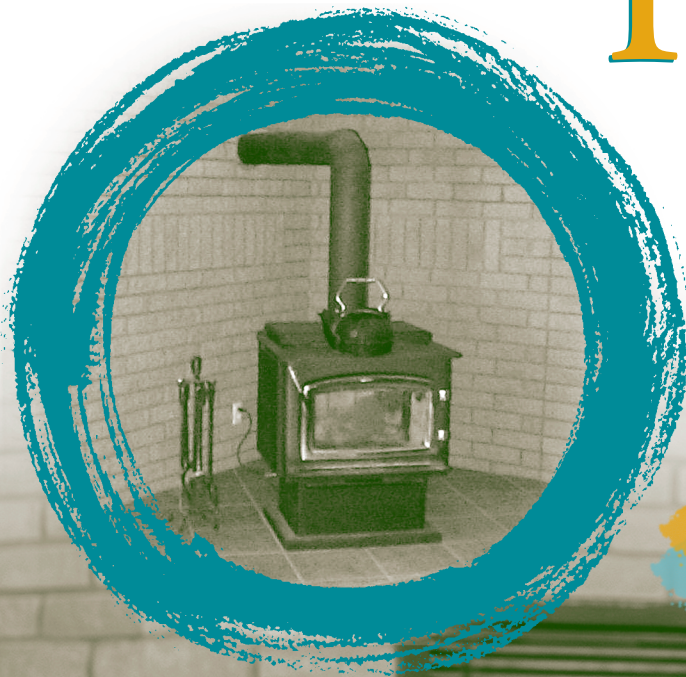


Discover

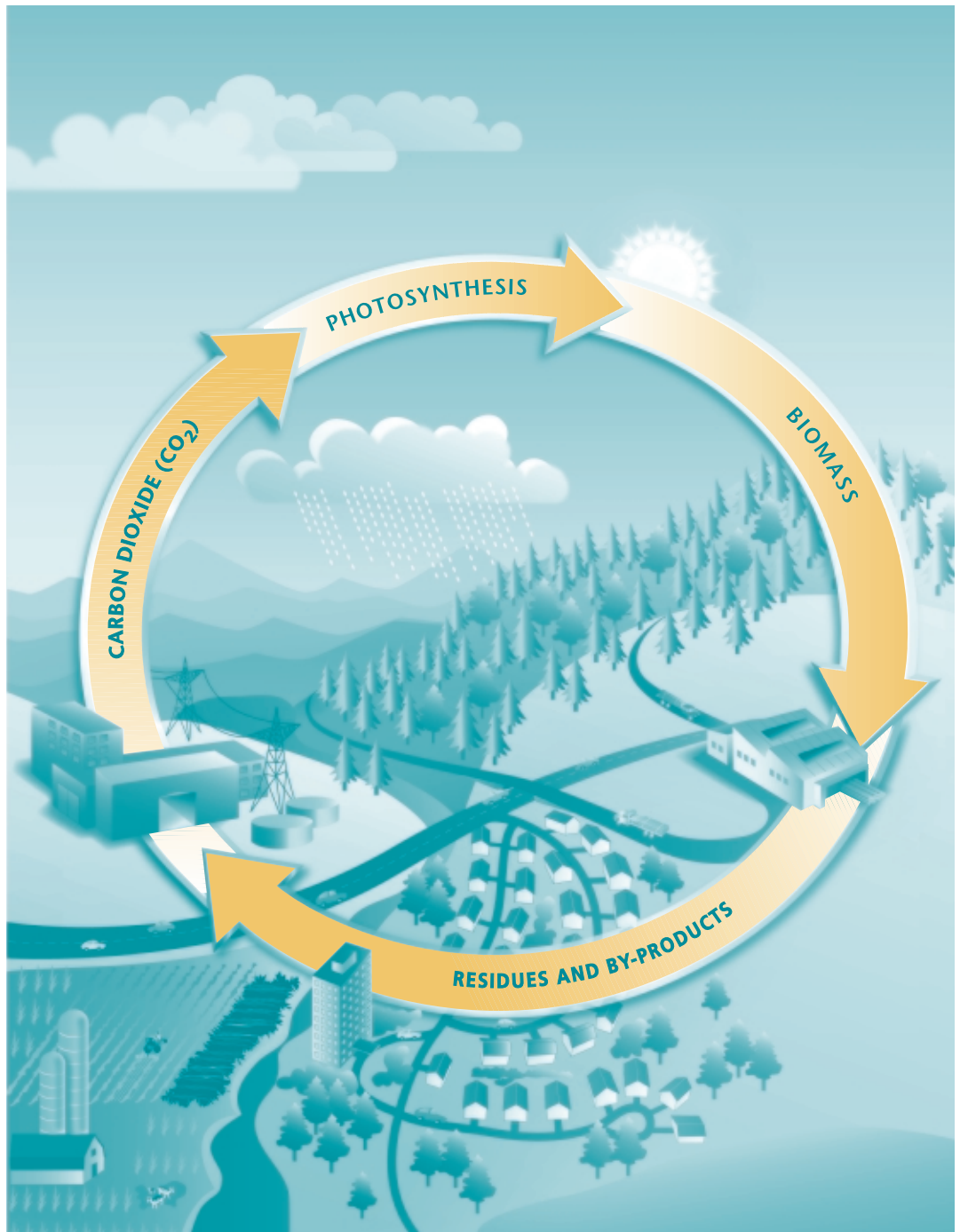
THE BENEFITS OF

Wood RESIDENTIAL Heating



How **4** residential wood-heating systems are being used to reduce energy costs and increase home comfort





Biomass combustion is considered CO₂ neutral and therefore is not considered a major producer of greenhouse gas linked to climate change.

Discover the Benefits of Residential WOOD HEATING

Canadians have always enjoyed the cosy warmth of a wood fire, and until the advent of convenient oil, gas and electric heating systems, wood was the main fuel for home heating. But is wood heating an efficient option today?

The answer for more than 3 million Canadian households is a resounding yes. Although heating with wood requires more physical work than some other heating options and calls for a good knowledge of how to operate and maintain the system, the rewards for those who heat their homes with wood are substantial.

Biomass energy, or bioenergy, refers to all forms of renewable energy that are derived from plant materials produced by photosynthesis. Bioenergy can be derived from organic residues, agricultural crops or, in this case, wood. These fuels can be obtained from many sources in Canada, including sawmills, woodworking shops, forest operations and farms.

