Designing a Sustainable Home Office

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by Sharon Boddy

As the designers put it, the Alberta Sustainable Home Office (ASHO) integrates the best of yesterday with the reality of today and the trends of tomorrow.

The Alberta Sustainable Home Office in Calgary. Photo: Sharon Boddy.

Jorg Ostrowski and Orian Low of EcoBuildings built the environmental demonstration home office with the help of more than 220 leading-edge companies from around the world. Brightly decorated inside and out, it truly stands out in a sea of conventional "little pink houses" in a Calgary suburb.

First and foremost, it's off-grid—no natural gas pipelines enter the home. Instead, it is heated by passive solar, assisted by R-50 insulation and walls that are each about one foot thick. A small masonry heater is used as a back-up heat source for those chilly Alberta winters, but Low points out that even during their coldest winter, they burned less than one cord of wood during the entire season.

Although the home has a few solar panels on the roof, they aren't hooked up—literally 60 percent of the heat comes through the windows. "Sun pipes" (wide, glass-covered metal tubes) on the roof allow more light and heat into the building, with the remaining 40 per cent made up by a solar hot water heater. Just like a conventional hot water heater that doesn't just heat water, but also the immediate area surrounding it, the solar hot water heater reradiates heat into the home.

Rain and melted snow flow down through eavestroughing into vacuum tubes. The tubes are on the outside of the building and are coloured black to absorb more sun and trap heat, and heat the water before it flows into a hot water tank that heats both the water for the home's use (showers, dish washing, etc.) and the concrete slabs of the walls and floor. All of that energy is transferred through the vacuum tubes to a heat exchanger and into the hot water tank.

An airlocked lobby has two heavy glass and wood doors that prevent cold air entering the house, and mirrors on the window jambs (the vertical inner part of the window frame) coax even more light inside.

The windows on the south side of the house have an insulation value of R-6, which balances the heat gain during the day with the heat loss at night and on overcast days. The home actually has a net heat gain over the year, making passive solar even more effective. Most of the other windows in the home have an R-12 or R-8 value depending on their

orientation. Even the window blinds are used to absorb or release heat as needed, with a white finish on one side, black on another.

The home is connected to the electric grid and eventually it will produce revenue through energy credits. "During the day when we're producing electricity we'll put it into the grid when we don't need it, and at night we'll pull it back out again," Low explains.

Air tightness and ventilation

"All houses leak, so air tightness is important," says Low. "By being careful and sealing every little nook and cranny, it makes living inside the house like living in a balloon. We're keeping the heat that's in, in."

Water barrels stand sentry at each corner of the Alberta Sustainable Home Office. Photo: Sharon Boddy.

With such an airtight building, proper ventilation becomes very important. "Attached to our ventilation system is a scrubber that has a variety of materials in it that filter out dust, particulates, and smoke in the air outside. Our inside air is actually cleaner than outside," says Low.

All of the area rugs and furniture were made using natural fibres, and low VOC paint (which contains fewer volatile components) was also used. Many products were simply avoided, like permanent press clothes and sheets, which are treated with formaldehyde. "There are up to 12,000 products used in the construction of a house and many of them contain many different chemicals," says Low. "So there may be up to 100,000 synthetic chemicals in products and less than five per cent of them have been tested for human health impact." Even fewer have been tested for the ways in which different chemicals react to each other in a closed environment.

"When you go into a new home, there's that new home smell—that's a chemical soup," he says. "It's really an indication that the house is sick. So what price is your health? How do you put a number on that? You can't, so it becomes a choice to live in a healthy environment. We've tried for years to convince developers and builders that it's an incredible marketing opportunity—build a house with healthy materials and market it that way. Given a choice, people will take the healthy house even if it costs more."

Greywater system

The inside is littered with plants and they all do something: treat waste water, provide oxygen, or, in the case of spider plants, remove more carbon dioxide than any other house plant. Of course, they make a lovely aesthetic addition to the home as well.

The greywater system uses sand and ultraviolet light to filter the water, in some cases through a layer of soil and fig trees. Waterless toilets are found on the upper and lower floors. All waste solids are brought to a larger container on the lower floor where water and oxygen break them down into compost.

Appliances

Considering that a refrigerator is the biggest energy user in most homes, it comes as a shock to find out that the ASHO fridge uses only $5 in electricity per year. A motorized damper draws cold air inside and circulates it around the well-insulated refrigerator.

A crockpot is favoured over an oven and stove, and a large solar cooker stands like a beacon on the front deck. Low reports that he once cooked a full Thanksgiving turkey in it!

Lifestyle choices

The house is open for tours, with over 50,000 visitors since 1994. "They're from all over the world," says Low. "We had the largest home builder in Japan come through—they build 80,000 homes a year."

The rest of the home's considerations come down to lifestyle choices. "We're trying to get people to think about changing their lifestyles. Consciousness is the biggest problem we've got in addressing environmental issues. People think they're aware of what's going on, but 90 per cent of the time they'll choose convenience."

To see more of this amazing home office, visit www.ecobuildings.net.

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