

## Indoor Air Quality (IAQ): Combustion By-products

### What are combustion by-products?

Combustion (burning) by-products are gases and small particles caused by the incomplete burning of fuels such as oil, gas, kerosene, wood, coal, and propane. Sources include 'combustion appliances' such as wood heaters and woodstoves, furnaces, gas ranges, fireplaces and car exhaust.

The type and amount of combustion by-product produced depends on both the fuel type and the type of combustion appliance, including how well the appliance is designed, built, installed and maintained.

Examples of combustion by-products include: carbon monoxide, nitrogen dioxide, carbon dioxide, sulphur dioxide, water vapor, particles, and unburned hydrocarbons.

### Where do combustion by-products come from?

Combustion by-products, including carbon monoxide and nitrogen dioxide, can come from a number of sources including wood heaters and wood stoves, furnaces, gas ranges, generators, leaking chimneys, vehicle exhaust, unvented kerosene and gas heaters, and fireplaces. Second-hand cigarette smoke is another source. People are the main source of carbon dioxide in indoor air.

### What health concerns do combustion by-products cause?

**Carbon monoxide (CO)** reduces the blood's ability to carry oxygen. It may cause tiredness, headaches, nausea, flu-like symptoms, dizziness, impaired vision, and confusion. In people with heart disease,

it can also cause chest pain. Very high levels of CO exposure can cause loss of consciousness and death.

**Nitrogen dioxide** can cause irritation of the eyes, nose, throat and lungs, in addition to shortness of breath. People with respiratory illnesses such as asthma may be even more at risk to nitrogen dioxide.

**Carbon dioxide (CO<sub>2</sub>)** High levels of CO<sub>2</sub> can cause headache, dizziness and fatigue. Other substances in the air that may be at high levels may cause similar symptoms when there is poor ventilation. CO<sub>2</sub> levels are sometimes measured to tell whether or not enough fresh air is getting in to a room or building.

**Particles** or particulate matter are formed when fuel is not completely burned. Tiny airborne particles can cause eye, nose and throat irritation. As well, they can lodge in the lungs causing irritation or damage to lung tissue. Some combustion particles may contain cancer-causing substances.

### What can be done to limit the health concerns?

#### **Control the source:**

- Follow the manufacturers' instructions for all combustion appliances.
- Use the recommended fuel types.
- Adjust combustion appliances properly. Service and clean appliances and their vents such as chimneys, regularly.
- Make sure that wood stoves are installed correctly and the doors are tight fitting.

- Use only aged or dried wood, not pressure treated or painted wood that may form additional toxic compounds when burned.
- Inspect furnace and flues, and repair cracks and damaged parts. Open the flue when using your fireplace. Don't let a fire within a wood heater smolder, especially just before opening the firebox.
- Change your furnace and air conditioning filters every couple of months if using them regularly. Consider using a more effective furnace filter.
- Do not allow smoking in or near the home.

#### ***Improve ventilation:***

- Use a stove hood with the fan properly vented to the outdoors when cooking with gas stoves and ranges.
- When you need to replace an unvented space heater, replace it with a vented type.
- Make sure there is enough fresh air entering your home from the outdoors, especially when using combustion appliances.
- Make sure fresh air intake vents are not blocked or covered.
- Do not have air intake vents coming into your home from your garage. This can bring car exhaust fumes into the house.

#### ***Removal of pollutants by air cleaners:***

Air cleaners can be used along with source control and improved ventilation to reduce levels of pollutants in indoor air.

Air cleaners use electrical attraction, mechanical filters or ion generation to remove particles from the air. They vary in their cost and how well they work. No air cleaners will remove *all* pollutants from indoor air.

If you are planning to buy some type of air cleaning system, make sure you get the device that best meets your needs.

#### ***Carbon monoxide (CO) detectors:***

CO detectors are readily available and can be installed cheaply. Like smoke detectors, they need regular testing to make sure they are working properly. As well, check with a consumer-oriented publication to find a CO detector that will best meet your needs.

#### **For more information**

- The Canada Mortgage and Housing Corporation (CMHC). Call toll-free 1-800-668-2642, or see: [www.cmhc-schl.gc.ca/en/co/](http://www.cmhc-schl.gc.ca/en/co/)
- The British Columbia Lung Association. Call toll-free 1-800-665-LUNG (5864), or see: [www.bc.lung.ca/](http://www.bc.lung.ca/)
- Health Canada. Visit the It's Your Health section at: [www.hc-sc.gc.ca/english/iyh/index.html](http://www.hc-sc.gc.ca/english/iyh/index.html)



**BC Centre for Disease Control**  
AN AGENCY OF THE PROVINCIAL HEALTH SERVICES AUTHORITY

**For more BC HealthFile topics visit**  
[www.bchealthguide.org/healthfiles/index.stm](http://www.bchealthguide.org/healthfiles/index.stm)  
or visit your local public health unit.

**Call the BC NurseLine to speak to a registered nurse, available 24-hours every day:**

- In Greater Vancouver, call 604-215-4700
- In BC, call toll-free 1-866-215-4700
- Deaf and hearing-impaired, call 1-866-889-4700
- Pharmacist available 5pm to 9am every day
- Translation services in over 130 languages upon request.

**Visit BC HealthGuide OnLine – a world of health information you can trust at**  
[www.bchealthguide.org](http://www.bchealthguide.org)