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The Air That They Breathe

By Paul Bubny

As the greening of commercial real estate gathers momentum, owners and developers are paying more attention to their properties' effects on the people inside the buildings as well as on the outside world. A major force behind this push toward improved indoor air quality comes from corporate tenants.

"Many of the large tenants, in particular professional service firms, are starting to focus on this area," says Jackson Lehr, an associate with the sustainability strategy consulting firm GreenOrder. "A good example of that is Bank of America and the strong focus they've got on IAQ in the new tower going up at 42nd Street and Sixth Avenue. Their green effort goes beyond energy and also looks at the indoor environmental quality. And they'll be monitoring the IAQ in that building, which not a lot of people are doing yet."

IAQ "has always been a focal point as it relates to corporate America's leasing needs and requirements," says Richard Hartz, executive vice president with Aragon Construction. "With work environment being a major component of corporate build-outs, it is critical that design engineers specify and scope state-of-the-art mechanical air distribution and filtration to exceed all building standards."

He points out that paying attention to IAQ is a "crucial" element in obtaining LEED certification from the US Green Building Council.

Lehr adds, "Knowing that IAQ is the second highest point category in the LEED rating system, it's getting more and more attention. And within the LEED system both for new construction and existing buildings, there are a lot of points that have to do specifically with air quality."

David Bonifacic, managing principal at WB Engineers, says he hasn't seen "any uptick in awareness" among building owners about the importance of IAQ per se. "What I do see in LEED build-outs is that a lot of people are aiming for the LEED point for outdoor air ventilation, since more outdoor air leads to better indoor air quality," he says. "So I see more of that than I see building owners concerned about what the existing air quality is." If thinking about air quality does not keep building owners awake at night, "It's a critical issue for all tenants, whether they know it or not," says Marisa Manley, president of Commercial Tenant Real Estate Representation. "Most tenants don't know it, but they see it in the context of complaints from their employees about satisfaction with the HVAC system."

She says most tenants are unaware of the ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) standard defining a "comfort zone" or the municipal and state codes specifying minimum levels of outdoor air. "What they do know is they get into a space and then for some reason they're always getting complaints from their employees: it's too hot, it's too stuffy, it's too cold. And all of that directly relates to air quality."

The benefits of optimizing IAQ go beyond hearing fewer gripes. "There are all kinds of studies which in general show you that the more fresh air you introduce into an office space, the healthier the environment you create for employees," says Marcus Rayner, principal with CresaPartners, a corporate real estate advisory firm. "What that means, in theory, is less absenteeism and employees who have a higher level of concentration, which in turn means there's a link between

fresh air and employees being more productive. As companies consider their competitive strategy in the war for talent and try to maximize the productivity of their employees, they will begin to look at these things more carefully and ask more questions.”

Are employees themselves asking these questions? “The overwhelming answer must be: increasingly they are,” Rayner says. “It’s very much an issue for people coming into the workforce, and it didn’t used to be.”

Lehr notes that professional service firms, “where so much of their expenses are tied up in their people and so much of their success is dependent on their employees,” are paying attention, especially since real estate-related issues represent “a very small item in their overall budget. Outside of retail banks, you’re seeing it in investment banks, some of the major consulting firms, accounting firms and law firms. A lot of the occupants who pay a premium in the leasing side also pay a premium for some of the best green office spaces that boast top indoor air quality. So there’s definitely a link between the caliber of professional service firms and the focus on IAQ.”

Quantifying the effects of IAQ on employees is one focus of the ongoing Carnegie Mellon Consortium BID program, a research initiative that analyzes the benefits of green building systems and their effects on return on investment cost, productivity, absenteeism and turnover. “Carnegie Mellon is really just getting started with those types of studies,” says Sally Wilson, global director of environmental strategy for CB Richard Ellis and a participant in the program.

She adds that it’s still a little early in the game to be able to call on a large mine of data. “If you take LEED as an example, there are about 1,000 LEED projects ranging from commercial interiors to buildings to existing building conversions, and they have about 10,000 in the pipeline for the next couple of years,” as compared to millions of US buildings that have not yet been greened.

