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Breathing Free, Part II

Steering clear of yet more indoor pollutants.

The gases given off by burning wood, fossil fuels, and cigarettes are unhealthy in large doses. The main indoor pollutants from combustion are carbon monoxide (CO), carbon dioxide (CO₂), nitrogen dioxide (NO₂), and particulates.

CO, CO₂, and NO₂ are colorless and odorless, except for the faint odor of nitrogen dioxide at high levels. CO causes headaches and dizziness at moderate levels by displacing oxygen in the bloodstream. At higher levels it will cause severe headaches, nausea, and death. CO₂ (a natural component of the air and a product of breathing) can produce similar symptoms at extremely high concentrations. NO₂ exposure has been linked to higher rates of respiratory illness where occupants have been exposed to elevated levels for prolonged periods—such as in houses with unvented gas stoves.

The main sources of NO₂ and other combustion gases in the home are cigarettes and unvented combustion appliances, such as stoves, space heaters, and gas dryers. Space heaters are particularly bad because they remain on continuously. The cheaper sulfur-rich fuels often used in kerosene space heaters also add sulphur dioxide, another lung irritant, to the air.

Particulates are the partly burned tiny particles that make up smoke. The smallest particles, called RSP's (respirable suspended particles) are the worst. They can lodge in the lungs. The health effects of RSP's vary according to their chemistry. One type, called benzo-a-pyrene or BaP, is believed to cause cancer. Cigarettes are the main source of BaP and particulates in homes where smoking occurs. Woodstoves and fireplaces, if badly installed or operated, may be another significant source. Unvented gas appliances and the frying and broiling of food also produce particulates.

Guidelines to keeping these substances out of the home are fairly straightforward. One, don't use any unvented gas or kerosene heaters indoors. Two, use only pilotless gas appliances (quick payback due to fuel savings). Three, vent gas stoves to the outdoors with a vent hood.

Studies at Lawrence Berkeley Labs show that standard range hoods will remove from 60 to 87 percent of a stove's combustion pollutants at fan speeds from 90 to 240 cfm, respectively. LBL found that range hoods were several times more effective than central air-to-air heat exchangers at reducing overall house concentrations of combustion products. Range hoods also help exhaust odors and excess water vapor. Of course, range hoods only work if used. Like air-to-air heat exchangers they tend to be underused because they are noisy. One idea, courtesy of William Turner of the Harvard School of Public Health, is to wire the range hood to a cheap differential controller that turns it on when the stove is used. As for gas dryers, vent them outdoors.

If you're heating with wood, use a quality appliance and install it properly. Pay special attention to flue design and adequate combustion air. For example, avoid long outside flues (too cold) and too many turns and horizontal runs in the stovepipe. If the house is tight enough to need mechanical ventilation, it also needs outside combustion air supplied to the woodstove or fireplace. In their woodstove tests, LBL and the Harvard School of Public Health found that airtight woodstoves did not pollute the indoor air except slightly during lighting and reloading. Non-airtight stoves and open fireplaces did, however, leak slightly to the indoors. According to LBL researcher Greg Traynor, your nose is a useful diagnostic instrument for these problems.

If cigarette smoking is anticipated, provide a well-ventilated room and recommend smokeless ashtrays. If frequent smoking occurs in a house, then it is likely to be the dominant source of pollution from combustion. Tobacco smoke adds over 2000 nasty compounds to the air.

Allergens

The most common allergenic substances originate outdoors. So, in general, tighter houses are healthier for allergic people. According to Dr. Charles Read at the Mayo Clinic, the major indoor-bred biological allergen is the dust mite. These microscopic critters thrive in carpets and bedding and other places where the relative humidity (RH) runs at 50 to 80 percent. At 80 per-

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