to five person home which includes an eighty gallon hot water heater installation and all other cost less sales tax. But now we need to compare this to an energy star rated hot water heater from Whirlpool sold at Lowes.

To keep this comparison simple we are making two assumptions first, each hot water tank requires the same amount of energy regardless of source and second, prices and availability of energy stay the same. The Whirlpool hot water heater costs two thousand three hundred and fifty dollars after insulation and has an annual energy consumption of one thousand eight hundred and eighty four kwh at ten and one half cents a kwh (what this is advertised as cost of energy with this appliance) this price comes to be around two hundred and eight dollars annually. The South Sound Solar water heater would save you sixty percent of your energy usage, so that would save you one hundred and twenty five dollars a year but you would still pay around eighty three dollars for heating your water. So how long would it take for the solar hot water heater from South Sound Solar to pay you back when compared to the cost of heating water with a normal water heater? It would take you thirty-two

years before the South Sound Solar water heater becomes less expensive than the Whirlpool hybrid electric heater. Then there is the opportunity cost of the price defiance. Buying the whirlpool saves you three thousand nine hundred and fifty dollars, which you could invest in a government bond for thirty years, which right now, yields a three percent return rate. This would get you somewhere in the realm of ninety five hundred dollars, which would at the time net you just shy of one thousand dollars after subtracting the total cost of your water heating energy. This comparison does not account for inflation or fluctuating interest rates of bonds, but it does show that solar water heaters alone are a less desirable choice than other conventional water heaters available on the market for less. It is also important to note that unlike photovoltaic systems solar hot water energy cannot be sold back to the energy grid.

The final piece to our South Sound Solar puzzle is the Co₂ footprint. Or rather what the reduction is by using a south sound solar system. First we need to know what a house in Washington creates in terms of Co₂. Well as we saw before a Washington house uses about 13000 Kwh of energy a year. Because of our states hydroelectric system we have in place the amount of Co₂ we produce per kWh is really low right around zero point thirty-six (0.36) pounds of Co₂. At that rate of production, an average house produces an average amount of Co₂ which combined weighs four thousand six hundred ninety-one and a half pounds when running of strictly grid energy. If you were to install a system from south sound solar which includes one solar hot water heater and one of their photovoltaic systems this could cut your energy use by fifty one percent. Which translates too two thousand three

hundred ninety two and a half pounds of Co2 saved. That is the equivalent of about one hundred and seventy gallons of gas, every year for life span of your system. (Kuni)History tells us that energy prices will go up, a South Sound Solar system will help you manage what the raise in price will cost you but the prohibitively high entry cost makes it a difficult system to justify installing on a home as any thing less than a supplement or back up.

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