be a meeting worth attending for building science re-
searchers, designers, and builders.

This meeting seems to be similar but a bit wider in
scope than the Thermal Envelopes conference spon-
sored every three years by the US Department of En-
ergy and the American Society of Heating, Refrigerat-
ing, and Air-Conditioning Engineers (ASHRAE). The
initial list of topics includes weather resistance, wind-
loading on facades, sealants, glass and coatings, ma-
sory wall technology, and acoustics.

For more information, contact Brenda Apted, ICBEST
'97, Centre for Window and Cladding Technology, Uni-
versity of Bath, Bath BA2 7AY, UK; +44 225 826 541,
Fax: +44 225 826 556, E-mail: icbest@bath.ac.uk.

READERS’ FORUM

On the Glory of Being Trashed by a Fiberglass Manufacturer

Dear Ned:

I look forward each month to receiving an envelope
that has Cutter Information Corp. as a return address.
I know that it contains the best energy newsletter pub-
lished in the country. What a surprise to find my
name on the front cover with the title “Who is Doug
Rye Anyway?” Folks started calling me to say I had
made the big time and encouraging me to keep up the
good work.

And then I am recognized by the CertainTeed Corp.
with a brochure with my name on the front cover.
Ned, I believe that your readers are smart enough to
figure out why CertainTeed would be trying to stop
Doug Rye from telling consumers what he knows. Ac-
tually, a more accurate title for the brochure would be
“Some Things Doug Rye Says Could Get You free Hot
Water.” You know, using geothermal systems.

And now I am on your front cover again. Wow, who
would’ve ever dreamed it? Ned, people have the
right to express their opinion as they will. However,
the proof is in the pudding. What more scientific data
could one want than having thousands of living units
that perform exactly as I teach?

So as CertainTeed continues to spend time and money
on negative propaganda, I will continue to help as
many people as I can. Keep up the good work at EDU.

Sincerely,

Doug Rye
Doug Rye & Associates, Inc.
Mabelvale, Arkansas

Editor’s reply:

As your popularity and influence grow, so will the de-
mands for accuracy in your presentations. For ex-
ample, I’d prefer that you explain that a geothermal heat
pump, like any type of heat pump, can provide “free”
hot water using waste heat from the cooling process,
but only during those hours when the system is oper-
ating in space cooling mode. Most of the time, energy
is required to heat the domestic water.

Thanks for your comments and kind words.

NN

RESEARCH AND IDEAS

Natural Ventilation Rate in Leaky Houses

Scenario: A building science workshop. At the front of
the room is a young lecturer explaining to a room full
of seasoned contractors that they should:

1. Spend money and time to seal up as many cracks
and holes as possible to make their homes airtight;
and then

2. Spend more money and time to install a ventilation
system to get fresh air into the building.

As eyes roll upward, one outspoken builder chal-
lenges the young engineer, asking why he should
bother sealing up those holes in the first place. Why
not just leave the house “leaky” so it can be “natu-
really” ventilated?

The answer is actually quite simple. For outdoor air
to naturally ventilate a home, there needs to be not only
holes in the building envelope, but also a driving force
to push air through those holes. The two natural forces
that ventilate a building are the “stack effect,” created
by warm, buoyant air in winter, and wind. Both are di-
rectly determined by weather and may be very strong
under some conditions, but near zero under others.
When the outdoor air temperature is the same as the indoor air temperature, the stack effect is zero. And obviously, when the wind speed is zero, there is no driving wind force. So on a mild, windless day, the actual ventilation rate may be zero, no matter how leaky the house.

**Let's go to the numbers — HOT2000 analysis**

Although the theory makes obvious sense, the practical reality is even more compelling. Figure 1 shows the calculated natural ventilation rate, in air changes per hour (ach), for leaky homes located in both Minneapolis, Minnesota, and Little Rock, Arkansas. The data are simulated using the HOT2000 computer program, developed by Natural Resources Canada (see review, *EDU*, April 1996). The measured air leakage rate of the home was set to 10.5 ach, which predicts an average natural ventilation rate of roughly 0.5 ach.

Notice that even in Minneapolis, the average natural ventilation rate is below the recommended minimum from April to October. In Little Rock, the home would almost always be underventilated.

This of course is only a computer analysis and cannot accurately depict what actually happens in a specific single home. Nonetheless, the general trend clearly illustrates that leaky homes are not necessarily well-ventilated homes. To provide adequate ventilation for indoor air quality, some type of mechanical ventilation is necessary.

To obtain a copy of the HOT2000 software, contact the Canadian Home Builders’ Association, HOT2000 Sales, 150 Laurier Avenue West, Suite 200, Ottawa, ON K1P 5J4, Canada; (613) 230 3060, Fax: (613) 232-8214.

**Best-Case Savings from Worst-Case Lighting Retrofit**

The results of a field study performed on a Florida home by the Florida Solar Energy Center (FSEC) show that when almost all light fixtures in the home were retrofitted with energy-efficient bulbs or controls, the total lighting energy consumption decreased by 61%.

An unusual aspect of the home was its high preretrofit lighting energy consumption — over 4,000 kilowatt hours (kWh) per year. (The FSEC’s final report indicates that annual residential lighting energy usage in Florida is “guesstimated” at 1,000 kWh per year.) The reduction in lighting energy use resulted in an impressive $200-per-year savings in electricity costs.

The retrofit consisted of a mixture of bulbs and controls, including compact fluorescent bulbs, PAR halogen lamps, motion sensor controls, and incandescent halogen bulbs. A total of 27 fixtures and controls were replaced at a cost of $405.

To determine lighting energy use, FSEC engineers installed lighting loggers that recorded on-time for each fixture. They then monitored total household electric consumption for six months prior and six months after the retrofit.

The results showed an average lighting use of 11.1 kWh per day before the retrofit and 4.3 kWh per day after the retrofit. The 6.8 kWh-per-day reduction translates into 2,480 kWh total in annual energy savings. Given roughly $400 in materials cost and $200 in annual savings, the estimated payback period is about two years.

The results are not surprising, given the well-documented benefits of compact fluorescent bulbs, but the economics are particularly encouraging. Typical lighting retrofit recommendations call for replacing only high-use bulbs — those that operate at least three hours per day — in order to get payback in three years or less. However, the FSEC study ignored economics and strove simply for maximum savings by...