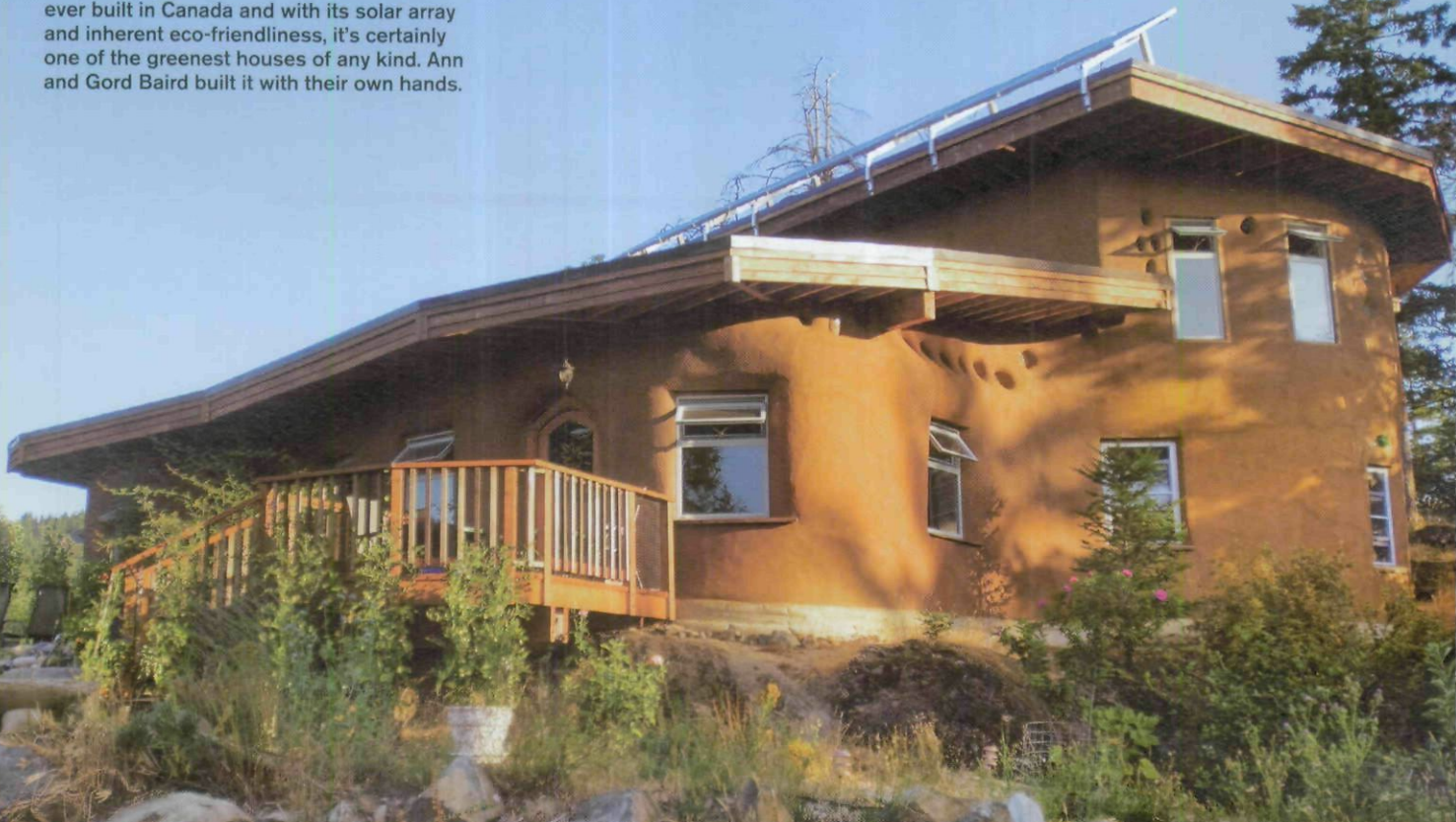


It's probably the most ambitious cob house ever built in Canada and with its solar array and inherent eco-friendliness, it's certainly one of the greenest houses of any kind. Ann and Gord Baird built it with their own hands.



