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## In the Region/Connecticut; A 'Health House' Can Help Its Owner Breathe Easier

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THE new three-bedroom, 2,700-square-foot house being completed along a dirt road deep in the woods of Roxbury is one that anybody with a respiratory ailment might covet. The air inside is so pure that it exceeds the requirements set by Health House, an affiliate of the American Lung Association that sets stringent clean-air specifications for home builders.

The Roxbury house, set on six acres and expected to sell for \$385,000 once it is completed later this month, is the only new home in Connecticut to receive certification from Health House, a nonprofit organization in Minneapolis.

Margaret LaCroix, a spokeswoman for the American Lung Association, said that people without health problems would also benefit from cleaner indoor air and that any homeowner would appreciate reduced heating and cooling costs. Lower maintenance costs can be achieved as well by the use of materials like cement-fiber siding that looks like wood, can be painted and will not need replacement in a lifetime, she said.

The Roxbury house, at 39 Transylvania Road, is being built by Mike Trolle (pronounced TROH-lee), a former vice president for commercial real estate at CB Commercial in Stamford. "I experienced a midlife crisis in 1998," he said, "and found a meaningful new career."

After researching "green" building -- the term for environmentally sound construction practices -- "I saw a great need for higher building standards that could contribute to improving and protecting health," he said, "something that is very important to many Americans."

He bought 21.5 acres in Roxbury, and last September the town granted him approval to build five homes. The model house was designed to Mr. Trolle's specifications by Thomas Hartman of Coldham Architects in Amherst, Mass. Bill Rock Smith of Integrated Building Systems Inc. of Latham, N.Y., coordinated the heating, cooling, electrical and plumbing systems.

The project's concept was based on surveys conducted in 1999 by the American Lung Association, concluding that indoor air pollution can be 2 to 100 times higher than outdoor levels, contributing to asthma, chronic rhinitis, nausea, nasal congestion, sinusitis and fatigue. Ms. LaCroix, the association's spokeswoman, said that the federal Centers for Disease Control in Atlanta have reported a 70 percent increase in asthma cases in the United States since 1982, in part because of inadequate or poorly maintained climate-control systems in homes, schools and workplaces.

Molds, bacteria, pollen, dust mites and animal dander are some of the irritants. But other chemical irritants come from building materials and home furnishings, in roofing and flooring, spackling compounds, paints, stains and coatings.

Mark LaLiberte, the president of Shelter Sources in Lakeville, Minn., conducts seminars about Health Houses for home builders' associations and utility companies across the country. "The building industry would be smart to provide as many choices for things like ventilating systems as they do for counter tops and Jacuzzis," he said.

Bruce Harley, the president of the Conservation Services Group in Westboro, Mass., said, "Most homeowners take it on faith that the houses they buy are healthy." His company tests residential air quality for most New England utility companies, for Health House and for Energy Star Homes, whose less complex standards are approved by the Environmental Protection Agency and the Department of Energy. (The Roxbury house also meets Energy Star requirements.)



"Builders look at it from a minimal safety point of view," he said. "Contaminants are a low priority." Compounding the problem is the fact that building an airtight house in which air quality can be maintained at optimal levels is complex, with a perplexing array of equipment and construction techniques available. "The fact that it's so complicated is part of why it has not become common practice," Mr. Harley said, "and most people assume it will cost."

Actually, the cost can be quite modest: an additional \$750 will buy a sealed-combustion furnace, and a simple ventilation system will cost \$300 more, Mr. LaLiberte said.

Sometimes, a healthy house costs nothing extra. Mr. Hartman, the architect, said of Mr. Trolle's project, "Mike's house is no more expensive than any good-quality house."

As interest in healthy houses spreads, other owners are taking different tacks. Last month, Tracy and William O'Brien moved into the house they built in Oxford after spending a year researching geothermal heating on the Internet. They worked with Joseph Swift of United Illuminating on Energy Star specifications, a free service provided by utilities across the country.

