

WHAT THE BRIGGS FAMILY DID TO LIVE LIGHTER ON THE PLANET

TRANSPORT

Phase One

- 1) Purchased a 2006 Honda Civic Hybrid with the help of State of Oregon tax credits of \$1500 and Federal Tax deduction of \$500. This Honda gets a real 38 mpg in the city and replaces a Ford Explorer that got 13.7 real mpg in the city. That's a 64% lowering of my carbon footprint for transport.
- 2) Set up main office in my house so I rarely commute to work. This enabled me to write off 22% of my energy saving investments based on square footage.
- 3) Walk or bike to many errands and activities in the "village" of Lake Oswego.
- 4) Awaiting streetcar service to downtown Portland...
- 5) Anticipate working to establish a local Flex-Share-Truck service for people like me who gave up their SUVs for smaller high mileage cars.

Phase Two

1) Expanded rooftop solar electric system to almost 10 kW---it can now power all of our energy sipping appliances, electronics, lights, and soon, an electric car. I will buy and electric car in 2012 or convert an existing gas car to a plug-in---many kits and conversion companies starting up---conversion estimate under \$10,000 and Federal tax credit is \$5000 and Oregon tax credit is \$1500 so rough estimate is \$3500 cost. If you had a 30 mpg car and drive 15,000 miles per year at \$3.00/gallon, you are paid back in 2.5 years. Most folks have bigger gas hogs and gas is now \$4.00 so it will pay back faster. This is the key reason to make your home solar system large---to fill up your gas tank with your own sun power. The solar system and the converted car pay for themselves quickly this way.

Footnote: We will soon pull the tires, the battery, and a few small parts off my 1996 Explorer, have a ceremony giving thanks for old technology, and then take it off the road and crush it to so it can be melted down and reused. We need to turn over the fleet by conversion to electric of the best old cars, but melting of the true dinosaurs.

ELECTRICITY

CONSERVATION

- 1) Disconnected hot tub, partially used second refrigerator, and extra freezer.
- 2) Installed great dimmable Cree LED Can lights in kitchen and replaced 200 watt candelabra overhead lights with 8 watt Sylvania LEDs. Mostly compact fluorescent lights in other fixtures for a 75% improvement in efficiency. I have found several factories in China that sell LEDs them for 1/3 price and would like to order by the container for the community on preorder and change everybody's lights. LED efficiency is 90% better than regular bulbs and they could last up to 20 years. As

lighting is up to 20% of all electricity, this alone could save perhaps 15% on the electric bill.

- 3) Installed power bar turnoffs or unplugged almost all standby electronics---they are always on. This represents about 5% of all electricity in the United States or perhaps 20 large coal power plants. Why not shut them down? We are in process of designing a remote control turnoff of all house standby electricity for more convenient use.
- 4) Retired my in-window portable air-condition unit and replace with frugal ceiling fans in second story bedroom. Use a variable speed fan in front of open screen door to upper deck to cool at night---works great, saves lots of power.

Installation of Energy Efficient Appliances

Phase One

- 1) New furnace with the help of \$350 tax credit from the State of Oregon and \$200 tax credit from Energy Trust has efficient motors and is on less and uses much less electricity.
- 2) New front load washing machine uses less than half the water, one-third the detergent, one third to one half the electricity and the high spin dries the clothes twice as much so the electric drier needs to be on one half as much.
- 3) New Energy Star refrigerator uses 470 kW/year instead of 1300 kW/year for the replaced twenty year old model. 64% improvement in efficiency.
- 5) Installed good small stereo next to giant stereo that could heat the living room which will be used for special occasions. We use a small TV often, saving large power-using flat screen digital TV for special occasions.
- 6) All computer monitors were changed from CRTs(tubes) to LCDs (flatscreens) which use much less power and emit zero radiation.
- 7) All power strip collages of electronic plug-ins were simplified and made more efficient and easy to turn off.

Phase Two

- 1) Installed LED lights in all main fixtures---15% improvement in efficiency. Home Depot has it's own line now from Cree---the high speed computer maker. Prices are coming down fast, light quality is good. Shop carefully.
- 2) Pulled out my gas furnace and replaced it with a cutting edge Mitsubishi, quiet, electric heat pump run efficient to 17 degrees by the solar on my roof.
- 3) Will soon be pulling out my gas hot water heater and replacing it with a timer on the electric element in the top third of my solar hot water heater---the solar hot water heater works 6 months a year solo, and other months we plan our showers an hour after the timer/electric element do their thing. No more burning carbon for hot water.
- 4) Bought a computer chip TV. 20% of the power of my previous TV. But sometimes the old movies look like video tape... getting used to that.