ONE OF A KIND

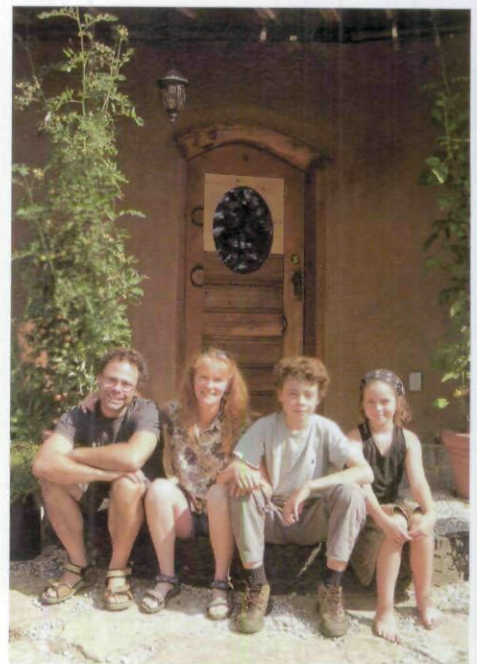
Welcome to an innovative home on Vancouver Island made of... well, mud. Don't laugh. This house is one of the greenest in the country and offers great lessons in sustainable living.

STORY BY TOM CRUICKSHANK PHOTOGRAPHY BY JEFFREY BOSDET

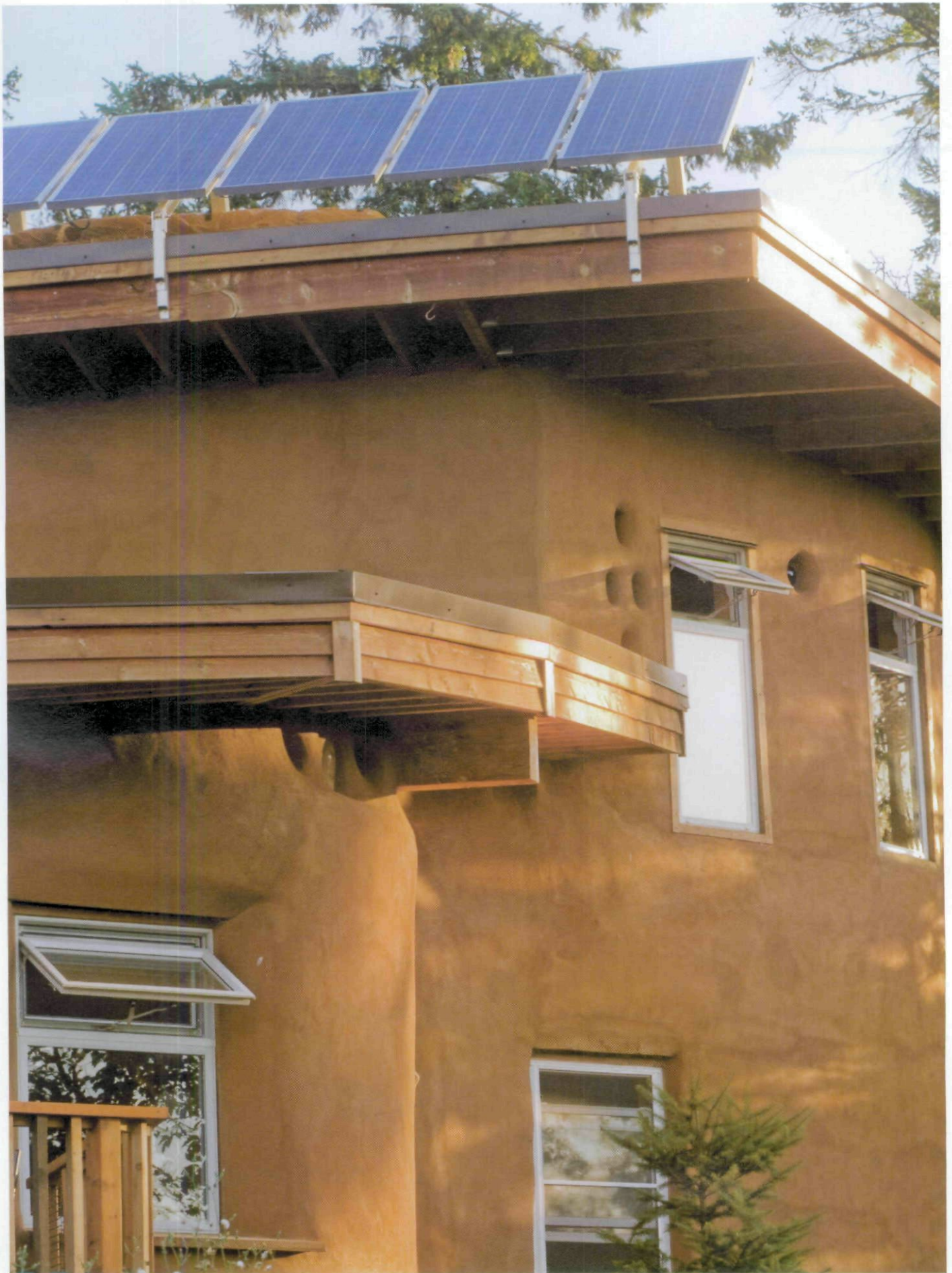
Here's something to really test the mettle of an eco-enthusiast: Force him or her to live in a trailer while their dream home is under construction. That's the scenario that Gord and Ann Baird faced back in 2007. While their cob home—a model of sustainability—was being built, the family slept in a trailer parked nearby. “It was awful,” Ann recalls. Not only were conditions cramped, “we always seemed to be fighting nature: It was too hot; then it was too cold; then it was too humid;

