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FEBRUARY 2010  
\$4.95  
Bnmag.com



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## The IAQ quandary

Build tight, ventilate right

BEN IKENSON

Many builders, if not most, can recognize the growing consumer demand for better indoor air quality. It should come as no surprise considering some of the facts. However, the indoor air quality problem is twofold. First, thousands of synthetic chemicals are used in construction materials and in many common household items, with few legal regulations to discourage their proliferation. Second, an increasing demand for energy-efficient homes has created a market for airtight homes that can end up trapping airborne

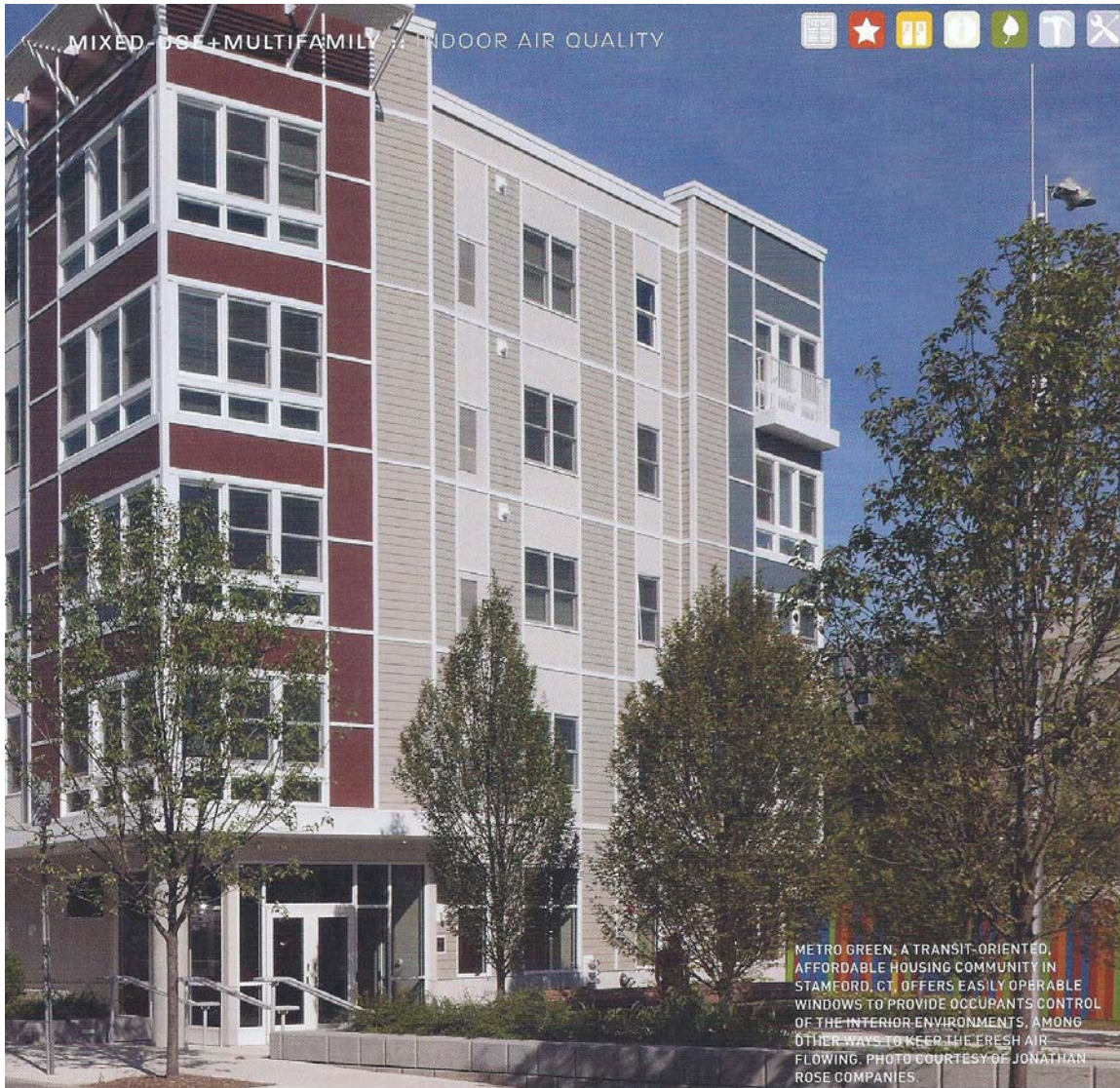
contaminants without the exchange of air to ensure a healthy indoor environment.

