



information resources

"Indoor Air Pollution: It's Time to Clean Up Our Act"

Source: John Bower
GreenKeeping Magazine

It's pretty well documented that indoor air pollution is almost always worse than outdoor air pollution, even in large industrialized cities. Since we, as Americans, spend 90% of our time in an enclosed environment, we are all breathing polluted air on a regular basis. It should come as no surprise that this affects our health.

Most people have a general idea that breathing poor quality indoor air isn't good for them. In fact, a survey in a builder's trade magazine found that the vast majority of new home buyers were willing to pay extra for a healthier house. The problem is that neither homeowners nor builders know specifically where the problems are, what to do about them, or if in fact, the problems are really bad enough to worry about.

Although we may not fully comprehend their consequences, most of us have heard something about the dangers of asbestos, lead paint and radon. These indoor contaminants just represent the tip of the iceberg. There are many more pollutants being identified daily that are much more difficult to pronounce and their effects are more difficult to understand. Many have hardly been studied at all. Something that I find unfortunate is that many people don't get concerned about indoor air pollution until they get sick. I'll have to admit that I was the same way. In fact, most of the pioneers in healthy house construction got involved because a friend or family member became ill or hypersensitive as a result of poor indoor air quality. In my case, my wife, Lynn, was severely affected by new building materials that we installed in a house we were living in. While people like Lynn are still in the minority, I have seen estimates that there are a million hypersensitive people out there. Like Lynn, their sensitivity is often the result of exposure to commonly available construction products.

Sadly, hypersensitive people seem to be increasing in number, evidence that we as a species could be in trouble. While some people may only have some minor sensitivities, the greater danger of daily exposure to low levels of pollutants may come in 20 or 30 years when cancer, arthritis, or heart disease develop. Some sensitive people actually consider themselves "lucky" because they have already found out that air pollutants are dangerous to their health, and as a result, they avoid them. The rest of society continues to experience the constant exposure, oblivious of the long term consequences. As human organisms, this can't do us any good.

I believe that the experiences of hypersensitive people should be taken as a warning by the rest of us. Indoor air pollution is affecting us all right now; it is just that most of us don't realize it yet. We should learn to listen to sensitive people when they tell us that something bothers them, because the odds are it is having some kind of an effect on us also. Miners listened to the canaries they took with them into the coal mines. When the canaries stopped singing, the miners knew that it was time to go to the surface for some fresh air. Sensitive people are telling us that it is time for some fresh air right now. Actually, a Massachusetts study has stated that indoor pollutants account for half of all illnesses. Surprise - even the establishment agrees that we really are at risk.

Sensitive people live in healthy houses out of necessity, in order to maintain their health. Their spouses also live in these non-toxic houses, and often they feel that it enhances their own well being. Many spouses of sensitive people begin to notice various minor sensitivities, after their systems have been "cleaned out" by living in an unpolluted atmosphere for a while. Very much exposure to cigarette smoke or exhaust fumes, for example, may result in a headache or a hyperactive, sleepless night. These are certainly not major symptoms, but they are symptoms

nevertheless. They are signs that many people can react negatively to so called "minor" levels of pollution, they just aren't always aware of the cause and effect relationship.

Spouses may not have noticed any symptoms until they started spending a lot of time in unpolluted air. Previously, they may have been exposed to a variety of air contaminants on a continual basis, just like the rest of society. At that time their body was used to the daily exposure. Some doctors, say that exposure to pollution can be compared to addiction. An addict must increase his dosage in order to get high. If he maintains a constant level of usage, he notices no effect, although it may be slowly wearing him down.

While the continual daily exposure to air pollutants may have no immediately apparent consequences, it is definitely doing something to our bodies. When an alcoholic takes a drink after an extended abstinence, he notices an immediate effect on his system. In the same way, when a person is not exposed to pollution for a while, and then encounters it again, his symptoms will be more noticeable.

I don't mean to make you feel paranoid about going indoors and breathing the polluted air. After all, many of the air pollutants that we are exposed to on a daily basis are really pretty minor, and a healthy body is capable of tolerating and processing a certain amount of air contamination. On the other hand, its important to realize that we are breathing these contaminants on a continual hourly-hour basis. We are asking our bodies to cope with an atmosphere that didn't exist 100 years ago. It can take an organism tens of thousands of years to adapt and evolve to new influences of climate, surroundings, or food supply. We can't possibly have adapted to today's air pollution in a few short decades.