and it was always too stuffy. And the amount of propane we went through was outrageous!” Besides, there wasn't a natural material in sight. “Everything was made of highly processed stuff: plastic, metal, synthetic carpets and vinyl. It went against everything we stand for.”

“If anything, life in a trailer strengthened our resolve to live green,” Gord says. “The day they towed the trailer away and we could finally move into our house was one of the happiest days of my life.”



Three generations live in the rambling abode: Gord and Ann, Parker and Emily, and not in the photograph, Ann's parents, Howie and Merrily.



COB: THE BASIC RECIPE

- **SAND**—to provide compressive strength, about eight truckloads
- **STRAW**—fibre for tensile strength, about 100 bales
- **CLAY**—to act as a binder, about eight truckloads.

Mix with water to a lumpy, oatmeal-cookie-dough consistency. Walls are built in eight-foot-long, two-foot-high increments and left to dry. A skilled builder can mix three batches in a day and build a 25-foot section, two feet high in a day.



Emily, then age 5 (left), holds up a glob of cob, ready to slap into place as the house goes under construction. Meanwhile, Gord demonstrates the similarities between crushing grapes and the traditional way of mixing cob (above); he soon streamlined the method with the help of a roto-tiller (below).



The Bairds' eco-home—situated on eight hilly acres in Highlands, just outside Victoria—is the antithesis of life in a trailer. Designed not to fight nature but to work with it, the house is consistently comfortable without consuming a lot of resources. “We’re aiming for ‘net-zero,’” Ann says, referring to the noble idea of providing all their energy and water on site, while producing no waste. “Our goal is to balance consumption with enough compensating green factors that our environmental impact is next to nothing.” Moreover, Ann and Gord were determined to build with local materials. “We employed what we call the ‘100-mile architectural diet,’” Gord says. “It’s about as far away from a factory-made trailer as you can get.”

You can say that again. The Bairds' house is one-of-a-kind and made of the most local material of all, namely “cob,” an ages-old but little known construction technique whose main ingredient is nothing more than plain old dirt. “Cob is a mixture of sand, straw and clay,” Gord explains. “Eight dump trucks full of each material is enough to build a house.” Mixed on site (see sidebar, left) with water to make mud, cob is easy to work with. “No stick frame, no cranes, no fuss: You simply pack and pile the cob—layer by layer—into free-form walls, just shy of two feet thick. What could be simpler?”

Indeed, Gord and Ann did all the work themselves, although they acknowledge there was a learning curve. In fact, they got their feet wet not on the house, but on a smaller outbuilding they now use as a workshop. “It takes some practice to get the technique right,” Gord says. “Even so, we spent six weeks on the first eight-foot section of wall, but we learned a couple of tricks to make faster progress.” For one, the couple realized they could greatly speed up the mixing process by blending the ingredients not with manpower but with a roto-tiller. “This cut an eight-hour chore down to 30 minutes,” Gord advises. Likewise, they tossed in some pumice—a volcanic mineral sometimes added to concrete to make it lighter, to give the mix more strength and to improve its thermal performance.

