[redacted]

equipment available to handle that additional load at an affordable price."

Without proper dehumidification, it was feared, a mechanical ventilation rate of 15 cfm could actually harm indoor air quality by increasing the incidence of mold.

In northern climes, introducing cold, dry air during the winter exacts a price in heating and humidification. But the incremental equipment and operating cost would typically be less than in the South. In either climate, the lower cfm requirement for mechanical ventilation will mean less up-front expense to the home builder and lower operating cost to the homeowner.

One key speaker at the symposium was Max Sherman, chairman of the American Society of Heating, Refrigerating and Air-Conditioning Engineers' (ASHRAE) 62.2 technical committee. Standard 62.2, which has just completed its first public review and comment period, spells out minimum measures for mechanical ventilation and acceptable indoor air quality for new homes and other low-rise residential buildings (see ***EDU***, July 2000).

Sherman tells ***EDU*** that the 62.2 technical committee, which convened the day before the symposium, endorses the new 7.5 cfm benchmark for mechanical ventilation and other changes, which will be presented at ASHRAE's *Winter Meeting* in Atlanta, Georgia, this month.

The committee sorted through about 2,500 comments before making changes to the standard. About 90% of the comments came from home builders who were protesting some portion of the proposed standard or urging ASHRAE to scrap it altogether. The National Association of Home Builders (NAHB), which has been a staunch opponent of 62.2, reportedly orchestrated some of the responses through a mass mailing to builders.

"Our thinking about the minimum ventilation requirements for people has not really changed," Sherman explains. "But in response to the comments we received, the committee was persuaded that it's appropriate to raise the infiltration credit to 2 cfm per 100 ft^2 — reflecting typical house leakage — and to lower the fan requirement to 7.5 cfm per person."

Sherman tells ***EDU*** that, in light of the comments received during the review period that ended October 10 and the input from the BETEC symposium, the following changes to 62.2 will be proposed:

1. The mechanical ventilation requirement will be lowered from 15 cfm per person to 7.5, plus 1 cfm for each 100 ft^2 of floor space. The infiltration credit will be doubled to 2 cfm per 100 ft^2. For example, a 2,000 ft^2 home with 3 bedrooms (4 people) would now require 90 cfm of fresh air ventilation, with 50 cfm provided by a fan (4 x 7.5 + 20) and 40 cfm derived from infiltration (2 cfm per 100 ft^2). Under the old formula, 80 cfm would have come from a fan and only 20 cfm from infiltration. Overall, the new method requires slightly less fresh air per person than the old (22.5 cfm versus 25).
2. Carbon monoxide (CO) alarms, required in the earlier version, have been dropped from the standard. NAHB, the American Gas Association, and others fought this provision, in part because of accuracy and reliability questions about CO alarms (see ***EDU***, November and April 2000). The committee decided to yield on the point, but added provisions 3 through 6 below to compensate.
3. If there are air handlers or return air ducts in the garage, they must be tested for tightness.
4. Range hoods must be vented to the outside. (The earlier version had allowed recirculating fans with filters.)
5. New homes with large exhaust fans (e.g., powerful range hoods) must have a backdraft test or interlocking supply ventilation system to prevent backdrafts.
6. All unvented combustion appliances (e.g., unvented gas fireplaces) must have an exhaust fan in the room.

"The change in fan size requirements is significant," Sherman says, "but we're not significantly changing the impact to indoor air quality when you consider both infiltration and the source control measures that were added to the standard."

Sherman tells ***EDU*** that all of the commentators will receive drafts of the modified standard and are invited to attend public sessions scheduled January 26-27 during ASHRAE's *Winter Meeting* in Atlanta. The 62.2 committee will then vote on the standard on January 28. If ASHRAE approves the amended standard, it will be released for a second review and comment period in the spring.

Industry Forum Charts the Future for Building Envelopes

"In 2020, building envelopes will be self-sustaining, energy-positive, adaptable, affordable, environmental, healthy, intelligent, and durable." That's the vision statement adopted by the 100-member team that's crafting the Building Envelope Technology Roadmap, or BETR 2020.