AMONG other amenities, the O'Briens installed a geothermal heating system to help relieve Mr. O'Brien's allergies. "He breathes a lot easier at home now," Mrs. O'Brien said. "He used to breathe easier outside."

Anyone interested in seeing Mr. Trolle's Health House in Roxbury can take a free tour, beginning Tuesday. Hours are noon to 4 p.m. Tuesday through Friday and 10 a.m. to 4 p.m. Saturday. Information and directions: (860) 350-3580.

Aside from the 16-by-23-foot basement playroom, the rooms in the Health House are not as large as some buyers might expect. On the first floor, there are a 12 1/2-by-12 1/4-foot living room, a 10 2/3-by-10 1/2-foot den, a 12 1/2-by-11 1/2-foot dining room, 12 1/2-by-11-foot kitchen and a powder room. Upstairs, there are a 12-foot-7-inch square master bedroom and a master bath with only a stall shower, an 11 2/3-by-11-foot bedroom, a 11 2/3-by-10-foot bedroom and a second bath with a shower-tub combination.

Mr. Trolle employed a number of energy-saving features, beginning with the house's plain rectangular shape, which minimizes construction costs and simplifies blowing in cellulose insulation. The insulation is rated at R50 in the ceilings and R38 in the walls, exceeding the Energy Star standard of R38 and R19.

A waterproof precast concrete foundation will keep the house free of dampness and mildew, Mr. Trolle said, aided by a four-inch concrete basement floor over 10 inches of crushed stone. Seams between the foundation, floors and walls are sealed to keep out air, moisture and radon. The two-car garage is separated by a 13-foot breezeway, isolating carbon monoxide fumes.

The heating and air-conditioning system is connected to an energy recovery ventilator, a crucial piece of equipment. It maintains a balance of fresh air, humidity and heating or cooling. And it exhausts stale, contaminated air, providing a complete change of air every four hours, or by flicking a switch to increase the fan speed, every three hours. In contrast, most conventional heating and air-conditioning systems are closed loops of in-house air, Mr. Trolle said, with no provision for bringing in fresh air, aside from opening a window or door.

There are no plumbing pipes or heating ducts in the exterior walls to minimize heat and cooling loss. The sheet metal ducts are sealed with mastic to prevent leaks.

In the kitchen, cabinet interiors are made of particle board, which contains formaldehyde, but they are encased in melamine, a neutral plastic. The cabinet exteriors are birch. Counter tops are autoclave concrete, made of Portland cement, quartz sand and a mineral binder that is formed into panels, steamed for 25 hours and then air-cured. The panels, which resemble granite, are produced in Germany and imported by Fireslate of Lewiston, Me. "It's 50 percent cheaper than granite," said Tom Worthen, the president of Fireslate, "30 percent cheaper than Corian, and two and a half times the cost of Formica, which has a lot of sophisticated glues."

Maple strip flooring is installed rather than carpeting, which can give off formaldehyde, Mr. Trolle said. The kitchen floor is also maple, and in the bathrooms, the buyer can choose ceramic tile or

linoleum made of pressed cork and linseed oil.

Anyone walking into the house will probably notice that there's no "new house" smell. "That's because there is no formaldehyde, benzene or other volatile gas present that makes a house smell 'new,'" Mr. Trolle said. Even the interior wall primer and paints are free of volatile organic compounds.

Additional features include double-paned windows filled with argon gas and set into fiberglass frames; airtight electrical outlets and openings for plumbing pipes and fixtures; a central vacuum system that filters its exhaust and vents it outdoors; and a central communications box wired to multifunction outlets for telephone, Internet, cable television and VCR.

Certification for Health House and Energy Star requires a door-blower test, to determine the tightness of the house by the amount of air that escapes, and a duct-blower test that measures how much air leaks into or out of ducts. Mr. Harley, who handles the tests for the Health House and Energy Star programs, rated the Roxbury house a "very good, tight envelope."

Mr. LaLiberte, who is charged with assessing Health House paperwork and test results, said, "The house exceeds the requirements in every respect."