For all its simplicity, cob is not



GREEN INNOVATIONS

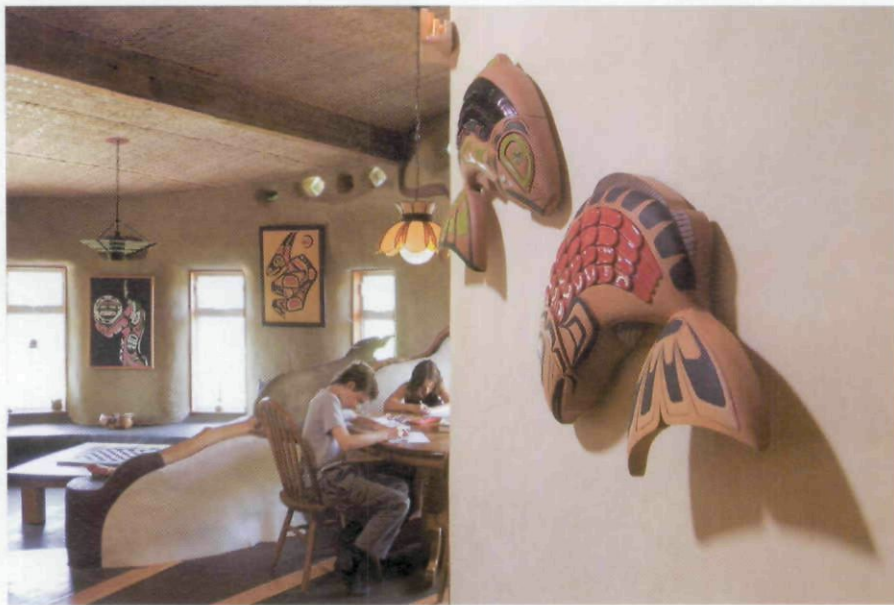
Some novel building ideas that make wise use of resources and/or conserve energy.

- As part of the "100-mile architectural diet," the house employs a minimum of lumber. "Cob houses don't require much, as there is no stick frame," advises Gord. For rafters, interior partitions and other applications requiring wood, he found a green source: "Eighty percent of the lumber is cobbled from demolition sites; ten percent came from local sawmills; another 10 percent—mostly plywood—came from conventional sources."

- To fully take advantage of passive solar, the south side of the house has the lion's share of windows. Conversely, the north side, which faces the brunt of winter winds, has none.

- Extended eaves shade the house from the summer sun; in winter, when the sun is lower in the sky, the eaves allow sunshine into the house when it is needed most.

- Windows are deliberately small, partly as a nod to load-bearing capacity of the cob walls, but to also minimize loss of heat through glass.



True to the eco-ethic, Ann and Gord grow as much of their own food as they can and there isn't a patch of mown grass in sight. Inside, the cob walls adopt a funky, curvilinear form.

considered mainstream, even in B.C., where experimental building materials seem to flourish (see "Cob: A Comparison," page 74). In fact, it is not acknowledged in the provincial building code, so the Bairds had to seek an engineer's stamp to make sure their house would conform to basic standards. (He recommended the walls be reinforced with a criss-cross of tension cables, augmenting the tensile strength of the straw.) Meanwhile, there are

dozens of cob houses in Britain currently approaching their 200th birthdays, but on this side of the pond, the method has rarely been more than a curiosity. Here, it is usually reserved for garden sheds and guest cabins and then only in the balmy reaches of British Columbia, as cob hasn't been proven in extreme climates. But that hasn't dampened Ann and Gord's enthusiasm. They say their house is the largest cob building in Canada, one of

COB: A COMPARISON

If cob sounds familiar, it might be because it resembles any number of other conventional and alternative building materials. However, there are basic differences and some are greener than others. Here's a primer:

COB—A humble mix of earth, sand and straw mixed with water. Cob construction is hand-built, layer by layer, and left to dry until it forms a solid one- to two-foot-thick wall. Usually requires exterior "breathable" lime stucco or plaster seal for weather-proofing; unproven in extreme climates, although the Bairds would like to challenge that.

RAMMED EARTH—Employs many of the same materials as cob but the main difference is that the wet earthen mixture is poured in place, then repeatedly beaten, pummeled, tamped and rammed until it dries into a rock-solid wall. More labour-intensive than cob and doesn't lend itself as easily to do-it-yourself applications (see "Ram-ifications," June 2005).

ADOBE—Like conventional brick, adobe is made of ordinary clay, but unlike its cousin, it is formed into large blocks. Nor is it fired in a kiln—each block dries in the sun. Requires a sheath of stucco to be waterproof.

