

# SunFest 2003

Hosts of "Solar Home" open house astound over 1,800 visitors with hands on introduction to private power, and so much more!



September 7th, 2003 was a picture perfect late summer day in southern Ontario with sunny skies, and a warm westerly breeze. What better way to spend it than with a drive in the country? Well, how about a drive in the country and an eye-opening tour of a state-of-the-art Solar Home?

Like any other "newbie" to the idea of private power and green energy, I was feeling rather overwhelmed and had no idea where to start. The Solar Home open house hosted by owners John Wilson, Leigh Geraghty, and their family turned out to be the perfect place. Not only did I learn about wind power and photo-voltaic electricity, but also the interdependent topics of grid tie-in, smart design, energy efficiency, passive solar heating, green roofs, and straw bale construction.

Like most Canadians, I love the conveniences of modern living, but I'm also becoming increasingly aware of environmental concerns. But can you afford to have both?

You can if you learn from Wilson and Geraghty! Their Solar Home proves that you can live better, reduce your cost of ownership, and make the world a better place all at the same time.

## Form Meets Function: The Importance of Design

Whoever coined the phrase "beauty is only skin deep" never saw a home such as this. The striking beauty of this house goes way beyond the attractive contemporary exterior of picture windows, zinc and wood siding, down into every aspect of its being. Great design is the cornerstone of this house. Its design fosters form and function, expertly raising both

by Peter Forint

energy efficiency and healthy, comfortable - and dare I say it, *luxurious living*.

The house boasts an open concept post and beam construction that provides minimal obstruction to the large windows and the inviting views of the beautiful Caledon Hills countryside. But the windows are not just for aesthetics. They serve two more purposes: natural lighting and passive solar heating.

## Natural Lighting

The orientation of the house and the location of its windows and skylights assure that sunlight reaches deep into the house throughout the day. Of course the windows are highly energy efficient. They are double glazed and krypton gas filled, allowing sunlight to penetrate into the house, while insulating it so that heat doesn't escape.

Hence the house has abundant natural light, reducing the need for electric lighting. The benefits are increased comfort for the eyes, and lower energy consumption.



## Radiant Heating without a Furnace

If you've ever lived in a house with radiators, you know how much more comfortable their constant, cozy warmth is compared to the on and off dry blowing heat of forced air. The Solar Home takes radiant heat to a much higher level with an in floor heating system that receives most of its energy from the sun shining through its windows.

The floor is made of concrete and absorbs the sun's heat



during the day, providing an excellent heat storage medium. Within the concrete is a system of pipes that circulates water to transfer the heat throughout the house. At night, the concrete releases the heat, keeping the house warm long after the sun has set. The sun's energy is supplemented on the coldest winter days by an in-line electric heater and a wood stove.

The heating system is so sophisticated that temperatures can be set independently for each room of the house. And, it's so efficient that the house has no fossil fuel furnace!

### Summer Cooling

Air conditioning systems require a lot of electricity to operate, so it was no surprise that this house doesn't have one. What did surprise me was that the house was pretty comfortable despite how warm it was outside, and how many people (close to 100) were inside. I learned that there were at least five design features keeping things cool.

First, the open concept design allows warm air to rise to the skylight area two stories above the main floor. Second, open windows take full advantage of cross winds, moving air through the house. Third, the amount of direct sunlight hitting the concrete floors is minimized in summer because of the high angle of the sun compared to winter. Hence most of the concrete floor is relatively cool as it is in the shade. (Wilson is considering adding awnings to the house to shade the parts of the floor that do get the direct rays of summer sun.) Fourth, the zinc siding is not only attractive, but is also functional, reflecting the sun off the house.

The fifth feature, called a "Green Roof", is as amazing as it is bizarre. The roof is designed to be a giant no maintenance garden. With about eight inches of soil, it is designed to support grass, wild plants, "or even strawberries" joked Wilson, as he explained how it works.