“Some of the better studies have been done with schools, and I think what Carnegie Mellon is doing as much as anything is looking at the variety of research and compiling the data,” Wilson says. “They also are developing some equipment that can monitor the quality of the indoor environment as it relates to temperature, lighting quality, fresh air quality and carbon monoxide. They have a little unit that they can put into the space and start to make these types of measurements. So I wouldn’t say that they have reached any conclusions; I would say the studies are ongoing.”

What has emerged from the research to date, says Wilson, is that “When you produce buildings with very fresh air, high filtration, better daylight and better views to the outside—all the human side to the design components of the building—then you affect the incidence of sickness in the workplace. Especially with things like filtration, you reduce allergies or colds spreading around. Also, it keeps people awake longer.”

She adds, “This doesn’t necessarily relate to the workplace, but the thing about the studies that have been done in schools is that you actually have a measurable component: test scores. So you can say that when you do a green school, you get better test scores.”

Producing comparable results in commercial settings is partly a function of hardware, specifically the building’s HVAC system. “Today’s systems, behind the scenes, are more sophisticated than ever,” says Rich Halley, district manager of Trane New York-New Jersey. “The user interface is just the temperature but they don’t see everything that happens. By tying all systems together—individual fans and boxes and coils and all those components in the ceiling—we’re able to provide tenants with a much higher quality indoor air environment.”

As a specific example, Halley says, “We’re actually able to look at the exact amount of outdoor air that’s required in terms of ventilation, and there’s guidelines that tell us what that is. So these

systems can look at how many people are in the space, based on load, and determine what the precise amount of ventilation should be. If you've got 10 people in a conference room that fits 100, there's going to be a certain amount of load that it generates. Based on load, the system's actually able to identify what the ventilation ratio should be and ventilates the pristine amount of air without over-ventilating. If you over-ventilate, you're cooling more air than you need for the space. And if you don't need that air, you're actually just dumping it back out into the atmosphere."

A high-efficiency HVAC system was just one IAQ component of the eco-friendly build-out done for Keyspan Energy at its new training facility in Melville, NY. Neil McDonald, a partner with William F. Collins AIA Architects, says the build-out also included natural day lighting and ventilation, paint and carpets that were low in volatile organic compounds and ceiling tiles treated with Humiguard and BioBlock to inhibit the growth of mold and mildew.

For building owners as well as tenants, "Having your indoor air quality tested could reveal some interesting information from a risk standpoint," Lehr says. "It's good to know and is often overlooked. Even excess moisture can lead to some of the biggest problems that you can have related to mold or mildew. And a lot of that has to do with how the building is operated and how equipment is maintained as opposed to the technology that's used in a building."

On the technology side, Lehr suggests installing carbon dioxide sensors. "It's almost a proxy for an occupancy sensor but it lets you know that you've got sufficient fresh air in the space," he says. "They help ensure good air quality, but also they're very important from an efficiency standpoint."

Bringing in large amounts of outdoor air on days that are either much hotter or much cooler than the desired indoor temperature, says Lehr, means that the outdoor air needs to be either heated or cooled, "which takes a lot of energy. Having carbon dioxide sensors, and knowing which zones or which offices need that fresh air, can limit the amount of heating or cooling that you have to do. Therefore you're not pumping inordinate amounts of fresh air into unoccupied rooms."

As to how much leeway corporate tenants have in controlling the IAQ in their office spaces, Rayner observes, "In these markets, it's very little. There's such a demand for space that they're forced to accept the landlord's existing air conditioning system and his specifications. How do they control their environment? An engineer will obviously tell you how they can actually do that. But the real issue for them is that they should be asking more questions about the performance specifications of the air conditioning system in the building in which they're looking to house employees."

Adds Manley, "Our fundamental recommendation to tenants is to work with a good HVAC engineer and you've got to get the HVAC engineer good information about your requirements. That includes how many people you're going to have in your space, what kind of equipment and what kind of air you're trying to move through the space so that you're within the prescribed temperature/humidity settings. That's all very technical and not very interesting, but it determines what people live with on a daily basis."