BRICK—Conventional brick takes adobe one step further: Bricks are smaller and fired in a kiln for waterproofing and structural strength. Loses green points for consuming huge amounts of heat in the kiln and for the long distances bricks are shipped.

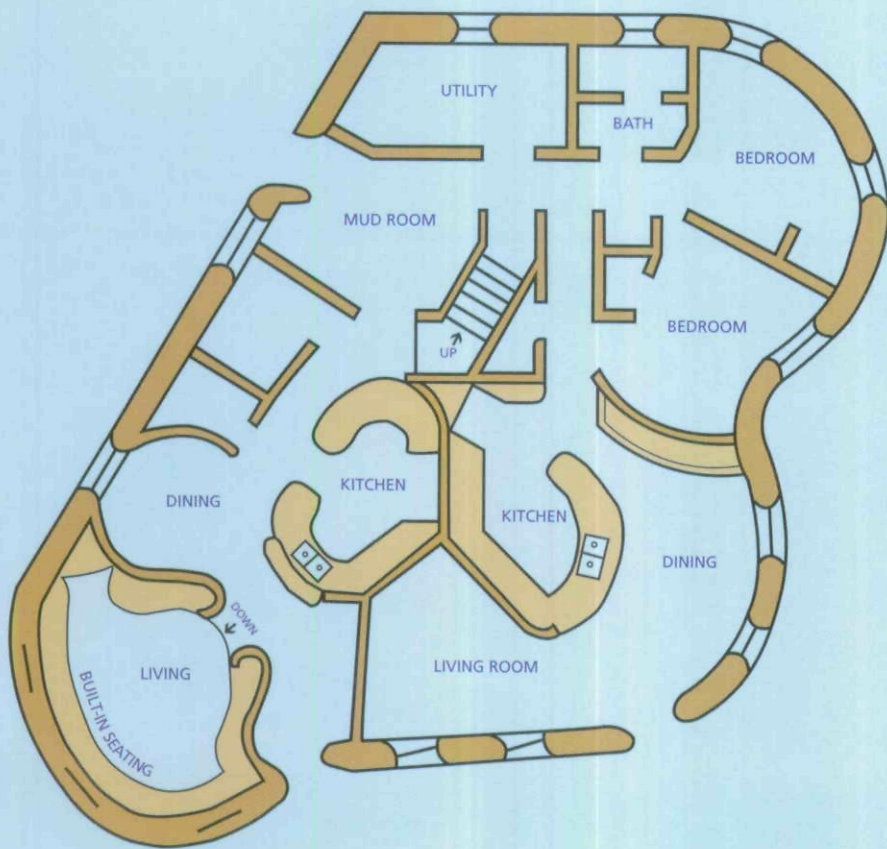


Living area and kitchen adopt an open-concept plan. Not only is this a friendlier approach than a house cut up into separate rooms, it is also easier to heat.

the few full-time, year-round homes to employ the technique. It's also seismically engineered in the event of an earthquake.

The Bairds say cob's best assets are its eco-friendliness, affordability, acoustics and air quality. But it also has a certain rustic aesthetic in its favour. "Like an egg, cob is at its structural best in curvilinear shapes, so it lends itself to free-form architecture," Gord relates, explaining that there isn't a square corner in the entire house. "No standard rooms; no straight lines;

you can add a window here, move a door there, as you go along. It's really great self-expression for a builder." However, this doesn't mean there was no logic in their house-building plans. On the contrary, there were plenty of practical considerations to address in the design of the house, among them rooms for two kids and most challenging of all, how to incorporate an in-law suite into the mix. And then there were the decisions that face every homebuilder: kitchen design, bathrooms and *(text continues on page 76)*



Specs

Concept Multi-generational eco-home designed to state-of-the-art sustainable-living standards. House is divided into two units, including in-law suite. Owner acted as own general contractor. Engineering advice: Kris Dick, University of Manitoba
Location 15 minutes north of Victoria in Highlands, B.C.

Genesis Land purchased 2005; construction begun 2007; occupied Christmas 2008

Bedrooms 4 + office (including suite for Ann's parents)

Bathrooms 3 (including granny flat)

Total Usable Floor Area About 2,150 square feet

Foundation High fly ash reinforced concrete, 20 inches wide, placed into a fabric form

Construction Innovative use of solid cob construction (see text). Upper floor: 2 x10 frame with cob infill. Exterior coated in waterproof lime plaster.

