Energy Design Update®

The Monthly Newsletter on Energy-Efficient Housing, from Aspen Publishers, Inc. • Formerly published by Cutter Information Corp.

Vol. 22, No. 11 November 2002

INDUSTRY NEWS

Leaky Homes Plague New Zealand

For the past several months, the residential construction industry in New Zealand has been shaken by a series of news reports focusing on the country's "leaky building crisis." The reporting, spearheaded by the *New Zealand Herald* (www.nzherald.co.nz), has highlighted incidents of serious leaks, rot, and mold in new homes. According to the *Herald*, as many as 10% of the 220,000 homes built in New Zealand during the past decade may have serious water-entry problems. In some cases, the *Herald* reports, new homes began rotting less than a year after completion (see Figure 1).

The *Herald* reported in September that Taradale Developments, one of New Zealand's largest developers of multi-family housing, is being sued for millions of dollars by 150 homeowners at a two-year-old development in Botany Downs called Sacramento. The plaintiffs allege that so much water has entered their homes that rotting structural components are growing mushrooms and mold. The *Herald* has also reported that in Ponsonby, New Zealand, the saturated floor joists of a three-story home built in the 1990s were so rotten that a double bed and a washing machine fell through the floor.

Photo credit: Geoff Bayley

Figure 1 — This New Zealand home was sheathed with a product called Triple-S, described by the manufacturer as a "cellulose fiber insulating board coated on one side with water-repellant bitumen." The sheathing was covered with wire mesh and stucco, without provision for drainage. Because of inadequate flashing details, water penetrated the stucco, causing the sheathing and framing to rot.

IN THIS ISSUE

Steve Alexander, an Auckland building repair expert, described problems at a three-year-old house to a *Herald* reporter. "There has been severe timber decay and we're having to take off probably 75 per cent of the cladding and perhaps rebuild 25 per cent of the outside walls and decks," said Alexander. "Some of the timber framing had no structural integrity at all. You could break it with your fingers."

Here We Go Again

To North American readers, the litany of New Zealand complaints sounds eerily reminiscent of similar construction-defect clusters in California, North Carolina, and British Columbia (see ***EDU,*** December 1995, December 1997, and June 2000). Many of the leaky New Zealand homes exhibit not only rot, but also persistent mold, including stachybotrys. Each cluster of rotting buildings includes a collection of irate and litigious homeowners. Since some of the New Zealand builders are already bankrupt and therefore beyond the reach of lawsuits, a national debate has arisen over who will end up paying for millions of dollars in anticipated repair costs.

Most observers agree that water-entry and rot problems in New Zealand are far more common in new houses than older houses, and the source of the water is rain, not condensed interior moisture. Investigators looking for changes in construction practices that might explain the rot epidemic note that most of the rotting homes have stucco siding, called "monolithic cladding" in New Zealand. The term includes both portland-cement stucco and synthetic stucco. In New Zealand, stucco is sometimes installed without sheathing; when sheathing is used, it may consist of plywood, OSB, fiber-cement, or rigid foam. Within the last few years, the percentage of new homes in New Zealand with stucco siding has risen to 40%. The use of stucco was relatively rare in New Zealand until the 1990s, when it began gaining over traditional sidings like clapboard and brick.

Other investigators absolve stucco, pointing instead at sloppy workmanship by builders, who are not required to be licensed in New Zealand. Apparently, buying a high-end home does not guarantee quality. The chief executive of the Consumers' Institute of New Zealand, David Russell, told a *Herald* reporter, "The more expensive the house, the more nooks and crannies it has, the more designed it is, the more likely you are to have problems."

Untreated Framing Lumber

Until 1996, New Zealand builders were required to use framing lumber treated with boron. Although the lumber treatment was intended to protect against a common New Zealand beetle, the house borer (*anobium punctatum*), the boron also slowed rot. But the requirement was revoked because of environmental concerns, and for the past six years New Zealand builders have been framing houses with untreated lumber (see Figure 2).

Although some homeowners blame their rotting framing on the switch to untreated lumber, not all experts agree. "Untreated timber is not the cause of the problem; weathertightness of building practices is," says Geoff Bayley, an Auckland building disputes arbitrator.

Photo credit: Philip O'Sullivan

Figure 2 — This photo shows rim-joist rot in a two-year-old New Zealand apartment building. Above and below the untreated Radiata pine joist, replacement 2x4 plates and studs were installed in a previous repair. The source of the moisture was a poorly flashed parapet.

Editor: Martin Holladay **Publisher: Jon J. Eldridge** **Manuscript Editor: Vincent Nordhaus**
Group Publisher: Richard H. Kravitz **Managing Editor: Vicki Dean** **Sr. Production Editor: M. Foronda**

Energy Design Update (ISSN 0741-3629) is published monthly by Aspen Publishers, 1185 Avenue of the Americas, New York, NY 10036. (212) 597-0200. Subscription price, $337/one year. *Printed in U.S.A. Postage paid at New York, NY, and additional mailing offices. POSTMASTER: Send address changes to Subscription Dept. EDU, P.O. Box 3000, Denville, NJ 07834.*

Subscription Services: To order a subscription, or for current subscribers with questions about service or to make address changes, call **(888) 313-6046**. For outside the US call (973) 627-5162. E-mail: custsvc_edupd@fulcoinc.com.

Other Customer Services: To purchase back issues of ***Energy Design Update***, from the past 12 months only or to get information about other Aspen Publishers products, call **(800) 638-8437**. To order 100 or more article reprints, contact Journal Reprint Services toll-free at 1-866-863-9726 (outside the US at 610-586-9973) or visit their Web site at www.journalreprint.com.

Editorial Offices: Martin Holladay, ***Energy Design Update***, P.O. Box 153, Sheffield, VT 05866. E-mail: mholladay@aspenpubl.com; Tel: (802) 626-1082; Fax: (802) 626-9982.

Investigators are still gathering data on the extent of the current crisis. Prendos, an Auckland consulting firm specializing in wet-envelope problems, is currently investigating leaks and rot in 2,000 homes. The *Herald* reported that the housing industry faces a total repair bill that may be as high as NZ $1 billion (about US $470 million).

In March 2002, the Building Industry Authority, a government-appointed board that enforces New Zealand's building standards, appointed a three-member committee to investigate and report on the leaky-building crisis. The committee, dubbed the Overview Group on Weathertightness, is the New Zealand equivalent of the Barrett Commission, established in British Columbia in 1998 to investigate the so-called leaky condo crisis.

Let's Skip the Flashing — Just Hand Me the Caulk Gun

The official report of the Overview Group, released in September, notes that problems are especially prevalent in high-end custom homes and multi-family row houses. The design elements associated with leaks include stucco cladding, skimpy roof overhangs, complicated roof forms, balconies, and flush windows or doors with inadequate flashing.

Other factors contributing to the crisis, according to the report, were a lack of attention by designers to weathertightness details, inadequate building inspection by local officials, and deficiencies in New Zealand's building code. For example, the report criticizes elements of the code that permit the use of caulk as an acceptable weatherproof detail for exterior joints.

Among the report's findings:

- "There has been much evidence of a general lack of understanding of the importance of, and in some cases even the need for, flashings at junctions and penetrations (even at windows and doors). Their use can be often minimal and in the worst cases non-existent."
- "Generally, New Zealand lacks science and technology based courses at tertiary level. There are few if any recognized Bachelor of Building, Construction Studies or Building Surveying courses available."
- "There is still a high degree of uncertainty in evaluating the potential cost of repair for the same reasons that the full extent of the problem of weathertightness itself is hard to determine. Even at the conservative end of the range [of estimated repair costs], however, the scale of the problem is unacceptably high."

