



The Green Architect

By Blair Seibert, AIA, LEED AP

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Improving Indoor Air Quality

Ahhh...that new car smell. For many of us that unique, short-lived fragrance is exhilarating -- but for others, it evokes the scent of drying adhesives, plastics and man-made products --many of which are toxic.

The quality of the air we breathe has a dramatic affect on our attitudes, productivity and health. When you consider that on average, Americans spend 90% of their lives indoors, it's clear that indoor air quality is critical to our well-being.

For this reason, many green-building rating systems include credits for construction materials, furniture and finishes that reduce the amount of harmful chemicals released into the air.

There are a number of ways to build in ways that foster cleaner air:

1. Increase outside air ventilation rates
2. Eliminate finish products, adhesives and sealants that off-gas harmful Volatile Organic Compounds (VOCs)
3. Institute Best Management Practices during construction and

prior to move-in that reduce the amount of dust and particulates introduced into the building

4. Maintain a water-tight building to eliminate moisture infiltration and mold growth

Outside Air Ventilation

Sick Building Syndrome (SBS) is a condition in which occupants experience acute health problems related to the time spent in buildings. Prior to the 1973 oil embargo, ventilation of 15 cubic feet per minute (cfm) per occupant was the norm. According to the EPA, this took into account the minimum amount of air required to remove bodily perspiration. After 1973, as an energy-saving measure, the codes were changed to allow ventilation of 5 cfm per occupant. As you can imagine this created many problems.

In an effort to improve air quality, the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recently changed ventilation rates to 15 cfm per occupant and 20 cfm per occupant in offices. In most parts of the country there is a large "energy penalty" for increasing outside air ventilation. As you bring in more air, more energy is required.

In Los Angeles however, during about 70% of the year we can rely on outside air that is similar in temperature to what we'd like on the inside. Using more of it should typically reduce the demand on our heating and cooling systems.

The U.S. Environmental Protection Agency provides a detailed description of SBS, its causes and remedies at this website: <http://www.epa.gov/iaq/pubs/sbs.html>.

Eliminate Toxins in Finishes

VOCs are organic chemical compounds that evaporate into the atmosphere. Like that new car smell, they exist in almost every interior finish product. Besides furniture and fabrics they exist in paints, coatings, adhesives and sealants.

Many agencies are testing and certifying products to meet low emission standards such as those established by the Collaborative for High Performance Schools

and LEED. If you have a client with allergies or one who is interested in improving the air quality in their building, looking for products with the following certifications may be wise: **Greenguard** (tests for formaldehyde, VOC and aldehydes among others), **Green Label** and **Green Label Plus** (tests for carpet emissions that attribute to SBS), **FloorScore** (hard surface flooring and flooring adhesive emissions) and **Indoor Advantage Gold**, which tests the same materials as **FloorScore** but raises the bar to meet the higher LEED, CHPS and California's Department of Health Services Section 01350 standards.

Be aware that certifications from these groups are limited to the testing-agencies' own defined parameters. They do not account for the overall performance or quality of a product.

BMPs for Protection of Indoor Air Quality (IAQ)

During construction following the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995, Chapter 3 is a sure way to improve air quality. An abbreviated list of the guide includes:

1. Store any absorptive building material in a dry place to prevent water damage and mold growth
2. Wrap ductwork to prevent the collection of dust in the ventilation system.
3. Use low-VOC products
4. Once the shell of a building is enclosed, limit the access to the building's interior to reduce the introduction of dirt particles. Provide walk-off mats at each entrance
5. Minimize dust by cleaning work areas and vacuuming walk off mats on a daily basis
6. Reduce chemicals in the space by allowing carpets, furniture and millwork to "off-gas" off site if possible
8. Allow paints and finishes to cure before installing absorptive materials like carpets and furnishings

Flushing the building or space with 100%

fresh air for minimum amount of time is advisable prior to move in. When it's not possible to do that, air testing can be performed to confirm that the particulate levels are within range of healthy air.

Water Tight Buildings

During Southern California's short rainy season I am reminded that designers tend to lack basic knowledge of how rainwater works. Flashing, although not sexy, is extremely important to the long term sustainability of a building and health of its occupants. Unfortunately, rarely are contractors and subs of any help.

Many architectural designers create compromising conditions that require regular inspection and maintenance to eliminate water infiltration. Instituting a regular maintenance schedule for homeowners or facility engineers is critical to protecting indoor air quality and preventing damage to buildings.

Air quality in existing buildings can also be improved. In addition to reviewing those items listed above, the products brought into the space ...

In addition to things we can do when we design new space, the air in existing spaces can greatly affect the health of the occupants. Cleaning products are a major source of chemicals in any building. **GreenSeal** is an agency that sets standards and certifies cleaning products that cause less harm to the environment than other similar cleaning products. Rather than thinking of a strong floral or disinfectant smell as being clean, we should suspect those artificial odors of masking problems. The healthiest air has no smell at all.

Just as trees absorb carbon and emit oxygen, so do indoor plants. A number of studies have determined what plants are best for improving air quality. Although studies vary, the Golden Pathos, Philodendron and Spider Plant seem to be real winners. Direct sunlight or a lack of it should be considered when selecting, because plants need to be healthy to be fully beneficial. With plants often come mold on leaves and bugs. Watch for these as they can introduce other allergens.

The recent stories revealing that FEMA's own temporary trailers are dangerous because of their high level of formaldehyde-containing finishes are scary. Constant nose bleeds and headaches are common among the children of the families displaced by Katrina.

Like an unhealthy foods, many things in moderation can be tolerated. Formaldehyde is a naturally occurring component in woods, but the fact that it is used to preserve body parts should suggest something about its concentrated capabilities.

When we start thinking of our buildings as living organisms that support other living organisms the choices we make may be very different.

From Wikipedia: Volatile organic compounds (VOCs) are organic chemical compounds that have high enough vapor pressures under normal conditions to significantly vaporize and enter the atmosphere. A wide range of carbon-based molecules, such as aldehydes, ketones, and hydrocarbons are VOC's.

Blair Seibert, AIA, LEED AP is a member of the San Fernando Valley and Los Angeles AIA. It you have any questions or comments about this article or would like to be notified of local "green building" events, contact her at: 310-422-2417 or blair@verdearchitects.com.