operating Your Woodstove

seasoning the wood

Cordwood should be seasoned at least six months and sheltered from the weather

You can reduce your wood consumption by 25% simply through seasoning it before you burn — not only do you need less wood, it burns more efficiently, too! Freshly-cut, or 'green' wood is between 35 and 50 percent water by weight. You **must** season it to a moisture content below 20 percent or much of its heating value will be wasted driving off excess moisture. It is best to have your wood cut in the late winter or early spring before the heating season.

wood-storing tips

The best way to store wood for drying is cut to length, split and stacked. Keep your wood off the ground and let air flow under the stack by laying down poles or 2x4s first. Leave space for air to circulate between the pieces. Use plywood, metal or plastic to keep the rain and snow off your wood.

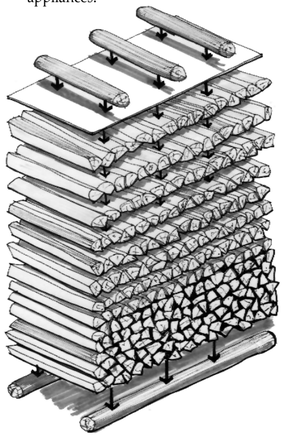
DON'T STORE WET WOOD IN YOUR HOUSE!!!

The moisture leaving wood as it dries will increase the relative humidity of the air in your house in the winter. Higher relative humidity levels increase the likelihood of mould and mildew growth, both of which can cause severe allergic reactions and asthma attacks as well as an increased number of colds and flus in your household.

Wood should never sizzle when burned! Excessive smoke production, more trips to the wood pile, potential creosote problems in your chimney (a safety hazard), and higher heating costs are the result.

The *size* of the wood you use is also important: smaller pieces of wood burn cleaner because they have 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 10 cm (4 in.) shorter than your firebox. Keep a good supply of very dry wood for kindling.

Plastics, painted or treated wood and manufactured wood products should not be burned in a residential stove or fireplace. They may emit toxic chemicals and may damage catalytic combustors. Coal burns hotter than wood, and may be a fire hazard if used in a woodstove. Coal should be burned only in specially designed, CSA/ULC approved appliances.



no, no & know

To protect the environment and heat your home efficiently, DO NOT burn these fuels in your woodstove:

- ***Wet wood (over 20% m.c.)***
- ***Green or pressure-treated wood***
- ***Painted wood or driftwood***
- ***Particle board or plywood***
- ***Diapers or household rubbish***
- ***Plastic, cardboard or coal***

lighting your fire

Many of today's wood-burning appliances require specific lighting techniques. Always follow the manufacturer's recommendations. Some general tips for cordwood stoves:

- Put lots of crumpled newspaper in the stove (not coloured or glossy paper). Put 10-15 small pieces of finely split dry kindling on top of it and behind it. Completely open the air-supply vent.
- Light the paper in several places near the air inlet. **DO NOT** leave the stove during this time — over-firing can cause dangerous levels of overheating.
- When the flames from the kindling begin to subside, add at least three small pieces of firewood. Take care not to smother the fire!
- Gradually increase the size of the wood as the coals build up.

keeping the home fire burning

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 woodstove's performance, watch both the fire and what comes out the chimney. Look at the fire first. Is it burning brightly? As your wood decomposes, it vaporizes into smoke — a cloud of combustible gases and tar droplets. The smoke will burn above the main fire in a 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.

woodburning tips

- *Burn only seasoned, split wood*
- *Run on high fire 10-15 minutes after each refuelling*
- *Don't starve your fire of air by closing the air inlet too far*
- *Avoid smouldering overnight burns*
- *Ensure good draft, proper chimney size*
- *Refuel more often with smaller loads*
- *Circulate hot air away from stove area to rest of house*

overnighting

If you use your woodstove overnight, fuel must be properly loaded to avoid a smouldering fire. To build a long-lasting fire, rake the coals towards the air inlet and use larger pieces of wood placed compactly in the firebox behind the coals. Place logs close together to prevent the heat and flame from penetrating the new load, saving the buried pieces for later in the burn.

Open the air inlets fully for 15 to 30 minutes, depending on the size of the load and its moisture content. When the outer pieces have acquired a thick layer of charcoal, reduce the air supply in stages to the desired level. The charcoal insulates the rest of the wood and slows down the release of combustible gases. This allows you to turn down the air control and still maintain a clean-burning fire.

indoor air quality

Poor woodburning practices create smoke, which contains compounds that can cause health problems, especially for those who already suffer from respiratory problems such as asthma. Burning dry wood properly in a well-maintained, efficient stove reduces the amount of smoke produced and minimizes the risk of exposure to the following:

HARMFUL CHEMICALS

Acrolein: irritation of the eyes and respiratory tract.