Bioenergy is regarded as “green” energy for several reasons. Assuming that biomass resources such as our forests are managed properly, biomass fuels are infinitely renewable. They have already proven to be economically stable sources of energy over time. Bioenergy is neutral in terms of carbon dioxide (CO₂) emissions. Burning biomass fuels merely releases the CO₂ that the plants absorbed over their life spans. In contrast, the combustion of fossil fuels releases large quantities of long-stored CO₂ – a greenhouse gas (GHG) that contributes to climate change. Moreover, bioenergy further reduces CO₂ emissions when it displaces fossil fuels.

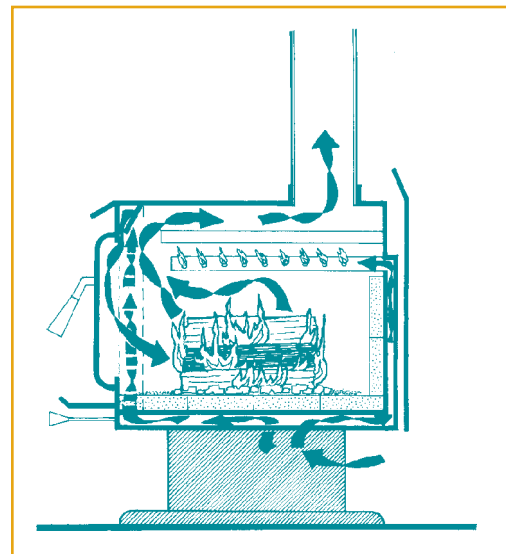
Although wood is a renewable fuel and its use can reduce overall GHG emissions, burning wood releases air pollutants. When burning is incomplete, as in a smouldering fire, the dense smoke that results is laden with particles and toxic gases. However, when wood is burned more completely in a hot, bright and lively fire, smoke emissions are reduced dramatically. Wood burned correctly produces little or no visible smoke at the chimney top.