Installation of solar electric system

Phase One

- 1) All of the efficiencies above reduced the electric load on the new 2.85 kW solar electric solar system. The system cost \$24,000 of which almost \$15,000 was covered

by tax credits---\$6000 from the State of Oregon, \$8300 for Energy Trust, and perhaps \$970 from the Federal Government. I could have sold about \$1200 of "Green Tags"--basically carbon reduction bragging rights to the Bonneville Foundation who in turn would sell it to say, a coal company so they could say they are working on renewable energy, but I decided to keep the ability to talk about my system. Quite a few real estate agents suggest that the remaining \$9000 cost of the system can be thought of as a real estate improvement and not a utility improvement. Few solar houses have been sold, but several agents suggest the value of the house will have gone up that \$9000 so in effect, installation of the system with present tax credits is "free." In addition of course, I trade and sell electricity to PGE daily and plan to recover several hundred \$/yr.

The solar electric system tie in with PGE works in the following way. Electricity from my panels goes into my circuit box where any power I need goes back into my house. Any extra power goes out to the PGE meter where it is counted and then added to the neighborhood power grid. PGE adds up my additions to the grid and gives me credit at a wholesale rate of about .088/kW for the power I sell them. After a month of my extra use of PGE power at retail rates, the trading of power at equal rates, and my selling of power to PGE at wholesale rates, one lady in accounting at PGE makes out the bills by hand for the 100 solar electric systems out PGE's 750,000 customers (it isn't yet worth the money to computerize it). Comparing my bills from pre-solar February 2005 and post-solar 2006(a low radiation winter month), I used 34 kW/day in 2005 and 11kW/day in 2006. This is before installation of the energy efficient refrigerator, the LED lights, and before several other efficient ideas. It is important to note that I am a GreenSource electric customer of PGE---that means that they can only sell me power from wind, geothermal and inflow small hydro which is 100% renewable and carbonless. This costs \$.80/kW and last month cost me \$2.80. So after conservation, efficiency, solar electric installation, and choosing the Greensource option on my PGE bill, my electricity comes 100% from renewable energy and 0% from fossil fuels.

Phase Two

Expanded the solar electric system by 6.88 kW October 2010. I now have a 9.73 kW system that replaces all carbon burning in my house. The gas furnace, hot water heater, old fireplace element have all been cast out of the house---natural gas is not a clean fuel---poisons the water table with a hundred toxic chemicals including benzene and diesel fuel and has a high carbon footprint due to leakage of methane from piping and wellheads---some research says equal to or greater carbon footprint than burning coal with full cost accounting---see "Gasland." Combined with new walls, a tripling of insulation, LED lights, energy sipping appliances, and soon a shift to an electric car, I will no longer burn any fossil fuels for energy in my house. I am net zero for burning carbon for energy. Come on in, the water's fine.

WATER

CONSERVATION

- 1) We act like water is precious and don't waste it. Nobody leaves the water on while brushing teeth or shaving. Dish washing is a dribble. We let the lawn burn out in summer and hand water the plants (they like this better---no foliage fungus and we get some vitamin D and plug into the yard.)

WATER EFFICIENT APPLIANCES

- 1) We installed low flow nozzles on all sinks and showers which reduces flow 60%.
- 2) The new Energy Star front load washing machine uses less than half the water, detergent, and electricity and gets the clothes just as clean and twice as dry with the high spin (this also reduces electrical use in the drier).
- 3) We reduced the size of our lawn by over half.
- 4) We are considering a water-catchment system to hold water from roof runoff for later garden use or slow percolation into ground water.
- 5) Drinking water comes from the highest rated and best buy Aquasana 4000 under sink system water filtering system that gives us water at \$.09/gallon. We put it in stainless steel water bottles to avoid endocrine disrupting chemicals from commercial plastic bottles and thus we have no throw away waste and don't contribute to chemical pollution in Chinese plastic recycling industries. Taste is tops.
- 6) Dual flush toilets installed in 2011. In Europe, many apartment buildings are now recycling all water and solid waste is biodigested/composted. Doesn't make sense yet for single family dwellings yet...
- 7) Pulled out almost all the grass and planted bio-diverse food-bearing native plants on my north side and an organic garden with lots of flowers for bees south side. Much less watering demand.
- 8) Rainwater catchment system that collects 6000 gallons of water off the roof (10 inches of rain) at a time for garden irrigation may be expanded to a gray water system for toilet flushing and perhaps washing clothes when Oregon State Codes are worked out. I can cover almost all of my garden irrigation needs and save money on the much increased, usage-based water bills in Lake Oswego.

