

## Wood Stoves and Indoor Air Quality

Many publications exist regarding safety factors to consider when using a wood stove to heat your home. Safety considerations include distances between the stove and combustible surfaces, annual chimney cleaning, and others.

Burning any fuel in a home has potential impacts on indoor air quality. Combustion pollutants are gases or particles that result from burning materials. The types and amounts of pollutants produced depend on the appliance, how well the appliance is installed, maintained, and the fuel it uses. Major combustion pollutants from wood and other fuels and the health effects of exposure include the following:

**Carbon monoxide** interferes with the delivery of oxygen in the blood to the rest of the body. It can cause fatigue, headaches, dizziness, weakness, nausea, vomiting, increased chest pain in people with heart disease, confusion and disorientation, and, at high levels, death. According to Consumer Product Safety Commission (CPSC), there are more than 1,000 carbon monoxide deaths in the U.S. each year. Because carbon monoxide is odorless and some of the symptoms it causes are similar to common illnesses, the effects may not be recognized until it is too late. Those most at risk are the elderly, infants, fetuses, and people with anemia or with a history of heart or respiratory disease.

**Nitrogen dioxide** is a colorless, odorless gas that can cause irritation of the respiratory tract, shortness of breath, and increased incidences of respiratory illness. There is evidence from animal studies that repeated exposures to elevated nitrogen dioxide levels may lead or contribute to the development of lung disease such as emphysema. Children and individuals with asthma and other respiratory illnesses are at greater risk from exposure to nitrogen dioxide.

**Sulfur dioxide** irritates the eyes, nose, and the respiratory tract at low levels of exposure. At high levels, it causes the lung airways to narrow. This results in chest tightness, wheezing, or breathing problems.

**Particulates** can cause eye, nose, throat, and lung irritation, and can increase respiratory problems, especially in those with preexisting medical conditions, such as cardiovascular illness and immune system diseases. Certain chemicals attached to the particles may cause lung cancer if they are inhaled. The risk of lung cancer increases with the length and amount of exposure. The health effects from inhaling particles depend on many factors, including the chemical makeup and size of the particles.

**Water** is also a product of combustion. When you heat your home with wood, be aware that water is also present in the wood before you burn it. Properly seasoned wood has a moisture content of 20 - 25 %. Freshly cut wood, which should not be burned in a stove or fireplace, has a moisture content of 45% or more. For this reason, firewood should never be stored inside a home, as the moisture it contains will evaporate and lead to potential condensation problems on windows, walls, and other surfaces. Under the right conditions this will lead to the growth of mold and dust mites. A good practice to follow is to store firewood outside and bring only small amounts of wood into your home at a time.

## **Adequate Combustion Air**

All fuels need oxygen to burn. Fireplaces and wood stoves get their combustion air from outside the home. Older woodstoves and fireplaces that get their combustion air from inside the home can depressurize the house. This can result in cold air being drawn into the home through cracks around windows and doors and places where dissimilar building materials meet. House depressurization can also pull radon and other soil gases into a home through cracks in a foundation wall and basement floor. To minimize this, run an air duct from outside the home to a spot near the woodstove or fireplace.

Backdrafting, the spilling of combustion products into the home, occurs when a chimney has inadequate draft or when one air-consuming appliance overpowers another and pulls its combustion gases into the home. An exhaust fan, clothes dryer, water heater, or furnace can cause this. Ideally, every combustion appliance in a home should get its combustion air from outside the home. Backdrafting can also be caused by a clogged chimney. Chimney cleaning and inspection is part of annual maintenance that should be performed on a wood stove or fireplace.

All homes should have smoke detectors and carbon monoxide detectors. These are not replacements for annual maintenance of wood stoves, fireplaces, furnaces, boilers, and water heaters, but do provide a level of protection.

### **Fireplace and Wood Stove Care:**

- Have chimneys inspected and cleaned annually.
- Use a sturdy fireplace screen when burning.
- Never leave fires unattended.
- Burn only wood. Paper and other products can send embers up and out of the chimney and ignite your roof or a neighboring home.
- Wood stoves should have a stove board underneath to protect the floor.
- Move anything flammable at least three feet from your fireplace or stove.