Wood heating regained popularity during the energy crisis of the 1970s. Hundreds of thousands of wood stoves were purchased to shelter household budgets from rising conventional energy prices. People did save money and felt more secure with control of home heating in their own hands, but a number of problems soon arose. The wood stoves and furnaces of that time were unsophisticated, and safety codes and training for professionals were lacking. The result was a rash of house fires caused by inferior equipment and improper installation. Later, it became apparent that air pollution from smoking wood stoves could be a serious problem in some communities.

Since then, however, there has been a transformation in wood-heating technologies and in the way they are used. The result has been a dramatic reduction in house fires, pollution and the amount of wood needed to heat the average home.

In the early 1980s, in response to the wood-heat safety problem, Energy, Mines and Resources Canada (now Natural Resources Canada) supported the creation of new safety standards and the development of the Wood Energy Technical Training (WETT) Program under which professional installers, inspectors and chimney sweeps receive training and certification. Today, when homeowners shop for wood-heating systems, they can receive reliable advice, professional installation services and products that are safety certified with clear instructions for correct installation. Proof of professional skills and experience is available through WETT certification of wood-heat system installers, and more homeowners are having their systems professionally installed. The result is peace of mind, reduced risk of fire and more effective wood-heat systems.

The wood-smoke pollution problem also prompted changes. Under pressure from the U.S. Environmental Protection Agency (EPA), North American stove manufacturers developed new, advanced combustion systems that on average produce one tenth of the smoke and deliver about one third higher efficiency. Now, these new EPA-certified stoves are widely available across Canada, and the Government of Canada recognizes EPA certification. Users report that the new stoves are more attractive, produce a more beautiful fire and are easier to use than the old “airtight” models of 10 to 20 years ago. The higher efficiency of these cleaner-burning stoves means less cost for firewood and less splitting, carrying and stacking for homeowners who process their own firewood. It also means less firewood used; therefore, it helps protect our forest resources.



Advanced combustion systems can burn firewood with few visible emissions.

During the same period, housing technology also changed, and this has helped to make space heating with a wood stove more effective than ever. Today’s houses are less drafty and better insulated, so a single wood stove can easily heat a medium-sized home, depending on the home’s design. When energy-efficient housing technology is matched to the new, advanced wood-burning technologies, a significant reduction in overall household GHG emissions results.

More than 3 million Canadian families heat with wood as their primary or secondary heating source in homes and cottages across the country. The four Canadian families who tell their stories about wood heating in this publication find that heating their homes this way is not only economical but adds to their quality of life through greater enjoyment of their homes. Wood heating also offers security from energy price fluctuations and electrical power failures.