SOLAR HOT WATER HEATER

- 1) We installed a solar hot water system for \$7000 of which \$3738 was covered by tax Credits: \$1500 State of Oregon, \$1398 Federal(30% of \$4660 left after other tax credits) and \$840 from Energy Trust. We considered tankless water heaters which seem more efficient for small households, but decided that this was a big family house and solar would fit better for the next family. We also replaced the 27 year old gas hot water heater backup with a new model for \$600. It is rarely on, but is a winter necessity in Oregon.
- 2) Installed inexpensive solar water heating of the community pool next door. They paid me back on the energy savings in four years and it could have been less with controls

that put the solar in front of the gas backup heater. The payback could have been 2-3 years. A no-brainer for every swimming pool. Be a Green Angel and put one on your community pool---they can pay you back fast and burn less carbon for heat.

WEATHERIZATION

Phase One

- 1) We replaced five large single pane windows with very efficient double panes that could open for cooling. We did this in 2004 before we learned about tax credits, but they are rather small for windows (\$25 each with a maximum of \$200 I believe).
- 2) We re-roofed the house with 50 year shingles.
- 3) We painted the house with low VOC Evolution Paint from Miller Paint guaranteed to last until we are dead (they may have made a good deal...)
- 4) We insulated the floor of the attic, as our Energy Trust audit pointed out that roof insulation meant we heated the attic space which was stupid. We studied the insulation possibilities for some time. The roof had R-11 fiberglass. We found that not only was fiberglass prickly on your installing arms and lodged in your lungs until it gradually melted, but new research shows the R values have been over-estimated by half. So R-11 is really only R-5.5. As we needed R-30, we continued our search. Rock wool is a pain to deal with. Cotton jean ends are neat but would have cost 7 times what we ended up paying. Studying what other green buildings have used online, we discovered simple blown-in cellulose which is nothing more than 85% recycled and shredded newsprint sprayed with non-toxic boric acid as a fire retardant. It was also dirt cheap. It cost \$320 for 800 square feet by 9.5 inches deep (R-30). Home Depot threw in the shredder/blower for free. I paid a guy \$125 to feed the machine and I put on a good respirator and goggles and gloves and did the whole job in 6.5 hours. Tax credits are still being worked out, but it looks like Energy Trust is up to \$200 (we just got refused this credit because we did not go to R-38---impossible with our tongue and groove attic storage floor at a 9.5 inch depth on 800 square feet) and the Federal Energy Department is in for 10% of the job or \$42. So it cost about \$180 to hopefully cut my heat bill a bunch (65% of all heat goes straight up). This is the first month---no bill, no data yet.
- 5) After the insulation was blown in, I had the ducts cleaned by the Eager Beavers. With the stronger blower from the new furnace, I had noticed more stuff in the air. Some of the stuff that came out of the ducts is on display. The ducts are spic and span and the air is noticeably better. It was pricey at \$400, we were convinced by the fact that The American Lung Association included this in their recommendations to reduce increasing asthma rates.

Phase Two

- 1) Built new walls on the outside of my cement block house and insulated with rigid foam.

- 2) Doubled all my house envelop walls and sprayed with water blown closed cell foam 3-3.5 inches and batted with blown in zero formaldehyde loose fiberglass "polar blanket." This included the peak of the roof---now a hot roof. Make sure you still have enough room for your shower curtains and close hanging in closets...
- 3) Installed a Heat Recovery Ventilator---HRV---to insure plenty of healthy fresh air in a tight house. It gives three times the air exchanges of a normal house by tossing out the stale air and keeping 80% of the heat or cool with heat-exchangers and adding it to the fresh air coming in. A brilliant German invention.
- 4) Installed 4 Indow windows---inside super-storm window to double my R-factor on north windows to R-4 for less heat and cool loss.

HOUSEHOLD CHEMICALS

- 1) Buying simpler chemicals that biodegrade before they hit the water table---and it all winds up in the water---are the key. We changed our indoor cleaners, dishwasher soap, laundry soap, soap soap, and are working on cosmetics and personal health care products that have scads of bad chemicals mixed in them. We have changed to low VOC paints and we change the air in the house a lot during midday warmth---indoor air pollution is about 10x worse than outdoor pollution according to research. We have eliminated pesticide use of any kind in the yard. There are many decent alternatives. Even if your genetics are great and pollution doesn't seem to bother you, you do have thresholds and they will often be crossed. One third of women will get breast cancer now. Asthma rates are skyrocketing in children. Learning disabilities in children are way up and chemical exposure in the womb is highly suspected. Most cancers will be from environmental pollution in combination with genetic factors---so why not limit your exposure? And remember, it all washes into the ground water and builds up in the beasts, some human, many children, downstream who may not be so lucky. The future is Green Chemistry based on the Precautionary Principle, but until it is everywhere, pay attention and make safe choices.

