Using Wood Burning Stoves and Appliances

Did you know that while wood smoke may smell good to some people, it's not good for you.

Wood smoke contains a complex mixture of air pollutants, including particulate matter, carbon monoxide, oxides of sulfur and nitrogen, dioxins and furans, and volatile organic compounds.

Air toxins such as benzene, formaldehyde, acrolein and polycyclic aromatic hydrocarbons may also be present in wood smoke.

Depending on what is being burned, the wood smoke may also contain hydrogen chloride and heavy metals such as arsenic, barium, cadmium, chromium, lead, manganese or mercury.

More info?

Contact the Saskatchewan Ministry of Environment
Public Inquiry Line
1-800-567-4224
(toll-free in North America)
or 306-787-2584.
centre.inquiry@gov.sk.ca

What are the sources?

Wood stoves are the most common wood burning appliance. Others include pellet stoves, fireplaces, fireplace inserts, wood cook stoves, masonry heaters, outdoor fire pits, central heating furnaces, outdoor boilers and outdoor heaters for pools or hot tubs.

Why the concern?

Wood smoke can affect everyone, but children, teenagers, older adults, people with lung disease, including asthma and chronic obstructive pulmonary disease, or people with heart diseases are the most vulnerable. Breathing in wood smoke can cause health problems such as burning eyes, runny nose, asthma attacks and illnesses such as bronchitis, as well as increase hospital admissions.

Exposure to wood smoke pollutants can occur both indoors and outdoors. Outdoor exposure is affected by factors such as poor combustion, poor wind dispersal, and other atmospheric conditions, and has the greatest effect on the surrounding neighbourhood. Indoor air quality can be impacted by wood smoke contaminants drawn from outside, and also through leakage from pipes or back-drafting from chimneys.

Wood smoke can also be a nuisance, causing reduced visibility (haze) and odour problems. Wood appliance emissions can have a significant impact on air quality in a community or neighbourhood, especially on a stagnant evening when numerous wood burning appliances are being used, or when combined with many other emission sources. Other environmental impacts include crop damage, and greater vulnerability to disease in some plant species.

What your community can do?

In light of growing evidence of the health effects of wood smoke, municipalities should consider this when making decisions about whether or not to permit such wood burning appliances in certain areas. In 2006 Environment and Climate Change Canada developed a *Model Municipal By-law for Regulating Wood-burning Appliances* to help jurisdictions with this issue.

Suggested best practices include:

- Consider requiring wood burning appliances to meet CSA or US EPA efficiency standards.
- Curtail wood burning activities during poor air quality episodes.
- Ensure that appliances are properly operated and maintained and wood is well seasoned and stored.
- Consider the collective impact of multiple emission sources from industrial, transportation, energy, oil and gas and agricultural related emissions.
- In areas that experience significant episodes of air quality degradation from wood smoke limit the use of certain types of wood burning appliances.
- Provide incentives to encourage homeowners to remove uncertified conventional appliances from use.
- Impose setback distances from nearby residences for larger appliances like indoor furnaces or outdoor boilers.

- Offer public outreach and education programs to raise awareness about the health and air quality impacts associated with wood burning and to educate homeowners on proper operation and maintenance of their wood burning appliances.

Individuals and businesses should contact local municipal offices before installing a solid fuel burning appliance for information on bylaws or other requirements.

Operators of wood burning appliances can do the following:

Choose the right equipment

The heating efficiency of any wood heater depends on how completely it burns the firewood and how much of the fire's heat gets into the room (rather than going up the flue). Only use wood burning appliances that meet the Canadian Standards Association (CSA) emission criteria. Stoves manufactured before 1990 burn wood less efficiently. Newer wood burning appliances reduce emissions by burning most of the smoke right in the firebox. Advanced stoves manufactured according to these CSA standards have the following advantages over older, uncertified appliances:

- Up to 55 per cent less toxic emissions
- Up to 70 per cent fewer fine particulate emissions
- At least 70 per cent more energy efficient
- Use 30-50 per cent less firewood for the same heat
- Reduce creosote build-up, hence reducing the risk of chimney fires
- Save money, time and resources.

Use an experienced installer

The most dangerous wood stove installations are makeshift installations by untrained people. Errors in installation may not be visible, and problems may not be immediately apparent except only by a resulting home fire.

Wood-burning appliances should be installed by professionals and inspected and cleaned at least once a year by a technician certified under the Wood Energy Technical Training Program. These certified installers and chimney sweeps have gone through a rigorous training program that is recognized by the industry and by government.

Experienced professionals can also properly size and place equipment for the best heat distribution. A wood-burning appliance that is sized and placed properly with a venting system that delivers adequate draft will reduce wood consumption, produce more usable heat, and reduce maintenance from inefficient fires.

Experienced professionals ensure there is proper wall and floor protection and required clearances to prevent material from self-igniting.

Contact your home insurance company prior to and after installing a wood stove. The money saved by heating your home with wood may be offset by the increase in your annual home insurance rate. Also, failure to inform your insurance company of a wood stove installation may void your insurance plan if you ever have to put in a claim.

Know what you are burning

Hard woods tend to have the most energy per cord, whereas soft woods like pine produce more emissions and deposits inside your chimney.

Split wood into pieces 15 cm in diameter or smaller for faster drying. Stack and store wood outdoors, off the ground, split side down, with the wood covered to protect wood from rain and snow yet the sides exposed for better air circulation.