Roof Living roof planted with groundcovers (see text)

Insulation Walls require no conventional insulation, thanks to thermal mass in cob walls; pumice in cob formula improves thermal performance.

Windows Low-E argon double- and triple-glazed units

Electrical Service House is on-grid, but produces extra electricity through roof-mounted solar panels, to be supplemented by a wind turbine. In fact, the house is a net-supplier to BC Hydro. House is wired for DC and AC.

Heat and Hot Water Heat generated by 60 solar thermal evacuated tubes (which collect about 65,000 BTUs an hour) and delivered through hydronic heating tubes embedded in the earthen floors; household hot water piggybacks on the same system. Backup heat provided by wood-gasification wood stove

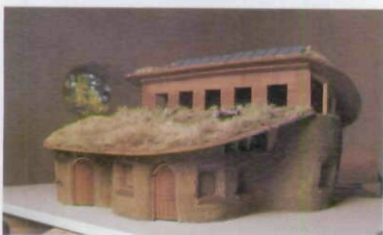
Water Conventional well for potable water; other household water provided by rainwater collected from roof. Grey water is used for garden irrigation.

PIERRE DURAND



Cob allows some funky flourishes such as a decorative gecko and a fully functioning bakeoven. The Bairds put a model together to guide them through construction.

(continued from page 74) other amenities. "We were guided by the green ethic, so all of the rooms are smaller than they might have been in an ordinary home," Gord advises.



In aiming for net-zero, the couple took stock of all household amenities and mechanical systems and put them to the green test. "We decided we could live without a clothes dryer, hair dryer and toaster," Ann says, thinking of their reputations as energy guzzlers. Likewise, they dispensed with such conventional items as bathtubs and flush toilets in favour of greener alternatives (see "All Systems Green," page 77). Even the counter surfaces and the floors and interior walls themselves are made from variations on the cob recipe. "Hardly anything came from the hardware store."



Early in the planning stages, Ann and Gord discussed the idea of going off-grid, only to realize that it wasn't cost-effective or necessarily the greenest solution in their case. "Off-grid only makes financial sense when the hydro

ALL SYSTEMS GREEN

• COMPOSTING TOILET

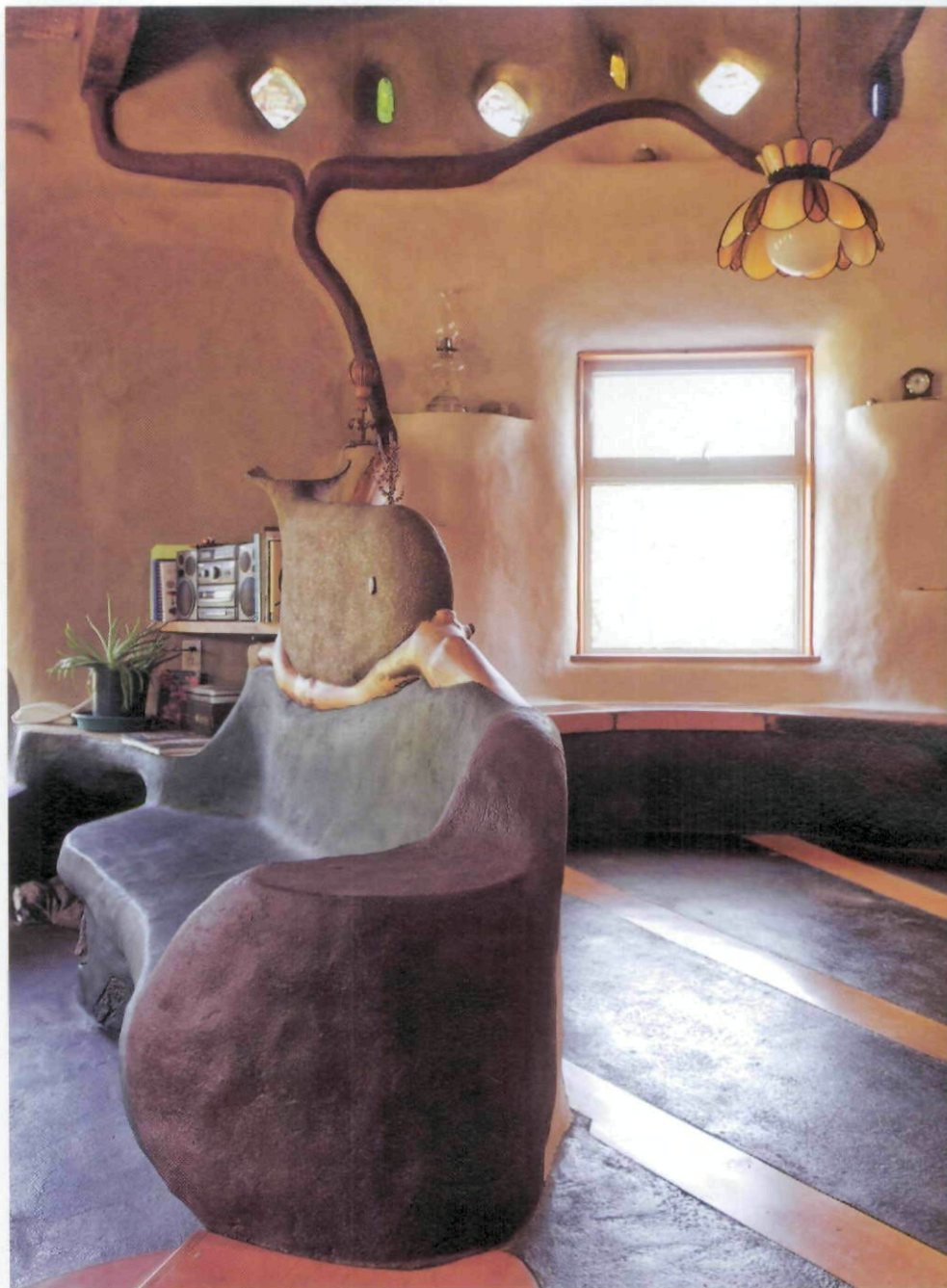
As everyone knows, conventional toilets are notorious water-wasters. Indeed, about 30 percent of household water gets flushed down the loo. This was incentive enough for Gord and Ann to choose a more eco-friendly toilet, namely the composting type. "The routine is slightly different," advises Gord. "Instead of flushing, you toss in some wood shavings." At this point, heat and suction fans take over, along with thermophillic bacteria, which eventually convert the organic material into garden compost. "It doesn't smell and there's something rewarding about turning waste into something useful."