An example: In October 1987, the offices of the Environmental Protection Agency headquarters in Washington, DC were remodeled. Soon, there were many complaints of eye and nasal irritations, nausea, headaches and skin rashes. Some employees are now so hypersensitive that they can't return to work. Many of these workers were PhD scientists who were originally skeptical that someone could become so sensitive. Now they themselves are affected. While it will not be possible to prove within a shadow of a doubt exactly what caused this instance of building related illness, the culprit was believed to be a chemical called 4-phenyl-cyclohexene (4-PC) that was given off by the new carpeting. Nearly 100 other chemicals were also found in the air, some of which could also be at fault.

Unfortunately, there are many things that contribute to indoor air pollution, and every house (or office, or school, or hospital) is unique. Some houses are subject to high radon concentrations. Others may contain a lot of formaldehyde, carbon monoxide, or something like 4-PC. Homeowners, builders, and researchers are now just beginning to grasp the concepts involved. As we all learn more about indoor pollution, the construction techniques will become more widely practiced. After all, we don't deserve to be guinea pigs, we deserve to breathe clean air.

In order to minimize our exposure to poor indoor air quality, there are definitely some things that can be done. Unfortunately, healthy house construction techniques, even though they are pretty well understood, are not yet very widespread. Part of the reason is that too many people believe a healthy house is only necessary for individuals who are hypersensitive to indoor air pollution. We now know that we could all benefit with some improvement in air quality.

While there can be negative health effects associated with virtually everything that a house is constructed of, there are a few major offenders. Building materials that can result in

unacceptable indoor air pollution levels can be items as common as carpeting and kitchen cabinets. Hypersensitive people must be wary of nearly everything, including paints and caulking.

Of course, indoor air pollution can be caused by more than the house itself. If you build a healthy house, it will still be possible to foul the air by filling it with unhealthful furnishings. Permanent press fabrics release formaldehyde, while some pesticides and cleaning products can contain carcinogens.

So, what can you do to clean up your indoor air? I find that if you can eliminate the "Big Three" problems, you will have improved the air in most houses considerably. The Big Three are wall-to-wall carpeting, formaldehyde, and combustion by-products. Most unhealthy houses contain all three.

When brand new, carpeting is a problem because of its potential for outgassing. Outgassing refers to the volatile gases that are given off by new synthetic materials. New car smell is a good example. Besides the carpet itself, stain resistant treatments, the backing, padding, and adhesives are also sources of chemical pollution. When the EPA employees got ill, outgassing is what did them in. Eventually they had to remove 27,000 square yards of carpeting. A good example of tax dollars at work.

If you insist on using carpeting, I suggest that it be rolled out somewhere like in a garage and allowed to outgas there before its brought indoors. You need to wait until the "new carpet" odor goes away. It may take only a few days or as long as several months depending on the carpet. When installing carpet, it also helps if it can be tacked down, rather than glued down, because the glues can be pretty nasty.

Once carpet starts aging, outgassing is no longer a big problem, but "bio-nasties" are. Bio-nasties are the tens of millions of mold spores, dust mites, and other microorganisms that thrive in carpet. The only way to combat them is to keep the carpet dry (bio-nasties love moisture) and clean.

Keeping carpet dry is easier said than done. For example, we often use carpet on a cool concrete slab, because carpet acts like an insulator to keep our feet warm. Unfortunately, there is a localized area of high relative humidity (RH) near any cold surface. This is why windows sweat in the winter. The glass is cold enough so that the localized RH reaches 100%. A concrete slab usually doesn't get so cold that liquid water will form, but the RH can definitely be elevated just enough for the microorganisms to thrive. If carpet really gets wet from a flood or something, it can get so infested with bio-nasties that the only solution is removal.

Keeping your carpet clean can also be difficult because most portable vacuums aren't very powerful. They also have very inefficient filters that allow the really fine particles to be blown back into the room. You can often see this by running your vacuum near a beam of sunlight. Portable vacuums with special water filters are a big improvement, but I prefer a more powerful central vacuum with an outdoor exhaust.