Moving Forward

The Overview Group considered many proposals for addressing the crisis, including regulations mandating the use of rainscreen siding details and a return to the use of treated framing lumber. These suggestions, however, were rejected by the Overview Group, which instead recommended:

- A warning to homeowners that many cantilevered balconies and decks are at risk of collapse;
- Further study of the health risks associated with mold;
- Further study of the advisability of licensing builders;
- The exclusion of "face-sealed cladding systems" (barrier cladding) from a list of code-approved siding options in "high-risk areas";
- The development of a national performance-based standard for weathertightness in residential construction;
- The development of a formal procedure for the approval of new building materials;
- Requiring building permit applications to include more weathertightness details and flashing details;
- The encouragement of more building science research in New Zealand; and
- New regulations requiring home-building contracts to include attached design plans, a mandatory home warranty insurance policy, and a stipulation that homes are built to code.

The committee's recommendations are non-binding, and the question of who will pay to fix New Zealand's rotting homes remains to be resolved by the legislature and the courts. In the meantime, the reputation of stucco cladding has been dealt a serious blow in New Zealand. The Consumers' Institute, a Wellington watchdog group, has the following advice posted on its Web site: "If you are thinking of buying a monolithic plaster home, be very cautious."

For more information, the Report of the Overview Group on the Weathertightness of Buildings is available at www.bia.govt.nz/publicat/weathertightness.php, or contact the Building Industry Authority, P.O. Box 11846, Wellington, New Zealand. Tel: 64-4-471-0794; Fax: 64-4-471-0798; E-mail: bia@bia.govt.nz.

Insulation from Hemp

Many green builders shun fiberglass batt insulation, which is energy-intensive to manufacture, difficult to recycle, and irritating to installers' skin. One skin-friendly alternative to fiberglass is insulation made from cotton fiber, available from at least two US manufacturers, Advanced Fiber Technology (513-860-4446) and Innotherm (866-627-2655). But natural-fiber batts can also be made from hemp. At least six European manufacturers — three in France, two in Germany, and one in Denmark — are now selling hemp insulation (see Table 1). Moreover, manufacturers in Wales (JB Plant Fibres in Gwynedd) and New Zealand (New Wool Products in Nelson) are also experimenting with hemp insulation.

Using Hurds and Fiber

When industrial hemp is processed, the long fibers of the plant are usually separated from the central core, a process called decortication. The outer fibers can be processed into felt or insulation batts, while the material in the core of the hemp stalk, called hurds or shives (in French, *chènevotte*), is mostly cellulose, and can be processed into a loose-fill insulation.

Hemp hurds look like fine wood chips, but are less dense. After hemp hurds are treated for fire resistance, the material is bagged and sold as insulation by two French manufacturers. Just like cellulose insulation made from recycled newsprint, insulation made from hemp hurds can be poured or blown in place to insulate wall cavities or attics (see Figure 3). The R-value of insulation made from hemp hurds varies from 2.0 to 3.0 per inch, somewhat below that of common cellulose insulation (R 3.1 to R 3.7 per inch).

Hemp fiber batts, sometimes called hemp wool (in French, *laine de chanvre*; in German, *Hanfwolle*), are

Table 1 — Comparing Hemp Insulation Products

Insulation	Manufacturer	Insulation type	Dimensions available	Price	R-value	Density
Chanvrinove	La Chanvrière de l'Aube	Loose-fill made from hurds	Bag holds 7 cubic feet	$3.29 per cubic foot		
Florapan	Isover	Batts made from fiber	Batts are 4 in to 9.5 in thick, 24 in wide, 48 in long	4-in batts, $0.91 per square foot	R 3.2 per inch	2.2 lbs ft per cubic
Hemp wool	Distributed by Arboga and Eco-Logis	Batts made from fiber	Rolls are 4 in thick, 17.7 in or 23.6 in wide, 32.8 ft long	$1.84 per square ft	R 3.6 per inch	1.5 lbs per cubic ft
Hemp wool	Distributed by www.idees maison.com	Batts made from fiber	Rolls are 4 in thick, 23.6 in wide, 18 ft long	$1.53 per square ft		
Isolaine	Chanvrière du Bélon	Batts made from fiber	Rolls are 3.1 in or 4 in thick, 23.6 in wide, 32.8 ft long	4-in batts, $1.00 per square ft		1.5 lbs per cubic ft
Chanvrisol bulk hemp hurds	La Chanvrière de l'Aube	Loose-fill made from hurds	Bag holds 4.4 cubic ft	$4.25 per cubic ft	R 3.0 per inch	3.1 lbs per cubic ft
Danish hemp insulation	ME-consulting ApS	Batts made from fiber	4 in or 7.8 in thick, up to 23.6 in wide	4-in batts, $0.51 per square ft	R 3.8 per inch	1.2 to 2.5 lbs per cubic ft
Isochanvre Isolation	Chènevotte Habitat	Loose-fill made from hurds	Bag holds 3.5 cubic ft		R 2.0 to R 2.2 per inch	6.2 to 8.7 lbs per cubic ft
Thermo-Hemp	Hock Vertriebs	Batts made from fiber	Batts are 1.5 in to 7 in thick, 24 in wide, 47.2 in long	4-in batts, $1.16 per per square ft	R 3.8 per inch	1.2 to 2.5 lbs per cubic ft

Table 1 — At least six European manufacturers sell insulation products made from hemp. The products fall into two broad categories: batts made from hemp fiber, and loose-fill insulation made from hemp hurds.

denser than fiberglass batts. The processed hemp fibers are usually treated with sodium silicate or ammonium phosphate to increase fire resistance. To make the finished batts springier, the hemp fibers are usually blended with a small percentage (2.5% to 15%) of polyester or polypropylene fibers. The finished insulation is sold in individual rectangular batts or in rolls, and is used in the same way as fiberglass batts (Figure 4). The R-value of hemp fiber batts ranges from 3.2 to 3.8 per inch, about the same as for fiberglass batts.

Europe Leads the Way

Hemp plants grown for fiber production are a low-THC variety of *cannabis sativa*, the same species that

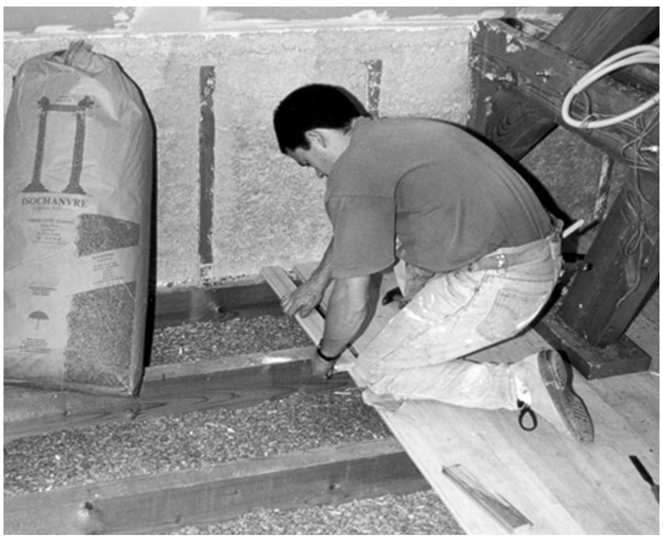

Figure 3 — Loose-fill insulation made from hemp hurds, like the Isochanvre Isolation in this photo, can be poured straight from the bag into wall cavities or joist bays.