Wood should be stored at least a season in advance of burning (3 to 6 months for softwood and 12 months for hard wood). Wood should have a moisture content of less than 20 per cent. Properly seasoned wood feels lighter than wet wood and sounds hollow when hit against another piece of wood (wet wood makes a thud sound).

Bring wood into your home as needed. The excess moisture found in green wood increases the relative humidity of the indoor air, which can lead to mould and mildew growth.

Buy and burn locally cut firewood to decrease the risk of transporting invasive forest pests to your property.

Maintain wood stoves

Inspect your stove or fireplace often to ensure a continued safe and clean-burning operation. Keep both your appliance and chimney in good clean condition. Watch your chimney for smoke. The sign of smokes indicates inefficient burn, potential buildup of creosote and money being wasted by having to burn more wood for the same heat.

Regularly remove ashes into a covered, metal container. Store the container outdoors on a nonflammable surface.

By operating and maintaining your wood-burning appliance correctly, you will:

- reduce the amount of wood you need to heat your home;
- reduce outdoor and indoor air pollution from wood smoke;
- reduce the frequency of chimney cleaning; and
- increase the convenience and pleasure of wood burning.

Operate your wood stove

Follow your appliance's operating instructions carefully. Newer energy efficient wood stoves or fireplace inserts have updated practices than previous stoves.

Burn only clean, seasoned wood, densified logs or firelogs. However, many wax and sawdust logs are made for open hearth fireplaces only. Check your wood stove or fireplace insert operating instructions before using artificial logs.

Burn small, hot fires -- they produce much less smoke than ones that are left to smoulder. For most new appliances, a smoldering fire is not safe or efficient.

To start a fire in your wood stove, crumple up clean paper on the stove floor and cover with small kindling to help preheat the firebox and chimney. Paper is not recommended for starting fires in stoves with catalytic elements. The ashes will plug the holes in the honeycomb and make the unit inefficient. Open the draft/damper fully and light. Hold the door slightly ajar for a few minutes and then close tightly. Once the wood is burning brightly, add additional dry seasoned wood to the fire. Use the draft control to adjust the burn rate. NEVER light or rekindle a fire with kerosene, gasoline, or charcoal lighter fluid.

Keep the doors of your wood-burning appliance closed unless loading or stoking the live fire. Harmful chemicals, like carbon monoxide, can be released into your home.

To gain the most heat from each load of firewood, the wood should be flaming throughout the burn cycle until it is reduced to charcoal, before adding additional wood.

To reload your fire box, open drafts for a few minutes, then open door slowly to prevent smoke spillage, add wood, close door and allow wood to burn hot for about 15 minutes, then return draft to desired level. By doing this you can reduce creosote buildup by as much as 30 per cent.

Generally, a wood-burning fireplace is an inefficient way to heat your home. Fireplace drafts can pull the warm air up the chimney, causing other rooms to be cooler. If you use central heat while burning in a fireplace, your heater will work harder to maintain constant temperatures throughout the house. Also, fireplaces do not burn as cleanly as certified wood stoves, creating 20 times the amount of air pollution.

What should not be burned?

- Cardboard, milk cartons, coal or artificial logs (unless specifically manufactured for this purpose) burn extremely hot and can crack masonry and warp metal in certain wood stoves.
- Magazines, gift wrap, or coloured paper, as they all produce particles that can clog a fireplace or wood stove's air passages and can also produce noxious, corrosive or even carcinogenic gases.
- Burning some building material will expose you to toxic chemicals and heavy metals you didn't even know were there.
- Paints used until 1978 contained lead; paints used until 1990 contained mercury. Paints containing PCBs were widely used from the 1940s to the 1970s and when PCBs are burned at lower temperatures they can produce dioxins and furans, which are dangerous carcinogens.
- Particleboard, plywood or other composite wood products are held together by glues which may contain cyanide and other extremely hazardous substances.
- Smoke from wood treated with varnishes and sealants will also contain hazardous pollutants.
- Don't burn wood from orchards which have been sprayed with pesticides.
- Never burn wood that has been taken from salt water. Chlorine combines with the smoke to produce dioxins and furans.
- Wet or unseasoned wood products take longer to reach optimal temperature because a lot of the heat energy is used to evaporate the water from the wood rather than heat the home. They also produce more smoke which results in more creosote buildup in chimneys and the plume, leaving the stack stays closer to the ground impacting the neighbourhood air quality more.
- Rotted, diseased or moldy wood will increase the chance of the home getting infected, as well as affecting the neighbourhood's air quality.

Preventing smoke and odours

Wood-burning systems that are properly designed, installed and operated will not spill smoke into the house. If you smell smoke in your home or see smoke coming out of the chimney, you may be burning treated wood or wood that is too wet or have a problem with your stove or fireplace. Also, higher levels of smoke are typically generated during fire start-up and when wood is smouldering.

If you have been using proper burning techniques, burning only dry wood, and you still smell smoke in your home to see smoke coming out of the chimney, have your system inspected by a professional.

Prohibited materials

- Petroleum products and solvents increase the risk of fires as well as damaging the design of the wood stoves.
- Decks often built of pressure treated wood contain arsenic and chromium. Wood treated with creosote is also extremely toxic when burned.
- Wood stoves are not designed to burn animal carcasses and manure which not only releases toxic chemicals in the air but also releases noxious odours in the neighbourhood.
- Garbage, plastics, rubber, styrofoam, industrial waste and hazardous substances all release toxic chemicals, have a noxious odour and may increase the amount of creosote buildup in chimneys. These toxic chemicals will be released into the environment in the smoke or in the ash that is disposed of later.