The reason tenants need to pay attention in this area, Manley says, is that in most cases, "either the landlord is going to have control of that HVAC environment or it's going to be a shared responsibility where the tenant is responsible for distribution within the premises, but the landlord is controlling the base building component. So from a tenant's perspective, you've got to know what you need, define what you need, put it in the lease and then have a performance specification to ensure that you get it. Most tenants don't do that."

There's another step tenants can take, at least in theory, and that's to open a window. "One of the

things a lot of tenants like is operable windows," Manley says. "That's a very simple way to regain a little bit of control and a little bit of comfort. And it's always an ongoing battle, because building owners who even have operable windows generally don't want you to open them. If they've got a building management system, they don't want something on the sixth floor near column three throwing the whole system off."

In fact, she says, "A majority of our buildings in both urban and suburban situations—not just the big tall towers, but even the 25,000-sf suburban office buildings—have fixed windows. So you've given up that additional element of control and suffer for the inadequacies of the HVAC system."

One factor in the seeming inadequacy of many present-day HVAC systems is the format they use. "Back in the '50s, you used to have what were known as constant-volume systems, where you were always bringing in a lot of outdoor air," Manley says. "People got away from that because it's costly to cool and warm and dehumidify the outdoor air. So people got into the variable air volume system, where you're bringing in less outdoor air. It was touted as being cost effective, and that's what we have predominantly in use today. But you have a conflict: you're not getting that same level of fresh air."

She adds, "If you're a wise tenant and you've defined your needs and you've communicated them to the landlord and you've put an HVAC performance specification in your lease, the other part that's often missing is really understanding whether you're getting the outside air flow that you need. Most tenants are in a good position to monitor that, and that can be checked by monitoring carbon dioxide levels and some of the other particulate matter. Frankly, it can probably be engineered with the building engineer's office. But that's going to involve a higher level of sophistication than some tenants have or that they want to invest in."

Aside from the HVAC system, says Lehr, another focal point for tenants should be "the source of pollutants themselves, along with the volume of fresh air to dilute or remove those pollutants. One of those pollutants is the buildup of carbon dioxide, so you need that fresh air just from a turnover standpoint. But focusing on the sources of indoor pollutants is also very important. That includes VOCs that can come from any of the adhesives, paints, carpets or office furniture."

In addition, Lehr advises tenants to look at "printers, copiers and the like. You want to have them in a space that's separately exhausted and directly exhausted, so the exhaust isn't getting filtered back into the HVAC system. Another interesting area, which has more to do with the operation of a building, is using green cleaning products so that you're not bringing toxics into your building through your cleaning supplies." For one thing, the use of green cleaning products minimizes the possibility of VOC-containing residues, he adds.

The long-term effects of all these measures won't be seen for at least another five years, Manley says, partly because it will take that long for the real estate community as a whole to adopt them. "Real estate is very slow moving compared to other environments, simply because of the length of lease terms," she says. "Let's say it's questionable whether most of new construction is now oriented toward green choices. If you look at the statistics, the answer is no, the majority is still not. So even most new construction may not be using these materials, and most construction is not turning over in terms of tenant interiors. So you've got to assume some type of an absorption period."

Moreover, indoor air quality is only one aspect of indoor environmental quality, which itself is only part of the overall greenness of a building. "The issue is really total sustainability, rather than just air quality," says Barry Barovick, co-leader with Liz Kulik of Schonbraun McCann's newly formed strategy group. "Air quality itself is being addressed pretty well."

As a case in point, the USGBC, along with other key organizations, will develop a design guide that

will address IAQ. The guide will describe an integrated process for achieving improved IAQ in all elements of a building. The USGBC will collaborate with ASHRAE, the American Institute of Architects, the Building Owners and Managers Association, the US Environmental Protection Agency and the Sheet Metal and Air Conditioning Contractors' National Association. The design guide will consist of a textbook and a professional development course, which will be designed for the building and design community.

Upon its completion, these tools will function as a prescriptive compliance path for IAQ, according to the USGBC, and will assist building professionals in implementing high-performance designs and improving IAQ performance in buildings. The book is slated to be published in April 2009, followed by the professional development course.

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