Personally, I would rank any kind of floor covering higher than wall-to-wall carpeting. The best choices are ceramic tile or wood floors. I also like to use area rugs because they are fairly easy to keep clean. Cotton has an advantage over wool in that it can be tossed in the washing

machine, but I really like the looks of wool Oriental and Navajo rugs. Fortunately, there are some professional rug cleaners who will use non-toxic cleaners if you request them.

Formaldehyde is often implicated in people becoming chemically sensitive, and it is a suspected carcinogen. While it is difficult to avoid formaldehyde completely, there is a major source that I'd like to see cleaned up: manufactured wood products, especially those with urea-formaldehyde glue. Kitchen cabinets, particle board subflooring, and medium density fiberboard shelving are major offenders. While solid wood or steel construction can easily be substituted, it can be expensive. Sealers (like "Crystal Aire," Pace Chem Industries, 779 S. LaGrange Ave., Newbury Park, CA 91320, 805-499-2911) can certainly reduce emissions, but it may not be enough for individuals who are extremely sensitive to formaldehyde.

In new construction or remodeling, I highly recommend avoiding manufactured wood products containing any formaldehyde. However, if you aren't especially sensitive, construction grade plywood (both interior and exterior grade) only emits about a tenth as much formaldehyde as particle board, so it can sometimes be used as a compromise.

Combustion by-products are released whenever something burns. Indoors, this usually includes wood, natural gas, propane, oil, coal, kerosene, etc. If the fumes go up the chimney or flue, like they are supposed to, there may not be a problem. However, this is often not the case. Various studies have found that most chimneys backdraft to some extent. Spillage, where a percentage of the gases go up the chimney but a portion "spills" into the living space, is even more common. In about half of the houses studied in Canada, there is at least one pretty serious incident involving combustion by-products during the heating season. The most alarming consequence is death from carbon monoxide poisoning, something that happens to several hundred people every year.

Backdrafting and spillage can occur when a house gets depressurized. If you turn on anything that blows air out of the house (exhaust fans, range hood, clothes dryer, central vacuum, etc.), make-up air must enter somewhere else or the house starts getting depressurized. When this happens, air starts coming in wherever it can. In a fairly tight house, the path of least resistance is down the chimney. With air coming down a chimney, the combustion gases can't go up. This is backdrafting. If the gases don't go up the chimney fast enough, you get spillage. Natural forces like wind and temperature differences can also contribute to the problem.

All-electric houses don't have anything in them that give off combustion gases, unless someone is smoking, or burning candles or incense. There are also new high efficiency gas furnaces and water heaters that have sealed combustion chambers, that are immune from backdrafting. However, there are many homeowners living in problem houses who can't afford to move or replace their heating system. For them, one solution can be to crack open a window whenever an exhaust device is blowing air out of the house. Remember, a clothes dryer is an exhaust device as well as an exhaust fan. If there is a window near the furnace, opening it by only an inch can make a big difference. Unfortunately, air movement in houses can be quite complicated, so often a solution needs to be designed specifically for a certain house. Since all houses are unique, not all will have a problem due to combustion by-products, and not all heating contractors are trained to recognize a minor problem when it exists.

Like I said, if these "Big Three" pollution sources are taken care of, indoor air quality should improve a lot. Next, I would recommend some type of ventilation system to bring in fresh air on a continual basis. If you are relying on Mother Nature to supply fresh air, keep in mind that the

wind isn't always blowing. We all need fresh air every day, not just when there is a breeze. Ventilation system design can be simple or complex. It depends on the particular house, the amount of air needed, the amount of money you are willing to spend, energy efficiency requirements, etc.

For people building a new house or starting a remodeling project, I recommend choosing only low outgassing materials where possible. Solid wood, metal with a baked-on finish, ceramic tile, and glass are all pretty inert. For paints, adhesives, and materials with definite odors, choose from the growing list of alternative less noxious products, and allow for plenty of fresh air until they are cured.

When you realize that nearly every single building material is a potential polluter, the construction process can seem overwhelming. Fortunately, many of the problems are fairly minor. By addressing the big issues, the little ones may not be that important. While someone who is hypersensitive may need to be concerned with much more than the Big Three, people in fairly good health need not be as selective.