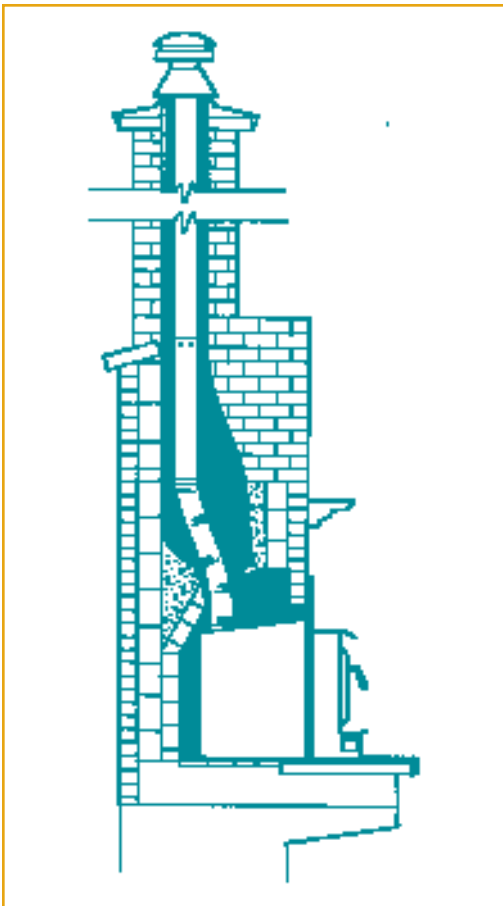
Fireplace Insert:

Let the Winter Storms Rage

The famous ice storm of 1998 caught Susan Brandum and Ed Martin of Port Elmsley, Ontario, unprepared. Huddled for eight days in front of an open fireplace in their near-freezing living room, the couple knew that they never again wanted to be so vulnerable to the weather.

A wood heater had been on their wish list, but the ice storm experience made it a priority. “The clincher,” says Susan, “was the

discount offered the next winter by our local wood stove store as an incentive to upgrade our fireplace.”



A proper fireplace insert installation includes a stainless steel chimney liner that extends from the insert flue collar to the top of the chimney.

The timing was perfect, so Susan and Ed had their EPA-certified fireplace insert installed under the Great Eastern Ontario Woodstove Changeout, a program organized by the Canadian hearth industry and partnering associations.

Susan and Ed’s fireplace insert, which is like a wood stove that is adapted to fit into an existing open fireplace, was installed professionally with a new stainless steel chimney liner to ensure safe and effective performance. From the moment they lit the first fire, Susan knew they’d made the right decision.

“We love it,” she says. “This type of heat is just so comfortable.”

To keep fuel costs down, they buy a full truckload of 2.5-m (8-ft.) logs. Ed cuts the wood to length and then rents a splitter to process it into firewood. One logging truckload, holding about seven full cords of wood, each 1.2 m x 2.4 m x 1.2 m (4 ft. x 8 ft. x 4 ft.), heats their 140-m²



The dark stain seen below the fireplace mantel occurred before the insert was installed. The insert should never smoke.

(1500-sq.-ft.) 1950s house for two winters. But the appeal of wood heating for Susan and Ed is more than just cosy comfort and low heating costs.

Susan likes the sense of security of wood heating, or, as she says, “not depending on a heating oil supplier or on technology you don’t understand – this is our own heat under our control.”

The insert transformed the old fireplace into a modern heating system that now provides virtually all of Susan and Ed’s heating needs. Having moved to their house in the country not long before the ice storm, Susan was new to wood heating.



“Once I experienced wood heat, it was a world of difference from the forced-air oil and electric baseboard heating I had been used to but never liked,” she says.

Susan and Ed’s fireplace insert provides all the security and comfort they need, even in the worst of winter storms.

Wood Furnace:

Saving Money Every Day

Nick Rilkoﬀ, who lives near Castlegar, British Columbia, has had his add-on wood furnace since 1984. He has saved thousands of dollars since it was installed. Not only has wood heated his home all these years, it has also reduced his water heating costs.

Nick is now retired from his job as a crane operator at a lumber mill, but for years he would bring home small amounts of free, non-processed mill scrap after work. (Note: never burn painted or treated wood; doing so produces toxins.)