FOOD

- 1) We have a large organic garden and flower garden for the bees. I have 5 berries, 4 fruits and twenty five vegetables in the summer and 8-10 in the fall and winter. Had to put up a 7 foot deer fence. Lots of biodiversity on this land now with lots of native plants and nesting sites for birds, mason/wild bees, and larger animals. You can make a Backyard Wildlife Habitat through National Wildlife or on your own.
- 2) For what we can't grow, we buy locally organic food whenever possible. We buy local to support local farmers, get fresher food with more vitamins and minerals (they go way down with time of transport), to lower the planet carbon cost of fossil fuel transport of food and to build community. We buy organic to avoid chemical residues from pesticides, herbicides, oil fertilizer, and genetically modified ingredients. It is more expensive, but it is the best money we spend.
- 3) We are gradually learning to eat less meat, to treat meat as a condiment. We use grass fed local meat. By eating less meat, we avoid the 80% of herbicides sprayed on corn and soybeans fed to livestock in feedlots. By eating less meat we save over three tons of

water per pound of beef to make it, and we can start to save the huge amount of oil fertilizer to grow the corn and soybeans---oil consumption actually greater than our use for transportation. **This lowers our carbon footprint.** We also follow the Endangered Seafood Buying Chart to avoid buying endangered or poorly regulated fisheries. We only eat wild salmon---farmed salmon are fed over-fished, strip-mined krill from the arctic, are laced with over thirty antibiotics and turn the area around the ocean pens into a dead zone. The color is artificial, the taste does not compare, and there are wild fish and fisherman in Alaska (and we can bring them back locally with real management) to be had so it is an easy decision.

4) We eat very few refined carbohydrates and almost no GMO sprayed corn based products like soda pop, feedlot corn fed beef, and as Michael Pollan explained recently in An Omnivore's Dilemma, almost all refined foods because it is such a cheap multi-subsidized ingredient.. We stay out of the center of the normal grocery store where most everything is processed GMO refined carbohydrates. We are learning to make vegetables taste good. I often first place raw vegetables out to snack on just before dinner is prepared so the kids will attack them with their early hunger. It works. To confront the diabetes epidemic, we eat smaller portions and dessert comes later. We tend toward dried fruits, sorbets and frozen yogurts instead of ice-creams, and chocolate comes in nibbles most of the time. We still fall off the wagon on that one.

5) We cook on stainless steel or iron. Teflon and aluminum have toxicity problems. We don't microwave in paper and absolutely never in plastic wrap (endocrine disrupter chemical transfers). We threw away most of our plastic tupperware and use glass, stainless or ceramic storage---we are looking for a better cheap line of these goods.

REDUCE, REUSE, RECYCLE---in that order

- 1) We try to only buy what we need and with the least packaging. We try to make things last. We haul unused building products to the Rebuilding Center. We recycle unpainted wood at Clean Wood. We tightened up our recycling so very little goes to garbage. Please take the time to study your Metro Trash Talk so you know just what can be recycled and what can't and what you can mix together.
- 2) We will soon decommission our Ford Explorer SUV. We want to take it off the road, not resell it. We are still trying to figure out the best use of the parts and metal with the least waste.
- 3) We have recycled our old refrigerator---gotten it out of circulation. Putting it in the garage was not the answer---it too was a guzzler. It needed to be melted down. We did the same with the old furnace and hot water heater.
- 4) When we painted and roofed the house, we did it with the best materials that were guaranteed for the longest time. That's reducing the load on the planet too.

Global Climate Change is a big deal. It will blow our world apart in fifty to one-hundred years with business as usual. The most effect we can have to slow it down and then stabilize it is to act now when the momentum is slower. If we wait, it will be very hard to stop. It is easier to survive a crash at five miles per hour than at sixty.

The key to remember as you approach your house or your business to lower your carbon and chemical footprints on the planet is that in order to get carbon dioxide stability in the atmosphere, the good research estimates that we have to reduce our individual fossil fuel use by about 80-90%. It's a load, but we did it in 4 years. It makes environmental and economic sense to do this---it is now common sense. You can get quite a ways with conservation in weeks, with energy efficiency using tax credits in months, and renewable power to eliminate your carbon use within years.

Please take the time and money and do the work to lower your carbon and chemical footprints. It is all connected. We are all downstream and downwind. We are all on this bus.

The Briggs Family
Lake Oswego, OR
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