### ARE BUILDINGS TOO TIGHT?

The problem, however, isn't necessarily the paradox it's sometimes made out to be.

"It's a common misconception that a building can be 'too tight,'" says Adelaide Grady, who co-chairs a green team for Wood Partners, one of the country's largest multifamily developers, with garden apartment and urban high-density projects across the map. "A leaky building leaks a lot on the coldest

and hottest days and hardly at all on the mildest days. This can be problematic because you get the most 'ventilation' when you want it the least, and it's most often way too much. Also, there's no telling where that 'fresh air' is coming from... it could be coming through holes in the foundation and basement, bringing dust and mold with it. It could also be bringing warm, damp air through cold building assemblies, resulting in condensation in areas susceptible to mold and rot. The ideal situation is for a building to be built tight and ventilated



METRO GREEN, A TRANSIT-ORIENTED, AFFORDABLE HOUSING COMMUNITY IN STAMFORD, CT, OFFERS EASILY OPERABLE WINDOWS TO PROVIDE OCCUPANTS CONTROL OF THE INTERIOR ENVIRONMENTS, AMONG OTHER WAYS TO KEEP THE FRESH AIR FLOWING. PHOTO COURTESY OF JONATHAN ROSE COMPANIES.

properly. With a tighter building envelope coupled with mechanical ventilation, builders avoid unintended consequences of unplanned air flow. Instead, they provide predictable amounts of fresh air throughout the year.”

In New England, Wood Partners works with Conservation Services Group (CSG) and its HERS raters who verify compliance with the Massachusetts New Homes with Energy Star Program. CSG has been promoting energy efficiency and clean energy technologies for 26 years, and now certifies buildings for

compliance with various popular green building programs like Energy Star, USGBC’s LEED for Homes Program, and NAHB’s National Green Building Program. For Wood Partners recently, CSG tested high-quality, efficient and quiet bath fans on timers to regularly exhaust air from multifamily units throughout the day at its Alta at Indian Woods, a 154-unit multifamily garden apartment community in a suburb of Boston. By measuring the fan’s actual air flow, program techs can set the fans to run at levels designed to ensure good

indoor air quality for the occupants.

Do they work? Ask CSG. “These systems have proven to work for removing moisture, and by creating a slight negative pressure they help introduce almost undetectable amounts of outside air through the various moving parts like doors and windows,” says Caitriona Cooke, the company’s program manager for New England residential new construction. “They’re good for smaller units up to about 2,000 square feet.”

Cooke also says that, depending on requirements and budget, there are other



effective ventilation systems available: supply systems; dedicated fresh air supply systems combined with exhaust ventilation to remove excess moisture; and energy recovery and heat recovery systems (ERV and HRV), which are more expensive but, "for a super-tight house, a really good option,"

she says. "They use the exhaust air to condition the incoming fresh air without mixing the airstreams, and work well in houses where ductwork is present."

If the options at first seem overwhelming, Cooke says that existing energy programs are excellent starting points. "They offer great guidelines for builders so they don't have to go back and reinvent the wheel. Of course, when builders eventually do get started on a project, they should always have their ventilation plans in place."

Adds Cooke, "There's a sort of mantra for those of us in the energy-efficient construction world: Build tight, ventilate right."

#### SHARED STRUCTURE, SEPARATE AIR

Multifamily construction poses unique challenges to both energy-efficient building and proper ventilation. "The largest challenge for multifamily residential buildings is the shared nature of the space," says Roger Gore, senior construction manager for the Jonathan Rose Companies, a leading green real estate development firm. "In addition to residential neighbors, residents can share the building with other uses, like commercial and indoor garage users. Separation of space, mechanical systems and materials used become important factors. Within the residential environment care needs to be taken to reduce or eliminate air transfer between units to address cooking, smoke and other odors generated by neighboring residents. HVAC systems which utilize

fresh air for purposes of ventilation in both common areas and apartment units can accomplish this."

Gore points to two of his company's

projects as illustrative:

Tapestry, a 12-story, 185-unit mixed-income rental residential building in New York City, and Metro

Green, a transit-oriented, affordable housing community in Stamford, CT, that currently consists of 50 apartment rental units. Both offer easily operable windows to provide occupants control of the interior environments, and Tapestry utilizes alternate means of ventilation

air intake through small mechanized openings in the wall cavity.

"At Tapestry, air-to-air heat exchangers are used to reduce energy loss from conditioned exhausted air," says Gore. "Extensive caulking between units, weatherstripping, and providing positive air pressure in common corridors will also reduce the likelihood of air transfer between units."