• TADALAKT SHOWER

Brightly glazed, conventional bathroom tile would look out of place in the Baird home, considering its prevailing earth tones, natural surfaces and sculptural rooms. That's why the couple lined their shower with *tadalakt*, a type of waterproof plaster that lends itself to curvilinear applications. Its secret ingredients are lime and a fine aggregate first developed in Morocco. "Besides, conventional tile has a big carbon footprint," Ann says. "Tadalakt is long-lasting, carbon neutral and made from natural materials: lime, sand, calcium carbonate and water and then burnished with a polished stone and sealed with an olive oil soap."

• WATER RECOVERY

Household water is never taken for granted on Vancouver Island. "Our well is 300 feet deep and that's not unusual around here," Ann explains. In an area subject to drought, wise is the homeowner who adopts a miserly approach to water consumption. That's why the Bairds reserve their well for drinking only. Garden irrigation is sourced from water harvested from the roof. "There's a garden growing on our roof," Ann continues, describing how the house is designed to harvest rain. "The soil filters rainwater and an impermeable membrane keeps water from leaking into the house. The water goes through some more filters and is conducted to cisterns. We have up to 10,000 gallons on hand." (See "Never a Dull Moment," page 75)



"We don't have a lot of furniture," confesses Ann. Come to think of it, who needs it when cob is so versatile that it lends itself to free-form seating?

lines are so far away that hooking up to conventional electricity costs a fortune," Gord explains. "Here, the hydro lines were quite handy." Even so, that didn't stop the couple from buying solar panels, which, depending on the time of year, produce more electricity than the house can use. "While a typical household might use 33 kilowatt-hours a day, we use three, so we sell our extra power to BC Hydro. It's all part of minimizing our footprint."

Both Ann and Gord quit their jobs

to devote themselves to the house full-time. As word got out about their funky hilltop house, more and more people dropped by to see it for themselves. It has generated so much buzz that the Bairds now offer tours to paying groups and use their home as a demonstration project. They have emerged as consultants on sustainable building. "People are fascinated by how we live with such a small carbon footprint," says Gord. "Most of all, they want to learn more about cob." Sure beats living in a trailer. ☼

Copyright of Harrowsmith Country Life (11908416) is the property of Malcolm Publishing Inc. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.