



ENV 155

RESIDENTIAL WOOD BURNING THE STRAIGHT FACTS

Heating with wood is a common practice in many communities in Canada. But many of those who heat with wood are not aware of the effects that wood smoke can have on their health and the health of their families and neighbours. Whether you heat your home solely with wood, or use wood only as an occasional source of heat, here are some things you should know when operating your wood stove.

Wood smoke is a complex mixture of numerous very small particles, together with various gases. Many components of wood smoke can be hazardous or toxic. Those include tiny smoke particles called particulate matter (PM), carbon monoxide (CO), nitrogen oxides (NO_x), as well as a wide range of organic chemicals. Recent studies have shown that any increase in ambient concentrations of some of these air pollutants can cause health effects in some individuals. Exposure to wood smoke can lead to a worsening of existing heart and respiratory conditions (angina, congestive heart failure, chronic obstructive pulmonary disease and asthma), eye, nose and throat irritation, headaches, and over the long term, an increased risk of cancer and genetic mutations.

In communities and neighbourhoods where wood burning is a common source of heat, air quality problems can intensify and pollutants from wood smoke can become more concentrated at ground level, particularly during periods of calm wind.

Particulate matter, nitrogen oxides and volatile organic compounds (VOCs) contribute to haze, smog and acid rain formation. The health and environmental concerns associated with wood smoke are not isolated to the individual home. Wood smoke carries throughout the neighborhood and the poor burning practices of a few can affect many.

FACT:
MANY COMPONENTS OF
WOOD SMOKE CAN BE
HAZARDOUS OR TOXIC.



particulate matter
organic chemicals

haze

health effects

smog

eye irritation

toxic

health effects

nose irritation

throat irritation

poor burning practices

respiratory illness

health effects

throat irritation

organic chemicals

carbon monoxide

haze

toxic

organic gases

smog

Particulate Matter

poor burning practices

illness

pollut

nose irritation

ous pollutants

COMPARISONS WITH OTHER HEATING OPTIONS

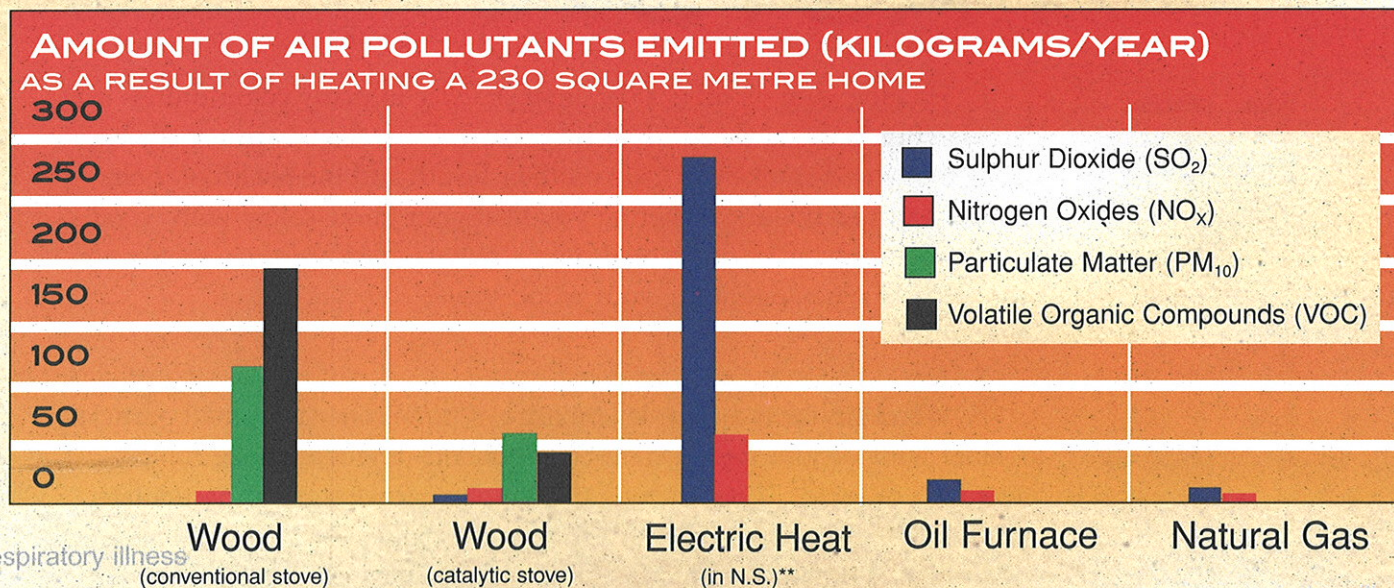
Conventional wood stoves and fireplaces can emit over 100 times more organic gases and particles than are released by burning oil or natural gas to produce the same amount of heat (see the chart).

