# EXTENSION NOTES

Ontario

# WOODCHIP COMBUSTION

Canadians now spend $6.5 billion annually to import oil and much of this is used in heating. In the past, solid wood was the primary source of heating in most of rural Canada. More recently, the forest resource has largely been overlooked as a source of reliable and renewable energy. Of the wood burning options available, current research into woodchip combustion suggests it is a feasible alternative to fossil fuels, yet its use is mostly unrecognized in Canada.

This Extension Note focuses on woodchip combustion as an alternative source of energy.

## BACKGROUND

Most of Canada's accessible forest is second-growth and requires forest management in the form of thinning to create healthy and more productive forests. Much of this low-value wood can be used in wood-burning heating systems. Heating by wood is more attractive to homeowners today, due to technological improvements that have made wood burning safer, more efficient and cleaner. Options range from traditional wood stoves to pellet and woodchip burning systems. And while pellet fuel is manufactured by compressing ground wood and biomass waste into small, cylindrical pellets, woodchip fuel requires little processing. Woodchips are exactly what the name implies, small chips of solid wood.

Among the advantages of woodchip combustion is the opportunity to use mill waste and culled wood from thinning operations. Woodchip fuel produced from such wood residues is cheaper than cordwood and pellet fuels. And finding new uses for waste forestry byproducts can create new employment opportunities while reducing our dependency on imported fossil fuel. Although the capital costs of woodchip heating systems are higher than oil-fired systems, the operating costs are lower. From an environmental perspective, chip combustion contributes less pollution and is a renewable resource.

## WOODCHIP COMBUSTION SYSTEMS

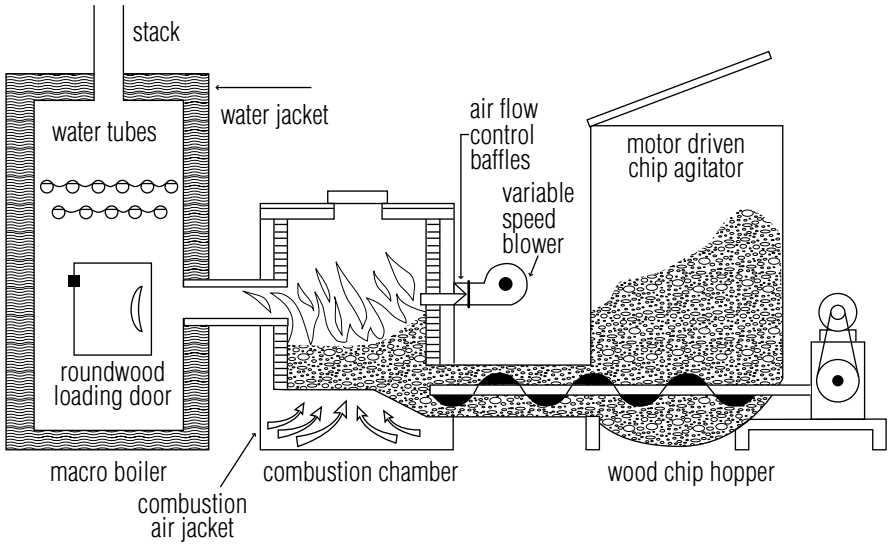
It is important to know how a woodchip combustion system works to fully appreciate its advantages. Woodchips are burned in a very efficient combustion chamber to produce fire which heats water. The hot water then circulates in pipes throughout your home, providing heat. In some commercial operations, such as a co-generation plant, steam is produced to power a turbine which generates electricity.

There are four main components in a woodchip combustion system for your home. They are: the chip hopper, conveyor system, combustion chamber and heat exchange boiler. The woodchip fuel is stored in the hopper. A motor-driven conveyor system moves the chip fuel slowly and steadily from the hopper into the combustion chamber. As the chips burn, a fan blows hot air into the heat exchange boiler where water-filled tubes are heated. The hot water then circulates in pipes throughout your home, providing comfortable heat. (Figure 1, on the following page, illustrates the components of a typical system).

# WOODCHIP COMBUSTION IN CANADA

In Canada, Prince Edward Island has the largest number of chip-fired combustion systems, partly because of the high cost of electricity. P.E.I. has institutional as well as commercial installations in nursing homes, garages, motels and greenhouses. P.E.I. has also pioneered chip-fired district heating in Canada. This concept was first developed in Sweden and involves a central heating plant which carries hot water to homes, businesses and large office buildings.

**FIGURE 1 — COMPONENTS OF A TYPICAL WOODCHIP COMBUSTION SYSTEM**




Newfoundland has the largest installation in Eastern Canada which produces electricity. There are also three hospitals in Newfoundland using the system. In Nova Scotia, several hospitals, an agricultural college, a poultry processing plant and a greenhouse complex use woodchip combustion. New Brunswick uses it in a district heating complex at the University of New Brunswick. Possibly because of low hydro rates, there are few chip-fired systems in Quebec, with the exception of a lumber drying operation located north of Montreal. In Ontario, chip-fired operations include a college in Brockville, several schools in the North, and a few co-generation plants adjacent to sawmills.

# IMPACT ON THE FOREST RESOURCE

Significant volumes of low-grade forest fibre in the form of early plantation thinnings, culled material from improvement cuts, harvesting and sawmill residue are available throughout Eastern Canada. Current market prices are too low to fully utilize this low-grade material. Often private woodlot owners are unable to carry out properly-timed thinnings because the lack of markets for thinned material reduces the economic potential for many forest stands. Providing markets for these products will enhance management opportunities, increase wood supply from the forest , boost the production of high-value sawlogs and increase the overall economic benefits from the forests.

# THE CHALLENGE

In spite of initially higher capital costs associated with woodchip combustion, its installation is now more economical in the long run. The financial investment on the biomass infrastructure and operation stays within the Canadian economy. Not only could our dependency on imported oil be reduced, increased use of the system would provide woodlot owners with a market for their thinned materials and allow them to carry out properly-timed thinnings.

For more information on woodchip combustion, please contact the Eastern Ontario Model Forest, and make reference to *Woodchip Combustion in Eastern Canada, Information Report No. 7.*

For more information contact:
**LandOwner Resource Centre**
P.O. Box 599, 5524 Dickinson Street
Manotick, Ontario K4M 1A5
Tel 613 692 2390 or 1 800 387 5304
Fax 613 692 2806
E-mail: lrc@sympatico.ca
Product Ordering: 1 888 571 INFO (4636)
Internet: http://www3.sympatico.ca/lrc

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