Free wood is a little harder to find these days, but he still manages without having to spend much money on his fuel supply. Nick prefers hemlock wood for fuel because, in his experience, it burns the best, but he also uses fir, larch, spruce and jack pine. Using a mix of available wood species where possible helps maintain a

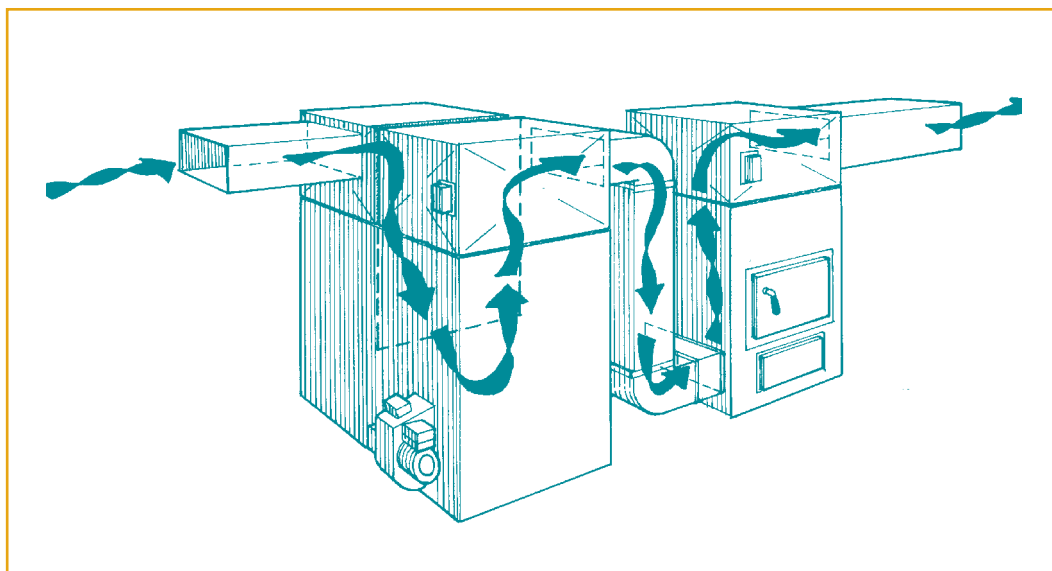


An add-on wood furnace provides almost all space and water heating for the Rilkoﬀ household.

sustainable harvest for the future. He reports that less than two full cords can heat his 100-m² (1100-sq.-ft.) house during the relatively mild winters in the Kootenay region.



Three face cords of wood make up one standard full cord.



An add-on furnace converts an oil-only heating system to a wood-oil combination system.

His add-on wood furnace is installed next to his oil furnace and shares its forced-air fan. This type of installation effectively converts an oil-only system to a combined wood-oil system. Each furnace has its own wall thermostat located in the main living area to control its heat output. A loop of pipe inside the furnace heats the water that circulates through it and back to a tank mounted on the wall. This heated water is then used as the feed water for the conventional water heater. The result is that the electric elements in the normal water heater rarely come on because the incoming water is already hot. This produces significant energy cost savings and reduces GHG emissions. The installation of this type of furnace system is complex and should not be attempted by the homeowner.

Nick is not the sole operator of the wood furnace. He reports that his wife, Mildred, “knows her way around the furnace just fine and sometimes gets the fire going in the morning while I linger in bed.”

The Rilkoff household uses very little fuel oil. “I had a fill-up three years ago, and there is still some left in the tank,” says Nick.

After so many years of successful wood burning, Nick has clear ideas on the right way to avoid problems: “I build small fires, burn them hot and seldom get any creosote.”

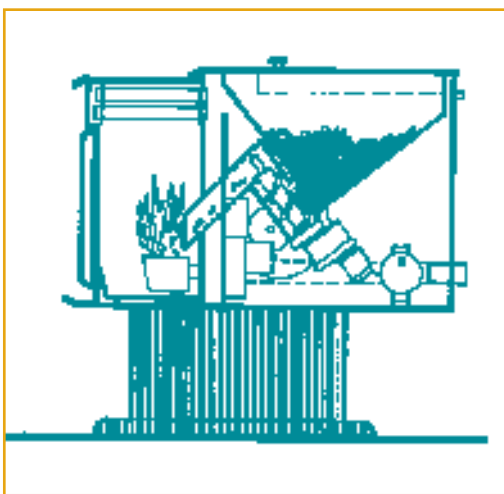
That is good advice for any wood-burner to follow.