Inside Tapestry and Metro Green, Gore says the units feature no- or low-VOC paints, adhesive and sealant products, urea formaldehyde-free composite wood, and minimal use of carpet. "Careful attention to the products used in construction can help to minimizing the potential of off-gassing," says Gore.

Other assets to air quality in the projects include MERV filters in some

The largest challenge for multifamily residential buildings is the shared nature of the space.

## Good Things Do Come In Small Packages!

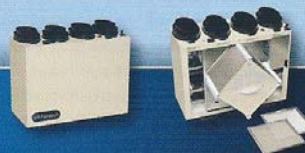
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ventilation systems to reduce particulate infiltration and three-step walk-off mat systems at the building entrance, which reduce the introduction of foot-borne contaminants.

Gore notes that it is also important to be mindful of indoor air during construction and cleaning. "Wood products, mechanical equipment and ductwork must be protected from contaminants during the installation process," he says. "Following construction completion, green housecleaning practices are implemented in common areas to avoid harmful chemicals found in many cleaning products. Residents are also encouraged to follow green housecleaning practices."

#### COMPATIBILITY

Another idea to consider when approaching indoor air quality issues is compatibility—for a building is only as strong as the systems that support it. That's a point Keith Anderson likes to make. As president of Clark Builders Group, Anderson oversees the business of constructing multifamily apartments, military housing, hotels and senior living facilities across the country.

"We take our time to ensure that the products we are installing—such as building wrap, siding, insulation and sheathing—all work together as a system," Anderson says. "Having incompatible products on the building can have negative impacts on both air quality and moisture infiltration. We work with outside consultants on each project to make sure that materials are installed per the manufacturer's instructions, are suitable for the local climate, are compatible with one another and work within the project specifications. We have found many instances where the design calls for 'best in breed' materials which don't work well together, and only



METRO'S UNITS FEATURE NO- OR LOW-VOC PAINTS, NO ADHESIVE AND SEALANT PRODUCTS, UREA FORMALDEHYDE-FREE COMPOSITE WOOD, AND MINIMAL USE OF CARPET. PHOTO COURTESY OF JONATHAN ROSE COMPANIES.

through close examination and field testing have we avoided problems."

"Often, projects are examined by experts for document review to ensure that the products are appropriate for a specific application before field testing of assemblies are conducted. "This process has been a great source of lessons learned for our field and project management staff," says Anderson. "We then cycle this information back through our preconstruction group to incorporate these details in new projects."

Also, as with other builders in the know, Anderson says that his company uses low-VOC materials for paint, carpet, sealants and other materials wherever possible. "The market demand for low-VOC materials has encouraged suppliers to provide them for many applications and often as part of their baseline product offerings. This is allowing builders to provide these products at no additional cost to the end user."

#### GREENER PASTURES, FRESHER AIR

Certainly, as consumer demands become ever greener, the market is constantly responding, and perhaps in no other sector is this as evident as it is in homebuilding.

"Green programs are gaining momentum across the country," explains Stephen Dominik, an intern architect with Dekker/Perich/Sabatini, which boasts award-winning and sustainable designs throughout the Southwest. "These programs have design criteria that help ensure the air quality is safe and healthy. Having materials that are low-VOC are not optional at this point, they're

mandatory. People now realize that what materials go into their homes matter, and people want to be healthy."


Dominik helped in planning designs for the Village Sage, what will be a 60-unit, low-income, multifamily rental project situated on

nearly six acres in Santa Fe, NM. The residential buildings are two stories in height and the dwelling units are single-loaded, meaning they are independently accessed by their respective occupants, and allow for the benefit of natural lighting and ventilation from two sides. The main living space boasts a large front-to-back dimension also allowing for natural ventilation and sunlight. The residential units feature hard-surface tiled flooring throughout to help reduce allergens associated with carpet.

As with other of the firm's projects, the client was involved early on in the design process. Likewise, a green building program was selected—in this case, the EPA's Green Communities—and is providing a framework for all subsequent project consultants. "Once we decided on the green building program," says Dominik, "we established checklists and started doing our product research. With this project, indoor air quality was a priority."

Dominik says indoor air quality is becoming a much more common request. "Tenants and clients are becoming more aware of building science issues," he says. "The knowledge of the general public has increased considerably over the last few years, and the public is demanding more thought and care on what goes into a building."

Including the air.

*This is the first of a two-part series. The next installment will look at the mechanicals and products used in ventilation. *