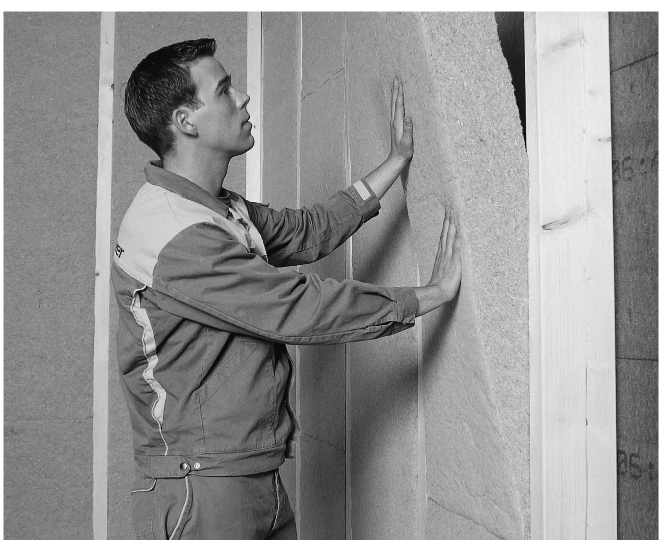

Figure 4 — Hemp fiber batts, like these Florapan batts from Isover, are stiffer than fiberglass batts. Hemp insulation is non-irritating, and can be installed without gloves or a facemask.

produces marijuana. Although industrial hemp is now widely grown in Canada, France, Germany, Denmark, Hungary, Romania, Ukraine, and Russia, its cultivation remains illegal in the US. Nevertheless, processed hemp fiber and hemp products can be legally imported to the US.

"Europe is clearly in the forefront of research on the use of hemp for insulation," says Erwin Lloyd, managing director of BioComposite Solutions, a consulting company in Bellingham, Washington, that specializes in the industrial use of natural fibers. "In Europe, because of high landfill costs, it is very expensive to dispose of anything. That creates great motivation to find natural products that are recyclable, and that has been a leading factor in generating interest in developing hemp insulation."

Hemp Economics

At this point, batts from ME-Consulting (Rønde, Denmark) are the only type of hemp insulation with a US distributor (Troika Nonwovens in Milwaukee, Wisconsin). Even if US farmers are eventually allowed to grow hemp, natural-fiber insulation will remain a niche product as long as it remains significantly more expensive than fiberglass and cellulose. In the US, cellulose costs contractors between 18 and 23 cents a pound, about a tenth of the cost of European insulation made from hemp hurds. As for hemp fiber batts, the current retail price in Europe ($0.51 to $1.55 per square foot for 4-inch-thick batts) is between two and six times the US price for unfaced fiberglass batts. The least expensive European hemp fiber batts (from ME-Consulting) cost about the same as cotton fiber batts sold in the US.

If hemp insulation does become more widely available in the US, likely customers include green builders willing to pay a premium for a natural-fiber product, and customers with chemical sensitivities. "There are certainly many homeowners out there who don't want to put fiberglass in, but there really isn't that much need to go with natural-fiber insulation," says Alex Wilson, executive editor of *Environmental Building News*. "It's a tough sell economically. Cellulose will probably perform better from an energy standpoint, because it will block air leakage more effectively."

Moreover, the category of natural-fiber insulation includes several competitors, including wool, cotton, and flax. "We know we can do this with hemp," says Lloyd. "But flax is probably a better way to go. The residue from flax oilseed production in the prairies is presently being burned. It is not considered to be high-end fiber, but it's a very good candidate for use as insulation."

Hemp Insulation at Pine Ridge

Among the few US builders who have had a chance to try hemp insulation are a group of Oglala Sioux (or Lakota) Indians on the Pine Ridge reservation in South Dakota. Alex White Plume, a Lakota rancher, has been researching the possibility of growing industrial hemp and processing it locally into insulation. "We have to begin using more natural products to build our houses," said White Plume. "We can't continue to ruin our earth anymore."

Although the Oglala Sioux Tribal Council legalized the cultivation of industrial hemp in 1998, that hasn't stopped US Drug Enforcement Administration agents from entering the Pine Ridge reservation to confiscate Alex White Plume's hemp fiber crop for three years in a row. Since White Plume has been stymied in his attempts to grown his own insulation, he has decided to import enough 6-inch thick hemp batts from Hock Vertriebs, a German manufacturer, to insulate two houses. The Thermo-Hemp batts cost him about $1,500, while the airfreight set him back an additional $5,100. "We were trying to make the point that although we could buy the insulation in Germany, and import it at a high price, we weren't being allowed to grow the hemp and make our own," said White Plume.

Tom Cook of Chadron, Nebraska, has also been active with the Oglala Sioux hemp initiative. Cook is the project director of the Slim Butte Land-Use Association, a housing development group at Pine Ridge. Since hemp cultivation is still impossible, and importing German hemp batts is costly, Cook decided to experiment with the use of minimally processed industrial hemp fiber as an insulation material. "We just bought a few bales of number-two hemp fiber from Kenex in Canada," said Cook. Kenex (519-351-9922; www.kenex.com), a hemp processor in Chatham, Ontario, sells 250-pound bales of industrial hemp fiber for 42 cents (US) per pound, according to Bob Lecuyer, Kenex's general manager. "We used the hemp fiber loose," says Cook. "It has very long, soft fibers. We just fluffed it and stuffed it into the spaces between the studs. It stays in place without falling down, until we put up the sheetrock."

Cook admits that the Kenex fiber can't compare with processed batts. "The hemp insulation that Alex White Plume bought from Germany is much superior," says Cook. "It bounces and retains its shape, and it doesn't burn. If you put a match to it, it won't ignite."

For more information, contact:

Arboga, 16 chemin de Fillet, 33750 Camarsac, France. Tel: 33-05-56-30-15-98; Fax: 33-05-56-30-10-73; E-mail: Arboga.francois@oreka.com; Web site: www.arboga.fr. A distributor of hemp fiber batts.

Chanvrière du Bélon, CDB Les Kaolins, B.P. 3, 29350 Riec-Sur-Bélon, France. Tel: 33-02-98-06-45-34; E-mail: chanvriere-du-belon2@wanadoo.fr; Web site: www.chanvre-diffusion.com/isoconstruction.htm. A manufacturer of hemp fiber batts.

Chènevotte Habitat, 6 rue du Vivier, Le Verger, F-72260 René, France. Tel: 33-02-43-97-45-18; Fax: 33-02-43-97-65-44; E-mail: chenevotte.habitat@wanadoo.fr; Web site: www.isochanvre.com. Manufacturer of Isochanvre Isolation, a loose-fill insulation made from hemp hurds.

Eco-Logis, Cantemerle, Berge du Taurou, 81110 Dourgne, France. Tel: 33-05-63-50-24-81; E-mail: alain@eco-logis.com; Web site: www.eco-logis.com. A distributor of loose-fill insulation made from hemp hurds and hemp fiber batts.

Effireal, 1 rue Nationale, 49120 Chemille, France; Tel: 33-02-41-30-60-19; Fax: 33-02-41-30-37-81; E-mail: effireal@wanadoo.fr; Web site: http://effireal.ifrance.com. A distributor of hemp fiber batts.

Eurovente Strasserville, ZAC Chamlys, 77192 Dammarie les Lys, France. Tel: 33-01-64-39-22-36; E-mail: bernard.boyeux@wanadoo.fr. A distributor of loose-fill insulation made from hemp hurds and hemp fiber batts.

Hock Vertriebs GmbH, Industriestrasse 7, D-76297 Stutensee-Spöck, Germany. Tel: 49-7249-9471-0; Fax: 49-7249-9471-25; E-mail: hock@thermo-hanf.de; Web site www.thermo-hanf.de. Manufacturer of Thermo-Hemp hemp fiber batts.

Isover, Postfach 21 05 65, D-67005 Ludwigshafen am Rhein, Germany. Tel: 49-621-4701-731; Fax: 49-800-501-6501; E-Mail: dialog@isover.de; Web site: www.isover.de. Manufacturer of Florapan hemp fiber batts.