The Pellet Stove:

Thoroughly Modern Wood Heating

Leigh-Ann Murphy's young family lives the whirlwind lifestyle that is so common these days. She and her husband both work long hours in demanding jobs, and their three children have plenty of sports and social activities to keep them busy. So, how can the labour demands of wood heating fit into such a hectic family life?

The answer is a pellet stove – two of them, in fact. The Murphys' large heritage home, with two and a half storeys and a basement, in Wolfville, Nova Scotia, has an oil-fired boiler in the basement that serves the first and second floors using cast-iron radiators, and it also heats the domestic hot water. But the large bed-sitting room on the third floor had only electric baseboard heaters that were far too costly to use continuously.



Pellet stoves need electricity to operate the exhaust fan, the heat circulating fan and the auger that moves the fuel from the hopper to the combustion chamber.



Pellet fuel comes in convenient 18.1-kg (40-lb.) bags.

This was the obvious location for the almost-new pellet stove the Murphys had brought with them when they moved to Wolfville two years ago. Using the pellet stove on the third floor reduced their electrical bills by at least \$1,200 a year.

More recently, the family wanted a space heater for the main floor living room to help offset the \$3,500 annual oil costs to run the boiler. Initially disappointed that the wood-fired fireplace insert that they had their hearts set on could not be installed because of an irreparably unsafe old fireplace flue, the Murphys opted for another pellet stove. It turned out to be yet another perfect solution.

Fuel for the stoves is produced from dried, finely ground wood waste that is compressed into hard pellets about the diameter of a pencil and up to 2 cm (1 in.) in length. Once a 18.1-kg (40-lb.) bag of pellets is loaded into its hopper, a stove can run automatically for up to 24 hours as the pellets are metered gradually into a small combustion chamber. This automatic operation is what makes it possible for the Murphys to heat with wood and still maintain their busy household routine.

The stove's fans and pellet delivery augers need electricity to operate, so an electrical power failure causes them to shut down. This is one of the drawbacks of pellet stoves compared with wood stoves, which don't require electricity. The Murphys have installed small battery backup systems to keep the stoves' exhaust fans running long enough to burn the fuel left in the combustion chamber and expel the

remaining exhaust to the outside. Without battery backup, some smoke would spill into the living space when electrical power is interrupted.

With automatic ignition and temperature output accurately regulated by a wall thermostat, convenience and ease of use are assured. Leigh-Ann, who rejected the option of a propane fireplace and who admits to being a little nervous about some home-heating options, is comfortable letting her 13-year-old daughter turn on the pellet stove if she is up first in the morning or is the first one home after school.

The Murphys buy their pellets 10 bags at a time and find the pellets convenient and easy to store. Leigh-Ann reports that "schlepping bags of pellets to the third floor is a chore but is certainly better than handling firewood."

"The kids love the pellet stove," she says. "They often run downstairs on a chilly morning to stand in front of the stove, getting warm."

The Murphy household is living proof that even the busiest families can enjoy the pleasure and efficiency of wood heating.

A New Wood Stove and a High-Efficiency Advanced Fireplace:

Part of a Comfortable Lifestyle

Pat and Joni Sandrelli have heated with wood for 25 years, ever since they bought their first house together. A few houses and heating systems later, they are just as committed to wood heat now as when they started.

The large riverfront home they built five years ago near Chapeau, Quebec, has a wood stove located in the finished lower level. The stove is their first experience with the new, low-emission wood-burning technology and features such as “airwash” that keeps the glass door clear for viewing the fire. “These stoves have come a long way. This one works great,” reports Pat. “We love it.”