Have you ever noticed how cool green grass is under your bare feet, even on the hottest summer days? Well, green roofs have the same effect on keeping the top of buildings cool. The plants and soil also protect the underlying roofing materials from the damaging effects of those high temperatures, and the sun's damaging UV rays, extending their useful lives. (I learned later from the Internet that modern green roof construction has been used in Europe for over 30 years.) Green roofs can also help control storm water, by

collecting over 75% of the rain that falls onto them.

These clever design features keep the house cool, maximize fresh air, and take no energy to operate.

### Straw Bale Construction

A sixth feature helps keep the house cool in summer and warm in winter. The north wall is constructed of straw bales covered in concrete stucco. The effect is like an Adobe wall. I'd never heard of straw bale construction and I doubted it was possible, but the "truth window" confirmed it.

Forget any misconceptions you may have from the tale of The Three Little Pigs. This type of construction has proven strong over time as evidenced by existing Pioneer houses, schools and churches built in the late 1800s throughout Nebraska. The builders of this wall, Camel Back Construction, has built over 40 buildings in Ontario in recent years.

The straw bale construction method offers many advantages over conventional wood frame walls. According to Martin Liefhebber, the Solar Home's architect, it offers R50 insulation, costs significantly less, and it breathes - easily overcoming the poor air quality that plagues many conventional high efficiency designs such as R2000. Wow!



*The "Truth Window" is a common feature of modern day straw bale construction, proving to visitors what's inside the concrete stucco!*

### Efficient Appliances and Lighting

Every private power consultant will tell you that you need to reduce your electricity consumption before installing your own generation system. The Solar Home shows you can do so without sacrificing your dishwasher, dryer, or central vacuum cleaner. The trick is to choose your lighting, appliances and electronics carefully.

This home features some of the most energy efficient appliances and lighting systems available, from manufactures such as Asko, Bosche, GE and Maytag. Energy consumption is dramatically reduced compared to the average family home, with no sacrifice in convenience.

You could say that convenience is even better than with conventional lighting and appliances because the modern compact florescent bulbs provide pleasing light and last, the convection oven cooks food faster, and the front load washer is more gentle on clothes, making them last longer.

## Power Generation and Grid Tie-In

Finally, we get to the reason for my visit to the open house.

I had done some research on the Net, and of course read the previous issue of this magazine, and was anxious to see some wind power turbines, photo-voltaic panels, and their supporting equipment up close. I wasn't disappointed!

Before the installation of the photo-voltaic panels and wind turbine, the home's electricity came entirely from the grid. Today, about half the home's electricity comes from a \$20,000 solar and wind generation system.

Phantom Electron Corporation supplied and installed the system consisting of:

- Ten Siemens ST40 (40 watt) solar modules,
- One Bergey XL-1 (1kW) wind turbine
- One Xantrex SW4024 4 kW inverter
- One SB50 power boosting solar charge controller
- Two sealed batteries

The system is large enough that on sunny, breezy days, the electricity meter actually runs backwards!

I was impressed at the prospect making money selling surplus power to Hydro. Unfortunately, under current regulations, Hydro does not pay grid tie-in home generators for their surplus electricity. So the best Wilson and Geraghty can hope for is a monthly bill of zero, which they haven't had yet.

None-the-less, the system saves about \$500 per year in electricity bills. Should the regulations change, or the price of Hydro increase, their savings will certainly increase.

## Conclusion

The Solar Home blew me away! I went to the open house to learn about solar and wind energy and I left with so much



more. Wilson and Geraghty are two people with a lot of vision, ingenuity and determination.

I feel inspired by the way they turned their dreams into reality. I won't be building my own Solar Home anytime soon, but I took away many lessons that I can apply to my conventional home, as did many of the other 1,800 visitors that day.

## Resources

**Owners:** John Wilson & Leigh Geraghty - <http://www.naturallifenetwork.com>

**Architect:** Martin Liefhebber - <http://www.martinliefhebber.com>

**Straw Bale Home Construction:** Camel's Back Construction - <http://www.strawhomes.ca>

**Power System:** Phantom Electron Corporation - <http://www.phantomelectron.com>