Kenex Limited, 24907 Winter Line Road, RR #8, Chatham, Ontario N7M 5J8, Canada. Tel: (519) 351-9922; Fax: (519) 351-6122; E-mail: kenex@kent.net; Web site: www.kenex.com. Processor of industrial hemp fiber.

La Chanvrière de l'Aube, Rue Général de Gaulle, 10200 Bar-Sur-Aube, France. Tel: 33-03-25-92-31-92; Fax: 33-03-25-27-35-48; E-mail: chanvriere.aube@wanadoo.fr. Manufacturer of Canobiote, Chanvrinove, and Chanvrisol hemp insulation, available from Eco-Logis and www.ideesmaison.com.

ME-Consulting ApS, Solskrænten 17, Ugelbølle, 8410 Rønde, Denmark. Fax: 45-8637-0645; E-mail: mee@meconsulting.dk; Web site: www.greenmat.com. Manufacturer of batts made from hemp and flax fiber.

Troika Nonwovens, 2833 W. Layton Avenue, Milwaukee, WI 53221-2624. Tel: (414) 282-2833; E-mail: service@troika-nonwovens.com; Web site: www.troika-nonwovens.com. US distributor for hemp and flax batts manufactured by ME-Consulting ApS of Rønde, Denmark.

NEWS BRIEFS

SACRAMENTO, CA — On August 30, the California legislature unanimously passed a bill (AB 58) modifying the state's net-metering law, eliminating a provision that would have excluded electrical systems between 10 kW and 1 MW. The legislation requires California utilities to allow true net metering for producers of photovoltaic or wind-generated power systems up to 1 MW in size. A separate bill approved by the California legislature, SB 1078, requires California utilities to purchase 20% of their electricity from renewable sources by 2017.

SPOKANE, WA — Kit Manufacturing of Caldwell, Idaho recently completed a zero energy manufactured home. The 1,600-square-foot house was on display at the Spokane County Interstate Fair before delivery to the Nez Percé Hatchery in Cherry Lane, Idaho, where it will be used for tribal housing. Designed with the help of the Washington State University Cooperative Extension Energy Program, the Icynene-insulated home includes a heat-recovery ventilator, solar thermal panels, and a $30,000 photovoltaic array rated at 6 kW.

SACRAMENTO, CA — One of the nation's premier promoters of photovoltaic (PV) power, the Sacramento Municipal Utility District (SMUD), recently admitted that the 2002 budget for its solar program would be insufficient to meet its obligations. According to a report in the *Sacramento Bee*, SMUD's solar power program "is in shambles." To address the funding crisis, the SMUD board has authorized additional spending to more than double the 2002 budget of the PV program from $3.2 million to $7.6 million, and announced that the budget might need to be further increased to $9.5 million. According to the *Bee*, the utility's PV program will be able to meet only 60% of its 2002 goal of installing 2 MW of subsidized PV modules on the roofs of local homes and businesses, in spite of the emergency cash infusion. The main causes for the budget crisis are higher than expected prices by manufacturers of PV modules and accounting errors.

AUSTIN, TX — John Cornyn, Attorney General of Texas, filed suit on August 28 against Mold Restoration, a Texas mold remediation company, and ordered the company's assets frozen. The suit alleges that Mold Restoration misrepresented the cost of dry cleaning services, failed to protect residents' belongings from mold contamination, charged customers for expensive equipment that was never used, and failed to perform work for which consumers were charged.

OTTAWA, ONTARIO — The Canadian government is considering a proposal to offer homeowner rebates of up to $1,000 for energy retrofits, according to the Toronto *Globe and Mail*. The proposal is one of a package of measures proposed to help Canada achieve its Kyoto protocol goals. The plan proposes incentives designed to achieve energy-efficiency retrofits in 20% of Canada's existing homes by 2012 (see ***EDU,*** April 2002). The incentives would help pay for residential weatherization measures, including insulation, air sealing, windows, and ventilation equipment. According to the *Globe and Mail,* Canada's Kyoto implementation plan also includes higher energy efficiency standards for new homes.

WASHINGTON, DC — The US Department of Housing and Urban Development (HUD) has signed an agreement with two other federal agencies, the Department of Energy and the Environmental Protection Agency, to promote increased energy efficiency in HUD's affordable housing programs. The agreement commits HUD to increase the number of Energy Star homes built under the auspices of HUD programs, and to develop programs to encourage the use of Energy Star appliances. The commitment extends to new and existing housing, including public housing, HUD-financed, and HUD-insured housing.

ARNHEM, NETHERLANDS — The likelihood that grid-connected residential photovoltaic (PV) installations will present an islanding risk — that is, will be able to feed power to the grid when the grid has failed, thereby endangering utility workers — is "practically zero," according to a report in *PV Power*, an online magazine published by the Photovoltaic Power Systems (PVPS) program of the International Energy Agency. Reporting on a PVPS task force meeting held in Arnhem in January 2002, the task force concluded that the chance of islanding is about one in a billion. For more information, visit www.oja-services.nl /iea-pvps/pvpower/16_01.htm.

FORT COLLINS, CO — The final report on a study of the performance of new Fort Collins homes is now available on line at www.fcgov.com/utilities/home-study.php. The study evaluated the performance of homes built between 1994 and 1999 (see ***EDU,*** September 2001). Among the study's findings: the number of studied homes that complied with code-mandated duct tightness requirements was zero.

TALLAHASSEE, FL — The Florida Physicians Arsenic Workgroup, a panel of six physicians appointed last year by the Florida Department of Health, has concluded that "the levels of arsenic in or around CCA-treated wood in playgrounds and recreational facilities does not appear to be sufficient to adversely affect the health of children or adults." The conclusion is included in a June 14, 2002, letter addressed to John Agwunobi, Florida's secretary of health. The workgroup supports the EPA position that there is no need to remove existing playground structures built of lumber pressure-treated with CCA.

COCOA, FL — The Florida Solar Energy Center (FSEC) has announced the appointment of Philip Fairey to serve as interim director. Fairey has been with FSEC since 1980, and has served as deputy director since 1990. Fairey replaces David Block, who recently resigned as director.

LOS ANGELES, CA — The photovoltaic (PV) incentive program of the Los Angeles Department of Water and Power (LDWAP) has been extended another year, until the end of 2003. The incentive payments — $4.50 per watt for most PV modules, or $6.00 per watt for PV modules manufactured in Los Angeles — remain the same, although the maximum payment for residential customers has been increased from $50,000 to $60,000 per project. As a result of the incentive program, two manufacturers of PV modules — Shell Solar and PowerLight Corporation — have located manufacturing facilities in Los Angeles. "We are pleased to provide larger incentive payments to our customers not only to keep momentum going but to speed it up," said David Wiggs, LADWP general manager. The goal of the solar program is to add 100,000 residential solar rooftop systems by 2010.

RESEARCH AND IDEAS

Skylights Reject a Portion of the Solar Energy They Admit

Most energy modeling software assumes that the solar energy entering a building through a skylight stays in the building as heat, adding to the building's cooling load in summer. But if a skylight is located at the top of a skylight well (rather than in a sloping ceiling), only about 75% of the solar energy admitted by the skylight stays in the building; the remaining 25% of the heat is rejected back to the exterior.

Joseph Klems, a staff scientist at Lawrence Berkeley National Laboratory (LBNL), made this finding after analyzing data collected in the lab's Mobile Window Thermal Test Facility. Radiant solar energy entering as sunlight heats the skylight well walls, which then heat the air in the skylight well. This heat rises by convection. Because of stratification of the still air in the well, the hot air is trapped near the skylight at the top of the well. Only a very small amount of the heat is transmitted to the space below by thermal radiation. When the sun is shining, the air at the top of the well is almost always hotter than the exterior air, and as a result heat transfer occurs from the air at the top of the skylight well to the exterior (see Figure 5).