Although electricity generation from coal and oil combustion can produce higher emissions of

sulphur dioxide (SO₂) it produces far less emissions of VOCs and PM. Other forms of wood burning, such as slash burning, backyard ornamental pots, and outdoor wood furnaces, produce the same hazardous pollutants as old inefficient wood stoves and fireplaces.

haze

smog

Particulate Matter
poor burning practices

** Emissions at power plant

PM₁₀ = PM which is less than or equal to 10 microns in diameter

(Meteorological Service of Canada, 2003. Environmental Comparison of Space & Hot Water Heating Alternatives in Nova Scotia)

respiratory toxic

WHAT CAN YOU DO ABOUT THIS PROBLEM?

Consider switching to an alternate fuel such as oil, propane or natural gas, and reduce other wood burning practices. You can convert your existing fireplace to oil, gas, propane or electricity with a new fireplace insert. Most alternative home heating options produce far less VOCs and PM than wood heating for the same heat value (see the chart). Any type of combustion appliance can emit PM, CO and NO_x into your home. It is important to ensure that your appliance is properly maintained and vented in order to minimize those emissions.

WIND AND SOLAR

These heating options have potential. The costs of these energies are becoming more competitive as a broader range of technologies is being developed and proven. The major advantage is that air pollution emissions are zero.

NATURAL GAS OR PROPANE

Natural Gas is a new fuel to the Atlantic Region, but is becoming more available to some areas. Propane is a good choice where natural gas is not currently available. Both options are cleaner fuel sources and burn more efficiently than wood. They emit lower amounts of PM, CO, and VOCs.

OIL

Oil heating is better than wood heat from an air quality perspective because it emits only relatively minor amounts of particulate matter and organic compounds. High efficiency oil furnaces (90% efficiency) are available and should be used if oil is selected.

ELECTRICITY

In your home, electricity is cleanly consumed. However if it is generated with fossil fuels such as heavy oil or coal, there are significant amounts of SO₂ and NO_x emitted during the production of that electricity which can contribute to local and long range air pollution. Hydroelectric or natural gas-generated power produces little or no SO₂ emissions.

BURN WOOD MORE EFFICIENTLY

If you choose to burn wood, be aware that improper wood stove operation and poor stove design are responsible for poor air quality while weather and geographic conditions increase the problem. Improving your stove's combustion efficiency will automatically reduce wood smoke production. To reduce wood smoke, pay close attention to what you burn, and when, where and how you burn it.

Residential wood stoves and fireplaces are designed to burn only wood. Do not burn plastics, household garbage, rubber, asphalt products, chemical substances, painted or treated wood or manufactured wood products. Burning these materials releases even more harmful air pollutants and may damage catalytic combustors in catalytic wood stoves.

To improve combustion and decrease emissions from wood heat you should use an EPA-certified stove.

CHOOSE AND PROPERLY INSTALL THE APPROPRIATELY SIZED UNIT

Any heating unit, including a wood stove, that is too large for the space it serves will be inefficient. Selecting the right size appliance provides a cleaner burn with adequate heat and greater fuel efficiency. To choose an appropriately sized unit, you should consult with a wood stove specialist. Wood stoves must be properly installed to be safe and efficient. Ensure that your installer or technician is certified by the WETT (Wood Energy Technical Training) program.