Formaldehyde: headaches, respiratory tract irritation. Probably carcinogenic.

Carbon Monoxide: angina in people with heart disease, lethal at high concentrations.

Nitrogen Oxides (NO_x): bronchial congestion, fluid congestion and fibrotic changes in the lungs.

Volatile Organic Compounds (VOCs): respiratory irritation and illness; some VOCs (e.g. benzene) are carcinogenic.

Dioxins and Furans: may be carcinogenic.

HARMFUL PARTICLES

Fine Particulate Matter: increased respiratory illness, cardiovascular stress, aggravation of asthma and other lung diseases, and early mortality.

Polycyclic Aromatic Hydrocarbons (PAHs): prolonged exposure is believed to pose a cancer risk.

To obtain more information or to borrow this pamphlet's companion video contact:

ENER*info*
Energy Advisory Service

NS Department of Natural Resources
Box 698, Halifax, NS B3J 2T9
1-800-670-4636 (toll-free)
website: http://www.gov.ns.ca/natr/meb

Your Wood stove

BURN it hot, KEEP it clean

ACTION 21 Environment Canada
NOVA SCOTIA
NOVA SCOTIA

How often have you gone for a walk on a cold, still night, and caught the scent of woodsmoke in the air? Smoke curling out of home chimneys may seem cosy, even romantic. But we can no longer view it in that simple way.

Woodsmoke: a burning issue

Virtually nothing but water and carbon dioxide is produced when wood is burned at high temperature with enough oxygen for complete combustion.With a 'clean' fire, very little or no smoke is produced. Dark or smelly woodsmoke is the result of incomplete combustion — and an inefficient stove. Woodsmoke consists of a complex misture of gases and very small solid and liquid particles. Some of the components of woodsmoke, such as carbon monoxide, hydrocarbons, nitrogen oxides and a range of organic chemicals are hazardous to human health.

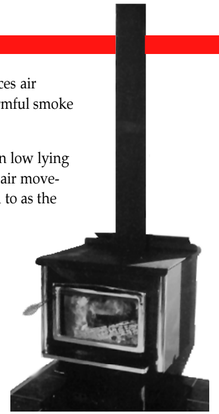
High concentrations of woodsmoke can cause serious local air-quality problems. Long-term exposure to woodsmoke can lead to eye and throat irritation, headaches and respiratory illness. Hazardous smoke particles are small enough to seep around closed doors and windows or to pass through ventilation system intake filters.

Woodsmoke production is greatest when a stove's air supply is restricted to reduce heat output or to extend a burn overnight. Reducing the fire's oxygen supply creates a smouldering, smoky fire … with all its associated pollutants, including creosote.

In some communities, pollutants from woodsmoke can become quite concentrated at ground level. On clear nights with light winds, the air temperature at ground level can drop quickly and become much cooler than the air above.

This "inversion" condition reduces air movement and tends to trap harmful smoke near its source.

A similar problem often occurs in low lying areas where nearby hills restrict air movement. This is sometimes referred to as the "bathtub" effect.



What can we do about this problem?

Inefficient woodstove operation and poor stove design or installation may have as much to do with this problem as weather and geography. Improving your stove's combustion efficiency will automatically reduce woodsmoke production. To reduce woodsmoke, pay close attention to what you burn, and when, where and how you burn it.

Following are a few simple steps that can improve woodstove efficiency by up to 50 percent. This reduces harmful emissions **and** saves you both work and fuel dollars.

choosing a woodstove

Your wood heating system cannot be truly efficient unless your home is also properly insulated and weatherproofed

To heat efficiently with wood, start with a stove matched to your heating needs. Large stoves often overheat today's well insulated homes. A smaller stove may be more suitable. It generally burns cleaner and uses less fuel because of its higher operating temperatures. To further increase your stove's heat output, and to increase its efficiency and reduce pollution, open the air inlet dampers.

look for EPA certification

The Canadian Standards Association emission standard (CSA B415) for wood stoves, inserts and small fireplaces recommends that emission levels of wood stoves manufactured in Canada meet or exceed US Environmental Protection Agency (EPA) standards. All new wood stoves sold in the United States must meet this standard. Stoves meeting EPA standards are sold throughout Atlantic Canada.