According to a report on Klem's findings in the Spring 2002 issue of *EETD News*, published by LBNL, "approximately 25% of the solar energy admitted by the skylight (that is, the energy that would enter the space if the skylight behaved exactly like a window)

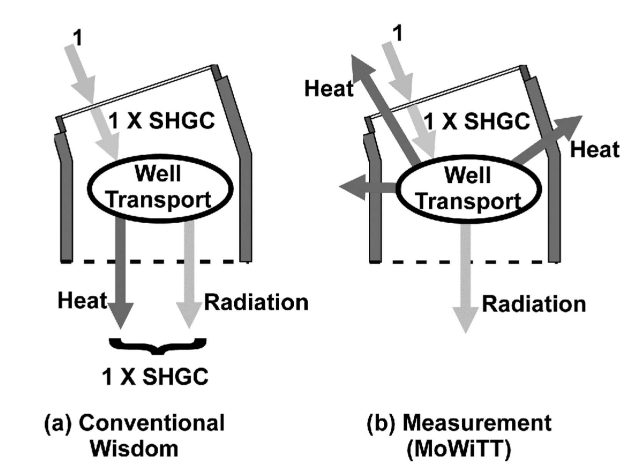

Figure 5 — According to conventional wisdom (Illustration a), when one unit of solar energy strikes a skylight, the amount of energy that stays in the building as heat is equal to one unit times the solar heat gain coefficient (SHGC) of the skylight glazing. Recent measurements by Joseph Klems at the Mobile Window Thermal Test Facility (MoWiTT), however, show that about 25% of the energy that passes through the skylight glazing is rejected back to the exterior rather than entering the building as heat (Illustration b).

was subsequently rejected, leaving only 75% to impose a cooling load on the space below. Of the rejected energy, about one-third was rejected by conduction through the walls of the well, with the remainder rejected by thermal transfer through the skylight.… It seems safe to say that with careful design of the light well (e.g., venting in summer, use of selective surfaces), skylight well systems could provide daylight without heating the space, other than heat contained in the light itself."

For more information, contact Joseph Klems, Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, Mail Stop 90R3111, One Cyclatron Road, Berkeley, CA 94720-8134. E-mail: jhklems@lbl.gov.

A Hot-Climate Energy Retrofit

A Nevada study has concluded that even in a hot climate, it probably doesn't pay to install a radiant barrier in the attic of an existing home. The study of energy retrofit measures, "Field Evaluation of PATH Technologies," documents the weatherization of a house in Henderson, Nevada. Among the study's conclusions: the installation of an attic radiant barrier had a payback period of 59 years.

The study was conducted by Craig Drumheller, a senior energy engineer at the National Association of Home Builders (NAHB) Research Center, and was sponsored by the Partnership for Advancing Technology in Housing (PATH), a private/public venture promoting new construction technology and residential energy efficiency.

An Ordinary Suburban House

The study focused on an occupied single-family house chosen as a typical example of mid-80s Nevada construction. The 1,270-square-foot three-bedroom house was built in 1986 on an uninsulated concrete slab. The house's 2x4 walls were insulated with R-11 fiberglass batts, and the attic was insulated with R-19 of blown-in cellulose. The aluminum windows had double-glazing. The roof-mounted HVAC equipment (a 9.5 SEER air conditioner and a 75% AFUE gas furnace) was original. A duct blaster test showed duct leakage to be 7.75% of flow, while a blower-door test showed 0.44 ACH_{nat}.

The researchers conducted a thorough energy audit, using Energy-10 software to model possible retrofit measures. The researcher's criterion for selecting retrofit measures was a simple payback of eight years or less (calculating the payback as if each measure were the only retrofit work performed). If several retrofit measures are simultaneously implemented, the actual energy savings from any single retrofit measure is usually less than assumed by this analysis. As the report explains, "An important point to remember when evaluating the savings of multiple technologies is that benefits may not be additive. For example, if a higher efficiency air conditioner is installed along with higher efficiency windows, the resulting savings will be less than the sum of the two if calculated separately. This is because not only is the amount of energy being lost through the windows reduced, but at the same time the cost to remove heat by the more efficient air conditioner has also been reduced."

Using "Incremental Cost" to Improve Payback Numbers

The researchers chose to define the cost of a retrofit as the incremental cost of the new energy-efficient equipment compared to "typical" equipment. Using this definition of cost, the researchers were able to justify spending $4,908 to replace the existing windows, since only $450 of this cost was charged to their payback spreadsheet. Similarly, they spent $3,675 to replace the HVAC equipment, while only charging $745 of the cost to their spreadsheet. Assuming that the existing equipment is worn out, such accounting is a logical way to determine whether it makes sense to buy the best available equipment. But the typical homeowner making weatherization decisions is unlikely to be able to afford work based on this accounting method. Even at the Nevada house, replacing the windows was a stretch. "The 14-year-old windows were installed when the house was built and were still within their useful life," the researchers noted. "For the purposes of the retrofit study, it was assumed that the decision to replace the windows had already been made, so the remaining life of the existing windows was disregarded."

Using the researcher's criteria, the following energy-efficiency measures were selected: air sealing work, installation of a new refrigerator, a front-loading clothes washer, programmable thermostat, compact fluorescent and LED lamps, duct insulation, attic insulation (R-19 additional), new windows (0.35 U-factor, 0.36 SHGC), and new HVAC equipment. (The decision to install an LED lamp appears to have been based upon mistaken information on the performance of white LEDs, and the installed lamp was so dim that the occupants of the house found it unacceptable.)

In order to gather data on radiant barriers, the researchers also decided to install a radiant barrier in the attic, even though the pre-retrofit analysis showed a 14.3-year payback for the measure at an assumed cost

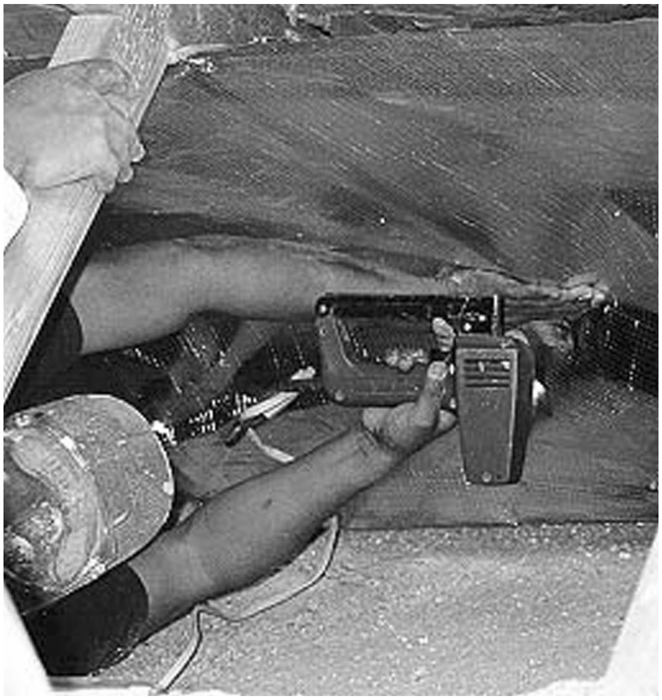

Figure 6 — Installation of the attic radiant barrier was particularly awkward near the eaves.

of $500. Stapling the radiant barrier to the underside of the top truss chords proved to be awkward, particularly near the eaves, and the installation ended up costing $650 (see Figure 6).

The existing 9.5 SEER 3-ton air conditioner was replaced with a new 12 SEER 2½-ton unit. Air sealing measures improved the blower-door results from 0.44 ACH_{nat} to 0.28 ACH_{nat}. The retrofit work, which was projected to cost $10,560, was performed in early 2000 at an actual cost of $11,398 (see Table 2).