“We keep our stove running every day, all winter,” he says. “It heats the whole house,

so the furnace hardly ever comes on.”

This is a considerable feat for a single wood stove, since the Sandrellis’ house has 425 m² (4600 sq. ft.) of floor space. But despite the cold northwest wind off the river, the house is easy to heat because it is a super-energy-efficient structure. The furnace Pat refers to is actually a ground-source heat pump, and although it is not called upon much for space heating, it does provide the household’s domestic hot water.

This single stove can heat the Sandrellis’ energy-efficient 425-m² (4600-sq.-ft.) house.



The Sandrellis haven't finished installing the mantel and trim around their new high-efficiency fireplace.



The couple owns a building supply store, which keeps them busy. Joni's more flexible schedule at the store means that she can leave the house later after tending the fire so that they return to a warm house after work.

Not only do Pat and Joni share tending to the fire, they also cut and split all the household's firewood together.

"When fall comes, I get the urge to go and cut wood to be used the following winter from the bush at our camp," says Pat. "We take two weeks off and cut, split and stack all the firewood for the house, plus some for the camp and one of the buildings at the store." Between them they produce as much as 12 full cords of wood each year, four of which are used to heat the house. Through careful and selective harvesting, the Sandrellis' woodlot will yield this much firewood annually forever and still increase in overall quality.

And what is Pat's explanation for spending so much time and effort on wood heating? "It's like a hobby, I guess. We probably don't save a nickel by doing this," he chuckles, "but it doesn't matter. We love spending time in the bush for the fresh air and exercise, and we love the heat from a wood fire."

Pat and Joni liked the stove so much that they installed an advanced technology fireplace upstairs in a large, glass-enclosed room with a hot tub at one end. The fireplace has the same type of internal features as the stove has to keep emissions low, efficiency high and the door glass clear. Now the room is cosy and inviting, even on the coldest nights.

The Sandrellis' advanced wood stove and advanced fireplace are much more than simply an alternative heating system – they are an important part of the couple's lifestyle. "We wouldn't have it any other way," says Pat.

Conclusion

All across Canada, families are using wood fuel to reduce heating costs and increase their security as well as to provide numerous intangible benefits such as comfort and a sense of independence. And whether they are aware of it or not, they are also preserving Canada's limited supply of fossil fuels such as oil and gas while reducing GHG emissions. When they burn firewood in low-emission EPA-certified stoves, inserts and fireplaces, the total environmental impact of their use of wood energy is modest.

Natural Resources Canada and its local and national partners have prepared a Canada-wide campaign to promote safer, cleaner and more efficient wood-burning practices for those who heat their homes with wood or use it for recreational purposes. The "Burn it Smart!" campaign's focus is to help Canadians make their wood-burning

habits safer, cleaner and more efficient. Knowing that wood smoke is a pollutant often caused by the inefficient combustion of wood fuel, Natural Resources Canada is providing tips and proposing actions to help the public reduce wood-smoke pollution, economize on the wood they use and increase household safety.



For more information on the "Burn it Smart!" campaign, visit the Web site at www.burnitsmart.org.

More Information on Residential Wood Heating

Other free publications on residential wood heating include the following:

- *A Guide to Residential Wood Heating*
- *All About Wood Fireplaces*
- *An Introduction to Home Heating With Wood*
- *Buying a High-Efficiency Wood-Burning Appliance*
- *Getting the Most Out of Your Wood Stove*

To receive any of these publications, contact

Renewable and Electrical Energy Division
Natural Resources Canada
580 Booth Street, 17th Floor
Ottawa ON K1A 0E4
1 800 387-2000 (toll free)
Web site: www.canren.gc.ca

Further information on residential wood heating is available from

Canada Mortgage and Housing Corporation
Canadian Housing Information Centre
700 Montreal Road
Ottawa ON K1A 0P7
Web site: www.cmhc-schl.gc.ca/cmhc.html

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