OPERATE YOUR WOOD STOVE PROPERLY

It is best to obtain your fire wood in late winter or early spring. It should be seasoned at least six months and sheltered from the weather. You can reduce your wood consumption by 25% simply through seasoning the wood before you burn it. Not only do you need less wood, it burns more efficiently. The size of the wood you use is also important: smaller pieces of wood burn more cleanly because they have relatively more surface area exposed to the flame. Wood should be split to a maximum thickness of 10-15 cm (4-6 in.), depending on stove size, and should be 10 cm (4in.) shorter than the firebox. Keep a good supply of very dry wood for kindling.

Careful control of the air supply determines how completely the fuel is burned. When you start a fire or add wood to it, the fresh fuel requires much more air for the first 10 to 15 minutes. Once the wood is well charred, the amount of air required drops off. Loosely stacked pieces burn faster since combustion air can reach all pieces at once. To maintain a consistently clean burn, refuel your stove frequently with suitably sized loads of wood before the previous load is completely consumed and the firebox cools.

To monitor your wood stove's performance, watch both the fire and what comes out of the chimney. In the firebox you see that as your wood decomposes it vaporizes into smoke. The smoke will burn in a bright yellow-blue turbulent flame. Secondary combustion produces bright, lively flames. Dull, steady flames, on the other hand, are a sign of oxygen starvation and incomplete combustion.

Excessive smoke from a chimney is another sign of poor combustion. Unburned gases either leave the chimney as air pollution or condense in the chimney as creosote. Some smoke may be visible when you first light the fire, but for the remainder of the burn the flue gases should be almost invisible.

Dampening or holding your fire overnight by cutting down on the air supply is not a recommended practice. It creates excessive emissions and promotes the formation of creosote.

FACT: haze

carbon monoxide
NATURAL GAS AND PROPANE smog

ARE MORE ACCEPTABLE

FROM AN AIR POLLUTION

STANDPOINT. Particulate Matter

pollutants

poor burning practices

toxic

SUMMARY

Wood burning, of any kind, is not the best environmental choice for home heating. Other forms of heating, such as oil, natural gas and propane are more acceptable from an air pollution standpoint. They emit less air polluting particulate matter and organic gases. However, if you cannot change from your wood heating system, you should consider an upgrade to an EPA-certified wood or pellet stove which emits significantly less pollution than conventional stoves.

HERE ARE A FEW SIMPLE THINGS YOU CAN DO TO REDUCE THE IMPACT WOOD HEATING CAN HAVE ON AIR POLLUTION AND HEALTH:

- Decrease your need for heat by making your house more energy efficient with well sealed, insulated windows and doors

- Use the best technology available (EPA-certified wood stoves)

- Burn only clean, dry seasoned hardwood.

- Never burn painted or treated wood, trash, or chemical products

- Keep your stovepipe and chimney clean.

- Empty ashes from wood stoves and fireplaces frequently

- Build small hot fires instead of large smouldering ones

- Do not dampen or "hold" your fire overnight by cutting down the air supply

- Do not burn wood when the air quality is poor, particularly during periods of calm wind.

haze toxic
FACT:
WOOD BURNING, OF ANY
smog
KIND, IS NOT THE BEST
ENVIRONMENTAL CHOICE
FOR HOME HEATING carbon monoxide

FOR MORE INFORMATION

More information on residential wood combustion can be obtained from the following websites:

- Environment Canada
www.atl.ec.gc.ca/pollution/air.html
- The Lung Association
www.lung.ca

or from the following offices:

Environment Canada, Atlantic Region
(902) 426-7231

Nova Scotia Department of Environment and Labour
(902) 424-2574

New Brunswick Environment and Local Government
Sciences and Reporting Branch
(506) 457-4844
information-elg-elg@gnb.ca

Prince Edward Island Department of Fisheries, Aquaculture and Environment
(902) 368-5037

Newfoundland & Labrador Department of Environment
(709) 729-2556

The Lung Association
1-888-566-LUNG

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