EPA certified stoves completely burn pollutants before they leave the firebox. This is achieved when:

1) enough oxygen is supplied;
2) combustible wood gases mix with preheated air (oxygen) at high temperatures; and
3) wood gases remain in the stove long enough to burn completely.

Certified stoves are not only more efficient than most older models but can cut smoke emissions by as much as 90%. If your existing stove is more than 7 years old, consider replacing it with a new advanced combustion unit meeting EPA standards. You won't regret it!

locate your woodstove intelligently

Your wood stove should be located in the space you wish to heat. Yet many stoves end up in the basement … even if the goal is to heat the main level. This causes poor heat distribution, excessive wood use and greater heat loss out of the basement, especially if it is poorly insulated.

Basement stoves are also more likely to backdraft than stoves located on the main level. Locate your stove where you spend most of your time.

install your stove safely

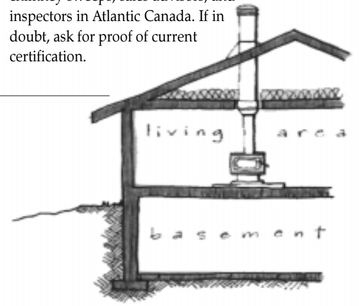
Woodstoves **must** be properly installed to be safe and efficient. Follow the manufacturer's instructions on clearances and connections. The chimney system must be sized and approved for use with your stove.

a good draft can be difficult to establish in a cold uninsulated exterior chimney

Woodstoves depend on the draft generated by a hot chimney to safely exhaust combustion gases. Because interior chimneys are always warm, draft is better and condensation or creosote problems are much less likely to occur. And heat lost by the chimney remains in your home.

Your installation must also conform with local building and fire-safety codes as well as CSA safety standards. Talk to your fire department or building inspector before installation. Notify your household insurer in order to maintain coverage and avoid disputes after installation.

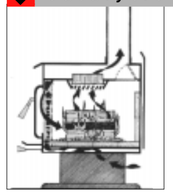
Insist that your installer or technician is certified by the WETT (Wood Energy Technical Training) program, Canada's only system for training and recognizing professional competence in the field of residential wood burning. There are hundreds of WETT certified installers, technicians, chimney sweeps, sales advisors, and inspectors in Atlantic Canada. If in doubt, ask for proof of current certification.



demand improved stove Technology

Canadian manufacturers are in the forefront of today's improved woodstove technology. Today's best woodstoves use one of the following approaches to improve combustion:

catalytic stoves

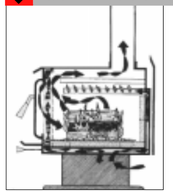


Catalytic woodstoves route exhaust gases through a catalytic combustor - a ceramic honeycomb coated with a rare metal such as platinum or palladium. In the presence of the catalyst, smoke gases and particles ignite at a much lower temperature (250°C) than they would without the combustor (500°C). Catalytic stoves burn cleaner and produce more heat, particularly under low fire conditions. Catalysts deteriorate over time and must be replaced every few years.

6 SIX WAYS TO REDUCE POLLUTION AND SAVE FUEL DOLLARS:

- *Select a stove that's certified clean-burning and tested to EPA 1990 or CSA B415 standards*
- *Make sure it's the proper size for its location and use (bigger is not always better)*
- *Make sure it's properly installed and inspected*
- *Avoid smouldering fires by using proper burning techniques*
- *Use only seasoned firewood split to the right size for your stove*
- *Reduce your need for fuel; make your house more energy-efficient!*

advanced combustion stoves



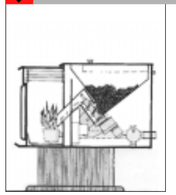
Advanced combustion stove systems use carefully designed fireboxes to optimize combustion. Design features to look for include the following:

Baffles: Create turbulence to direct wood gases back into the fire for a more complete burn.

Air Supply: Preheating the primary and secondary air supply minimizes the cooling effect of incoming air and keeps combustion temperatures high.

Firebox insulation: (such as firebrick) stores heat, stabilizes firebox temperatures and promotes more complete combustion. Heat storage will also warm your home long after the fire dies.

pellet stoves



Properly maintained wood pellet stoves burn cleanly and efficiently because the fuel to air mixture can be carefully controlled over a wide range of heat outputs. Pellet stoves need electricity to operate as the fuel is automatically fed into the stove's combustion chamber by a small motorized auger.

Wood pellets are manufactured locally from wood waste and sold in convenient 40 lb. plastic bags. They are about $\frac{1}{2}$" long with the same diameter as a pencil. The pellets must be kept dry to burn properly.