

## Indoor Air Quality: Combustion By-products

### What are combustion by-products?

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

The type and amount of combustion by-product produced depends on the type of fuel and the combustion appliance, including how well the appliance is designed, built, installed and maintained. Some appliances receive certification depending on how clean burning they are; both the Canadian Standards Association (CSA) and the Environmental Protection Agency (EPA) certify wood stoves and other appliances.

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

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

Combustion by-products can be formed by a number of sources including wood heaters and wood stoves, furnaces, gas ranges, gas heaters, generators, fireplaces, vehicle exhaust, and unvented kerosene heaters and stoves. Second-hand tobacco smoke also contains combustion by-products.

### What are some health concerns of combustion by-products?

**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 carbon monoxide exposure can cause loss of consciousness and death.

**Carbon dioxide (CO<sub>2</sub>)** at high levels can cause headaches, dizziness and fatigue. Carbon dioxide levels are sometimes measured to tell whether or not enough fresh air gets into a room or building. Although carbon dioxide and carbon monoxide are both combustion by-products, the presence of carbon dioxide does not in itself indicate that the highly toxic compound, carbon monoxide, is also present.

**Nitrogen dioxide (NO<sub>2</sub>)** 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 at higher risk of experiencing health effects from nitrogen dioxide exposure.

**Particulate matter (PM)** is formed when fuel does not completely burn. Tiny airborne particles can cause eye, nose and throat irritation. They can also lodge in the lungs, causing irritation or damage to lung tissue. Inflammation can also cause heart problems. Some combustion particles may contain cancer-causing substances.

### What can I do to prevent or limit the health concerns?

To help limit the health concerns associated with combustion by-products, it is important to control the source, improve ventilation, use air cleaners, and use carbon monoxide (CO) detectors.

### **Control the source:**

- Follow the manufacturers' instructions for all combustion appliances.
- Regularly service and clean appliances, and vents such as chimneys.
- Use only fuels recommended for each appliance.
- Make sure that wood stoves are installed and maintained correctly. Doors should be tight fitting to prevent leakage.
- 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. Do not 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. You can consider using a more effective furnace filter.
- Do not allow smoking in or near the home.

### **Improve ventilation:**

- Use a stove hood and fan that properly vents outside when cooking with gas stoves and ranges.
- When you need to replace a space heater, buy a vented heater.
- Make sure enough fresh air gets into 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.

### **Use 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. For more information, see Residential Air Cleaner Use to Improve Indoor Air Quality and Health at [www.ncceh.ca/sites/default/files/Air\\_Cleaners\\_Oct\\_2010.pdf](http://www.ncceh.ca/sites/default/files/Air_Cleaners_Oct_2010.pdf).

If you plan to buy an air cleaning system, make sure you get the device that best meets your needs.

### **Use carbon monoxide (CO) detectors:**

Carbon monoxide detectors are readily available, and these can be installed cheaply. Like smoke detectors, they need regular testing to make sure they are working properly. You can check with a consumer guide to find a carbon monoxide detector that best meets your needs.

### **For More Information**

For more information about indoor air quality and your health, visit the following websites:

- Health Canada – Indoor Air Quality [www.hc-sc.gc.ca/ewh-semt/air/in/index-eng.php](http://www.hc-sc.gc.ca/ewh-semt/air/in/index-eng.php)
- The B.C. Lung Association – Air Quality [www.bc.lung.ca/airquality/airquality.html](http://www.bc.lung.ca/airquality/airquality.html) or call toll-free 1-800-665-LUNG (5864)

For more HealthLinkBC File topics, visit [www.HealthLinkBC.ca/healthfiles](http://www.HealthLinkBC.ca/healthfiles) or your local public health unit.

Click on [www.HealthLinkBC.ca](http://www.HealthLinkBC.ca) or call **8-1-1** for non-emergency health information and services in B.C.

For deaf and hearing-impaired assistance, call 7-1-1 in B.C.

Translation services are available in more than 130 languages on request.

