Sun, Wind and Sawdust

We still use oil or natural gas to heat homes and burn coal to make electricity, but as the price of fossil fuels goes up, some Canadians are turning to other, natural energy resources.

Hundreds of buildings are now heated by sunlight, factories are run with water or sawdust, and wind and technology make toasters pop in the Magdelan Islands.

In this issue of CANADA TODAY/D'AUJOURD'HUI we report on the pursuit of new energy sources and triumphs and difficulties met along the way.

Sun

The sun makes it possible for man to survive.

The sun's by-products, coal, oil and wood, have made it possible to survive in 20th century comfort.

As fossil fuels become less abundant and more expensive, we are turning directly to the sun for the extra warmth.

The sun does not always shine in Canada (in some settled places it is out only six hours a day in December), but in a year it deposits the equivalent of 150 watts on an average flat, square metre. This sunshine could heat every home in the land. Most of it is wasted, but since 1978 federal and provincial programs have sponsored or inspired hundreds of active or passive solar buildings, and many problems have been solved along the way.

The most effective form is passive—buildings designed to capture and retain the sun's energy. A large, properly insulated window facing south takes in a great deal more than it lets out.

Active solar heating is more expensive and less reliable. Air, water or a freeze-resistant fluid is piped through solar panels and warmed by the sun. Air may be pumped directly into the house or its heat transferred for storage to beds of rocks. Water is piped to radiators for immediate use or used to heat additional water stored in tanks. The heat from circulating chemical fluids is also stored in water tanks.

Sun Fish

The solar-heated experimental fish hatchery at Gunton, Manitoba, can produce up to two million genetically selected rainbow trout fingerlings a year.

It gets 70 per cent of the heat needed to warm the hatchery water and the building from forty-eight panel collectors on its roof. They cover 1,340 square feet, face 10 degrees west of south and are tilted at a 45-degree angle.

The sunlight on the roof heats a propylene glycol solution which flows through a copper and stainless steel solar loop, heating water stored in twelve 1,400-litre tanks. The panels also heat the twenty tons of water needed to flush and clean the system each week. (A new water recycling process has reduced the amount of heated water needed in the hatcheries by 90 per cent.)

The project was founded and is operated by the federal Department of Fisheries and Oceans. The hatchery staff installed the collectors.

The hatchery began work in 1980 and was an immediate success. It provides the energy to heat the tank water to the 12° to 15°C that trout need to reproduce, for all but a few winter days (when there is not enough sunshine). On one day when the outside temperature was −10°C the water in the holding tanks was 35°.

The holding tanks keep water hot for two to three days in the winter and for four to five days in the summer. Electrical heaters provide backup.

The hatchery will eventually produce 500 to 1,000 pounds of fish a month, some six tons a year, for commercial use. Similar hatcheries are under construction at the Cardigan Fish Culture Station, St. Andrews, New Brunswick, and at the Institute of Ocean Sciences, Pat Bay, Sidney, British Columbia.

The Beginning

The government's solar energy program began in 1975 with six demonstration projects. Some stored heat in water, one in paraffin, some used combinations of solar heat and wind power. In one project, waterheating demonstration collectors were mounted on the Manitoba Legislature Building in Winnipeg.

The National Research Council's Division of Building Research sponsored fourteen more pioneer solar homes in 1977, and the next year the Council's new Solar Energy Project arranged for solar systems in multi-unit homes, low-rise apartment buildings and row houses.

The first projects often produced more light than heat, but lessons were learned even when systems broke down.

The Ark

The most dramatic demonstration of all was the launching of the Ark in Prince Edward Island.

It is an imposing structure of glass, wood and concrete at Spry Point, near the ocean's edge. Built with federal funds by the New Alchemy Institute, it was the world's first bio-shelter, a home where, in theory, one family could supply its own heat, power and food. It had thirty-six vertical collector panels along the roof and seven slanted ones below, a wood-burning backup stove and a greenhouse. Water flowed through pipes in the panels,

Cover Photo: The world's largest vertical axis wind turbine is whirling on a Magdalen Island in the Gulf of St. Lawrence.