Monitoring Performance

After the retrofit work was complete, the researchers installed thermocouples to monitor temperatures at a variety of locations — outdoors, indoors, and in the attic. They also installed data loggers to monitor appliance use. Monitoring extended from August 2000 to February 2001.

As with any retrofit job, some of the data were unexpected. The researchers hoped that the replacement of the top-loading clothes washer with a more miserly front-loading machine would result in lower hot water

Table 2 — Cost, Savings, and Payback Periods of Retrofit Measures

Energy Retrofit Measure	Estimated Installed Cost	Actual Installed Cost	Incremental Cost of Retrofit Measure Over “Typical” Equipment	Annual Savings (actual)	Simple Payback Period, in Years, of Incremental Cost
Programmable thermostat	$80	$80	$80	$38	2.1
Compact fluorescent lamps	$60	$60	$54	$35	1.5
Duct insulation	$100	$75	$75	$40	1.9
HVAC equipment	$3,755	$3,675	$745	$221	3.4
Refrigerator	$900	$900	$100	$36	2.8
Replacement windows with low-e glazing	$3,500	$4,908	$450	$97	4.6
White LED light	$65	$65	$63	$13	4.8
Additional attic insulation	$450	$450	$450	$45	10.0
Air sealing	$150	$150	$150	$21	7.1
Clothes washer	$600	$600	$200	$12	16.7
Radiant barrier	$500	$650	$650	$11	59.1

Table 2 — The NAHB Research Center study attributed only a portion of the retrofit costs to their simple payback calculations. For the purposes of the study, they assumed that the windows, air conditioner, furnace, refrigerator, and clothes washer were at the end of their useful life. The retrofit cost of the windows and HVAC equipment was assumed to be the difference between the cost of cheap, low-performing equipment and the cost of the energy-efficient equipment that was actually installed.

Table 3 — Retrofit Costs and Savings

	Predicted	Actual
Total retrofit cost	$10,560	$11,398
Incremental cost of retrofit measures over "typical" equipment	$2,894	$2,805
Electricity use reduction	39%	31%
Natural gas use reduction	28%	27%
Annual dollar savings	$530	$600
Simple payback period of incremental costs	5.5 years	4.7 years

Table 3 — The figures for the actual reductions in electrical and gas usage included in this table were weather-normalized. The payback periods are based on the "incremental" rather than total cost of the retrofit work. Because of a sudden jump in Las Vegas energy prices, the dollar savings were more than predicted.

usage. However, the behavior of occupants is always unpredictable; hot water use actually increased after the retrofit.

The pre-retrofit analysis calculated that the attic radiant barrier would have saved $29 annually if no additional attic insulation were installed. But since the attic insulation was improved from R-19 to R-38, the actual savings attributable to the radiant barrier was only $11 per year, providing a simple payback period of 59.1 years.

The researchers had hoped to achieve reductions of 39% in electrical usage and 28% in gas usage. Performance monitoring showed that actual reductions, normalized for weather, were lower (see Table 3). But Las Vegas energy costs jumped sharply between the time that the retrofit measures were chosen and the monitoring was discontinued: electricity rates jumped from 6.7 cents to 9.4 cents per kWh, while natural gas prices rose from 59 cents to 95 cents per therm. Because of these price surges, the dollar savings and the payback periods were better than predicted.

The full report on the study, "Field Evaluation of PATH Technologies," is available on the Web at www.toolbase.org/tertiaryT.asp?DocumentID=1666&CATEGORYID=67. For more information, contact Craig Drumheller at NAHB Research Center, 400 Prince George's Boulevard, Upper Marlboro, MD 20774-8781. E-mail: cdrumheller@nahbrc.org.

NEW PRODUCTS

A Fireplace Stack Robber with Ducted Exterior Air

The Replenum, a device installed on the fluepipe of a wood-burning fireplace, combines the features of a supply-ventilation fan, a draft induction fan, and a "stack robber." Like the Fireplace Xtrordinair (see ***EDU***, August 2002), the Replenum has a fan that pulls in exterior air that, after being warmed by a wood-burning fireplace, is introduced to the living space. But unlike the Fireplace Xtrordinair, the Replenum is designed as an add-on unit that attaches to an 8-inch metal chimney (see Figure 8).

The Replenum includes several features lacking on the Fireplace Xtrordinair, including a set-up procedure allowing the installer to balance the flow of incoming fresh air with the volume of flue gases rising up the chimney. The Replenum performs a number of functions, including improving the draft on a balky chimney, providing combustion makeup air, and extracting useful heat from fireplace flue gases.

Three Fans in One Box

The Replenum has a stainless-steel heat exchanger that encloses the fireplace flue. Ducted, filtered exterior air is pulled into the finned heat exchanger, and exits the unit through a 6-inch round duct that connects to a wall-mounted 8-inch-square grille (see Figure 9). Two squirrel-cage fans move the supply ventilation air. When the fire is first lit, a single 75-cfm fan introduces ventilation air. Once the fire heats up, automatic controls activate the second fan, for a total flow of 150 cfm of supply ventilation. "The average temperature coming out of the vent when a good fire is built will be between 120 and 150 degrees," says Charlie Beeson, technical communications specialist at Condar, the manufacturer of the Replenum. When the flue temperature drops to 95°F, a thermostat turns off all of the Replenum's fans.

In addition to the two supply-air fans, the Replenum includes a 150-cfm draft-induction fan controlled by a thermostat connected to a stack-temperature probe. "Because of the draft induction feature, we guarantee smokeless performance," says Beeson. The manufacturer recommends that the paddles on the draft induction fan be cleaned on the same schedule as routine chimney cleaning. Access to the draft induction fan is via a 13-inch by 21-inch access panel in the chimney chase.

The Replenum can also be used as a balanced ventilation system without operating the fireplace. During warm-weather ventilation mode, the draft-induction fan pulls stale air out of the house through the chimney, while fresh air is introduced through the wall grille. A wall-mounted timer controls this feature.

Balancing the Airflows

The Replenum comes with an installation manual explaining how the installer, using a rotating vane anemometer or a flow hood, balances the supply ventilation with the flue output. The draft induction fan includes a rheostat, which is adjusted to achieve a measured flue output (usually 70 cfm). Then, by adjusting a damper, the installer balances the flow of supply air to match the flue output.

The Replenum can be used with fireplaces with or without a glass door. The Replenum has received a UL listing for use with Tremco fireplaces only, and the manufacturer does not recommend that their unit be used with any other brand of fireplace. The Replenum has a list price of $1,666.

For more information, contact Condar Company, P.O. Box 250, Columbus, NC 28722-0250. Tel: (828) 894-8383; Fax: (828) 894-2718; Web site: www.fireplacehrv.com.

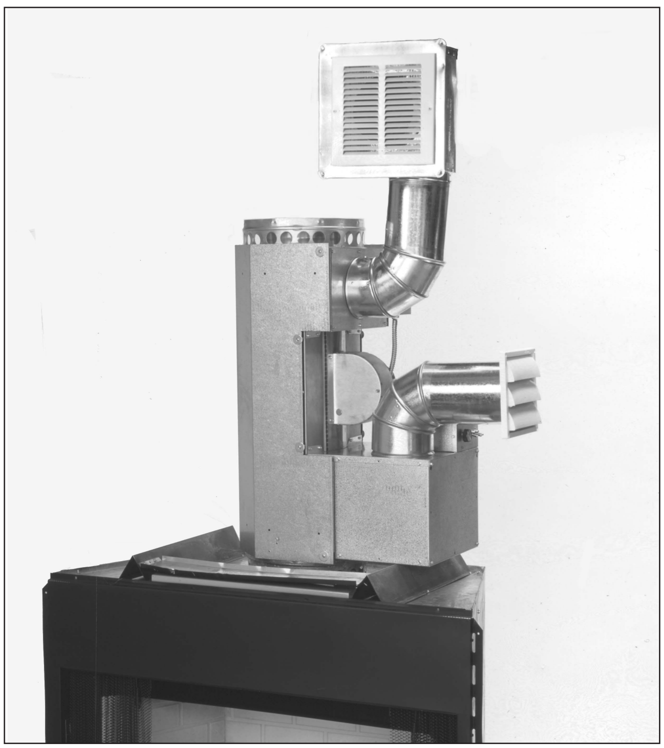

Figure 8 — The Replenum ventilation unit replaces a section of fluepipe in a wood-burning fireplace.