Members of the team, including building product manufacturers, industry organization representatives, nonprofit public interest groups, architects, designers, and builders met in Arlington, Virginia, on December 12 to hammer out the final details of the road map, which will serve as a framework to align public research, market, and policy agendas with industry priorities.

BETR is actually only one of several road maps being written by industry groups with support from the US Department of Energy's Office of Building Technology. Other road maps under development include windows, HVAC, and residential buildings. The technology maps for lighting and commercial buildings are already completed and available on the Web at www.eren.doe.gov/buildings/technology_roadmaps/.

Earlier last year, the BETR group identified four broad areas for action in support of the mission statement. These include initiatives to: increase skilled labor; develop collaborative research and development (R&D); develop a national envelope performance rating system; and overcome code issues. At the December 12 meeting, the forum members reviewed 140 technical ideas to advance the 2020 mission and categorized each idea as low, medium, or high risk. The ideas generally fall into four categories:

1. Materials (e.g., new insulation)
2. Systems (e.g., a new type of roof panel)
3. Process and design (architecture and engineering)
4. Testing, standards, and other criteria (e.g., for durability)

Additionally, the group is identifying the perceived barriers to achieving these goals. For example, enthusiasm was expressed for new types of building-integrated photovoltaics, but the group recognizes that a lack of installers who would know how to build such systems could present a real barrier to the use of such systems.

The US Department of Energy (DOE) will use BETR to allocate R&D money in the future, especially for promising ideas that the industry might peg as too risky to pursue alone. The map will also serve as a key communication and collaboration tool for industry members over the years to come. Ultimately, the participants hope that BETR 2020 will yield a portfolio of efficient, broadly applicable, technology options and strategies for the 2020 building envelope. A DOE spokesperson tells *EDU* that a final draft of BETR will go out for review this month, with the final document to be released in the spring.

Industry representatives participating in the forum include: American Solar, Andersen Corp., BP Solarex, Celotex, CertainTeed Corp., Champion Enterprises, Corbond Corp., DAP, DLR Consultants, DMO Associates, Dupont Tyvek Weatherization Systems, Energy Services Group, General Electric Company, Grace Construction Products, Icynene, Inc., Innovative Design, Intech Consulting, Jeld-Wen, Johns Manville, Louisiana Pacific, Marvin Windows, Masco Corp., Owens Corning, Rock Wool Manufacturing, Superior Walls of America, Dow Chemical, Trex Company, USG Corp., and What's Working. The project is being coordinated by A.D. Little (Cambridge, Massachusetts).

WUFI-ORNL/IBP on the Web

A powerful new software program that lets designers model temperature and moisture conditions inside walls is now available on the Web at www.ornl.gov/btc/moisture. The free, Windows-based tool — called WUFI-ORNL/IBP — was developed by Oak Ridge National Laboratory (ORNL) and Germany's Fraunhofer Institute of Bauphysics (see *EDU*, October 2000).

"One of the many unique features of the WUFI-ORNL/IBP model is the graphic manner with which it displays the temperature and humidity distributions as a function of time," says Achilles Karagiozis, a senior research engineer at ORNL. "The user may want to show the influence of a particular vapor control strategy, insulation placement, or retrofit element on the transport of heat and moisture in a wall system. Because the model displays the results in movie form, the designer can see the dynamic distribution of temperature, moisture content, and relative humidity as a function of time and space."

ORNL researchers are already using WUFI-ORNL/IBP to investigate the widespread moisture problems that have plagued buildings in the Northwest and to develop new wall assemblies for that region that will be more durable (see *EDU*, June 2000). For example, Figure 1 is part of a simulation run on a brick veneer wall in Seattle, Washington, on July 17, 2000, at 5 pm. The top graph displays the temperature distribution while the lower graph depicts the moisture content and relative humidity spatial distribution. The highlighted areas depict the range at which each parameter traversed and also show the upper and lower limits.

"In this wall system in Seattle, inward vapor drive [due to solar-driven moisture] is present that is condensing vapor on the exterior side of the polyethylene vapor retarder," Karagiozis explains. "It's interesting to point out the existence of this inward vapor drive, because many so-called moisture experts adamantly deny that it exists."

Karagiozis tells *EDU* that even more advanced moisture engineering tools are being developed at ORNL, which will help generate design guidelines for moisture control.