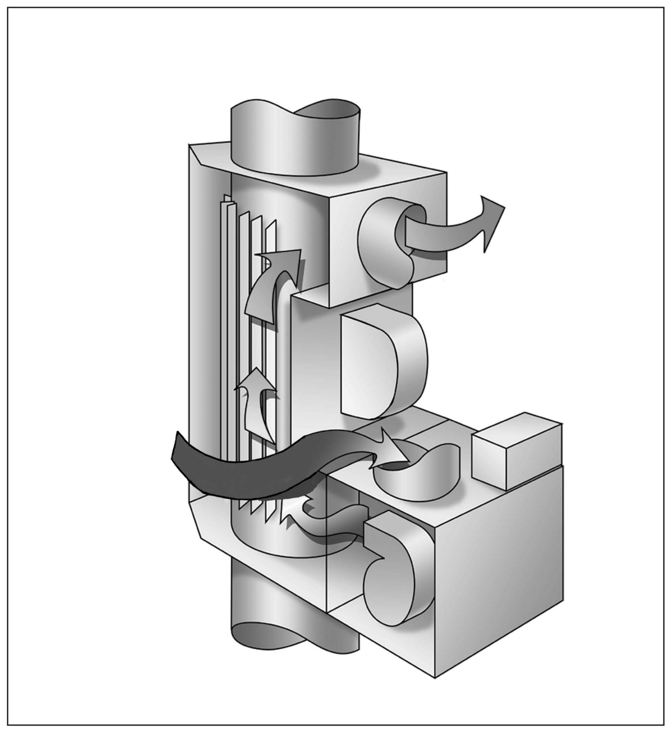

Figure 9 — Ducted exterior air is heated in the Replenum's stainless-steel heat exchanger. According to the manufacturer, the ventilation air enters the living space at 120°F to 150°F.

Crawlspace Exhaust Fan with a Smart Controller

As advocates of sealed crawlspaces point out, the moisture level in a crawlspace is more likely to be raised than lowered by passive vents, especially in regions with humid summers (see ***EDU,*** August 2002). But to avoid problems with mold or poor indoor air quality, a sealed crawlspace requires regular inspection and cleaning, as well as a degree of air exchange with the home's conditioned space. For those who are not yet convinced by arguments in favor of sealing crawlspace vents, one option to consider is the use of a Smartvent (see Figure 10).

The Smartvent is a 295-cfm crawlspace exhaust fan with sensors and electronic controls that monitor the temperature, relative humidity, and water vapor content of the crawlspace air and the exterior air. (The sensing of water vapor content, rather than just relative humidity, is important. For example, outdoor air at 95°F and 40% relative humidity contains twice the maximum desired water content for crawlspace air. If this air enters the crawlspace and cools, the crawlspace relative humidity will rise to 90%.)

Figure 10 — Each Smartvent unit, which is sized to replace a standard 8x8x15 inch concrete block, includes two fans with a combined rating of 295 cfm.

The Smartvent exhaust fan operates only when several criteria have been satisfied. To dry out a damp crawlspace, the Smartvent fan will not activate unless the exterior air temperature is between 43°F and 88°F, the outdoor relative humidity is less than 85%, the crawlspace relative humidity is above 35%, and the exterior air has at least 10% less absolute moisture than the crawlspace air. The manufacturer claims that in most homes, the fan runs for 40% to 50% of the time.

The Smartvent even has a cycle that operates the fan to *increase* the relative humidity of a crawlspace in the unusual event that it gets too dry. This humidity-increasing cycle is designed to prevent wide swings in the moisture content of wood flooring. The humidity-increasing cycle is initiated if the exterior air temperature is between 43°F and 88°F, the outdoor relative humidity is less than 85%, the crawlspace relative humidity is below 25%, and the outdoor air contains 20% more absolute moisture than the crawlspace air.

Installation of a Smartvent requires that the crawlspace have a second vent to serve as a passive source of makeup air. Adequate makeup air will be pulled through such a vent even if its louvers are left closed.

Besides ensuring that crawlspace ventilation only occurs when it will be beneficial, the Smartvent has other virtues. By depressurizing the crawlspace, the Smartvent helps limit the entry of undesirable smells or radon into a home.

The Smartvent is sized to replace a standard concrete block (8x8x15 inches). It retails for $325. Crawlspaces larger than 2,400 square feet will require more than one Smartvent. In that case, a second fan-only unit (costing $180) can be daisy-chained from the first fan/controller unit.

For more information, contact Smartvent, 3255 Cimarron Drive, Conway, AZ 72032. Tel: (501) 329-4915; Fax: (253) 295-9111; E-mail: sales@smartvent.net; Web site: www.smartvent.net.

INFORMATION RESOURCES

Comprehensive List of Energy Software

If you're looking for a comprehensive overview of energy-efficiency software, one of the best available resources is a Web site, www.energytoolsdirectory.gov. The Web site, called the Building Energy Software Tools Directory, is maintained by the US Department of Energy (DOE) — specifically, the Office of Building Technology of the Office of Energy Efficiency and Renewable Energy (EERE). The site lists 245 energy-related software programs, with an emphasis on programs that help improve the efficiency of buildings or facilitate the use of renewable energy sources.

Each of the listed software programs includes a link to a Web page providing more information, including information on obtaining the software. Some of the programs can be downloaded for free using the provided links. The listed energy tools include databases, spreadsheets, component and systems analyses, and whole-building energy performance simulation programs. The Web site provides a description of each software tool, as well as information on the expertise required, the expected audience, and the strengths and weaknesses of each program. Most of the software programs are intended for researchers, designers, architects, engineers, builders, or code officials.

The credit for maintaining the directory belongs to Drury Crawley, program manager for building energy tools at the DOE. To give an indication of the range of software surveyed, here is a sample of just a fraction of the listings for the first two letters of the alphabet:

- AkWarm is a residential energy-modeling program "designed for weatherization assessment and the EPA Energy Star Home energy rating program";
- APACHE is a "software tool for thermal design and energy simulation related to buildings," covering "the calculation of heating, cooling and latent room loads, the sizing of room units, internal comfort analysis and codes/standards checks";
- BASECALC "simulates heat losses from residential foundations (basements and slabs-on-grade) to assess the energy impact of design and insulation strategies";
- BEES is a free program that helps select cost-effective building materials for those concerned with minimizing environmental impact;
- BLAST "performs hourly simulations of buildings, air handling systems, and central plant equipment in order to provide accurate estimates of a building's energy needs";
- BTU Analysis is a "heat load calculation program that performs comprehensive heat load studies";
- BuilderGuide is a "design tool for residences that calculates annual heating and cooling estimates of loads," and is said to be "especially suitable for evaluating passive solar houses"; and
- BUS++ is a "new generation platform for building energy, ventilation, noise level and indoor air quality simulations."

Those looking for guidance through the confusing jungle of available energy software will find this Web site to be an excellent starting point.

Mold Reporter

Fans of idiosyncratic newsletters may wish to check out the *Mold Reporter*, a 16-page bimonthly edited by Ellen McCrady of Austin, Texas. The newsletter, which first appeared in January 2001, focuses on health and legal issues arising from the presence of mold in homes and schools. Many of the scatter-shot articles in the *Mold Reporter* are reprints from other sources. The newsletter is an omnium-gatherum, pulling together anecdotes, articles from the popular press, book reviews, reports of scientific studies, and tales reprinted from homeowner Web sites.

McCrady's interest in mold issues arose from her work reporting on the efforts of librarians to preserve moldy documents. Her fungal investigations led to the discovery of mold in her own house, a personal story that she shares with her readers: "During periods when the mold is giving me a lot of trouble, I have considered renting a mobile home, parking it in the driveway, and sleeping in it," she writes.

McCrady's sympathies lie with aggrieved homeowners, and in her newsletter she often expresses frustration with experts who disagree with her position. Without providing a source for her conclusions, she writes in the March 2001 issue, "We risk our health and sometimes our lives by breathing mold toxins." In fact, the role of inhalation in mold toxicity cases is far from clear, and a scientific consensus on the issue has not yet been reached. In the November 2001 issue, an unsigned article declares: "Ignorance about mold-induced illness is widespread among most of the professions, government departments and insurance companies that deal with families. For instance, a representative of the Wisconsin State Division of Health, Bill Otto, is quoted as saying that *stachybotrys chartarum* will aggravate allergies and asthma, 'but it's not going to kill you.'" Although the article ridicules Otto's statement, many scientists doubt that stachybotrys can be lethal unless it is eaten.

The lead story in the May 2001 issue is a reprint of a Web article by Don Vrana, who advises tenants with mold problems to "conduct an inexpensive home test" for mold, using a $30 mail-order kit. The next step, according to Vrana, is to insist that one's landlord pay for "professional testing" — whatever that is — of their apartments. "Once management has had an opportunity to verify the results from their experts they should relocate you immediately. If you have been experiencing mold symptoms or the test indicates higher spore levels than outdoor levels, all contents of your apartment should be considered contaminated," Vrana advises. "All 'soft' pour items like mattresses, upholstered furniture, leather, wood, etc. will need to be replaced." One wonders, does this include hardwood floors, wood windows, and doors?

The advice provided by the *Mold Reporter* is inconsistent. For example, the July 2002 issue includes a reprint of a sensible article by Nathan Yost, Joe Lstiburek, and Terry Brennan, who, unlike Vrana, advise homeowners against mold testing.

The least satisfying articles in the Mold Reporter are those in which the editor provides remodeling advice. For example, in the May 2001 issue, she writes, "If all the ducts lead away from the furnace/air conditioner, you will get better circulation if you can help it get back to the AC. I cut a hole in an interior wall and installed a fan." No further specifications are provided for what might be called the McCrady return-air retrofit.

In the March 2001 issue, on her "Editor's Page" column, McCrady writes, "What this field needs … [is] a way to prove beyond a doubt that a person's health has been damaged by mold." Well, at least McCrady admits that what she seeks remains unproven. The *Mold Reporter* is available for $35 a year from Abbey Publications, 7105 Geneva Drive, Austin, TX 78723. Tel: (512) 929-3992; Fax: (512) 929-3995; E-mail: abbeypub@grandecom.net; Web site: http://palimpsest.stanford.edu/byorg/abbey.

READERS' FORUM

Handbook Is a Valuable Reference Book

Dear Editor,

The *Radiant Heating and Cooling Handbook* [reviewed in ***EDU,*** July 2002] is just that, a reference book, designed with the depth to meet the rigorous demands of a university text, while including the applications, product source, and annotated bibliography information that ties theory to practice.

It is interesting that you report in the same issue that radiant tubing sales have doubled in the last four years. In fact, radiant heating is fuel-neutral, including alternate energy, and has found broad-based success in all types of buildings. And the black body tables are there because one of the unique features of long-range radiant energy is the relative opacity of glass, a research subject of long-term interest to the US DOE and Lawrence Berkeley Labs, with whom the authors [Richard Watson and Kirby Chapman] have been working on several current ASHRAE Research Projects.

Your readers would be interested in knowing that the *Handbook* contains not only a comprehensive listing of available sources for radiant products and installation information, but also a description of each of the articles and research projects relating to radiant spanning a period of over 50 years. Here, readers could examine the conditions under which building occupants in a radiant environment find comfort at a lower ambient temperature, which each of us has experienced first-hand during spring skiing, sunbathing, and walking in the sunshine when there is no wind and the air is relatively cool. The study cited [in the ***EDU*** review] acknowledges that the reported information [on thermostat set-point] was observational, without robust analysis as to occupant system use education, comfort, type of control, calibration, area mean radiant and dry-bulb air temperatures, etc. However, I can report, nonetheless, that the relevant ASHRAE technical committees are considering the issues involved and the framework for potential research.

The authors' interest is in providing a comprehensive resource about a subject in which there is growing interest so that comparative first cost, energy use, and life-cycle cost comparison is an option for the designer. To that end, the good news is that the McGraw-Hill *Handbook* series is a standard reference in many libraries and bookstores where the *Handbook* can be used without cost.

Thank you again for your interest; it's good to see ***EDU*** prospering.
[Edited for length]

Richard Watson
Old Saybrook, Connecticut

Vermont Energy Star Helped Build the Hanson House

Dear Editor:

I want to thank you for your article "Solar in the City" in the September 2002 issue. Vermont Energy Star Homes was pleased to assist the builder, Chuck Reiss, with this project. Though Chuck and William Maclay (the architect) would be building innovative, resource-efficient homes without our assistance, our provision of plan reviews, blower door testing, significant rebates, and efficiency labeling has proved valuable to both the builder and the buyer. In addition, the marketing we do helps others to realize that this level of efficiency is a real option and helps them connect with such enlightened builders.

Via providing information and photos I am glad to have helped with this excellent article. I am disappointed that you missed the opportunity to go a small step beyond photo credits and briefly advise your readers of the assistance available through Vermont Energy Star Homes (www.vtenergystarhomes.com; 800-893-1997), or, for that matter, in a number of states through their local Energy Star program.

EDU, throw us a bone. You do a great job; keep it up and we're glad to help. All we ask for is a little reciprocal PR back scratch to help us do our job too.
[Edited for length]

Jeffrey L. Gephart
Vermont Energy Star Homes
Rochester, Vermont

Editor's Reply

Many people contributed valuable information to the ***EDU*** article on the Hanson house. Most of the construction details on which the ***EDU*** article focused were provided by William Maclay, the architect; Chuck Reiss, the builder; Pat Hanson, the homeowner; and Kirk Herander of Vermont Solar Engineering, who installed the solar equipment. I also spoke with David Cole of E&M Mechanical, who installed the boiler; Michael Russom of Vermont Gas Systems; and a technical representative at the Burnham Corporation, manufacturer of the boiler.

Mr. Gephart graciously provided information on fuel consumption, as well as three of the five photos used in the ***EDU*** article, and I am grateful for his help. For the record, the services of Vermont Energy Star Homes were an important contribution to the success of the Hanson house. Vermont Energy Star Homes has a well-deserved national reputation as a leader in providing a variety of services promoting residential energy efficiency.

Unlike many construction magazines, ***EDU*** cannot promise a plug to an organization, no matter how worthy, in exchange for information. As Mr. Gephart points out, builders can turn to Energy Star for assistance in a number of states. ***EDU*** has, in fact, reported on elements of the Energy Star program in 33 of our last 34 issues.

I hope that in the long run, those who provide ***EDU*** information will realize that ***EDU's*** commitment to providing unbiased, technically accurate reporting is more valuable than a "reciprocal PR back scratch."

Energy Design Update®

ASPEN PUBLISHERS
1185 Avenue of the Americas
New York, NY 10036

Presorted
First Class
US Postage
PAID
Permit No. 4205
Southern, MD