Water

Canada has more water and more hydro power than any other country in the world. Seventy per cent of its electricity comes from waterfalls and dammed-up rivers.

La Grange complex on the edge of James Bay, near the top of the Province of Quebec, will produce 10 million kilowatts by 1985. The James Bay hydro system, if it is fully developed, could produce over 35 million kilowatts.

The $15 billion project is one of the greatest construction operations in history, a vast network of dikes, roads, powerhouses and dams. Water from huge reservoirs turns turbines housed in man-made caverns chisled out of granite 450 feet below the ground.

In addition to James Bay, Canada has great hydro stations at Churchill Falls in the Labrador part of Newfoundland (5.2 million kilowatts) and at the Nelson River Project in Manitoba (4 million kilowatts when completed).

Wind

Windmills have been turning for centuries. The Danes have used them to produce a considerable part of their electricity needs since 1908.

Canada is a breezy place. High wind potential exists in the Maritimes, on the west coast of Hudson Bay and, to a lesser extent, in the southern prairies.

An NRC study suggests that 200,000 windmills with 100-foot blades could produce more power than James Bay.

In Canada the National Research Council and Hydro-Québec have the world's largest vertical axis wind turbine whirling away on the Magdalen Islands in the Gulf of St. Lawrence, and they intend to build a much bigger one at another site and have it operating next year.

The designs of both are similar—two curved strips of metal attached at both ends to a vertical axis. Since they are vertical, the structure does not have to be turned to face a shifting wind.

The model on the Magdalen Islands produces 250 kilowatts in a 35-kilometre-an-hour wind and supplies power for lighting and appliances to fifty houses. An earlier model set up on the Island in May, 1977, fell over in July, 1978. It had been disconnected from its main disc brake the day before. The turbine accelerated in a strong wind until the blades began striking support cables. The cable turnbuckle broke and the rotor flew off. The rebuilt model has an improved brake system and stronger supports.

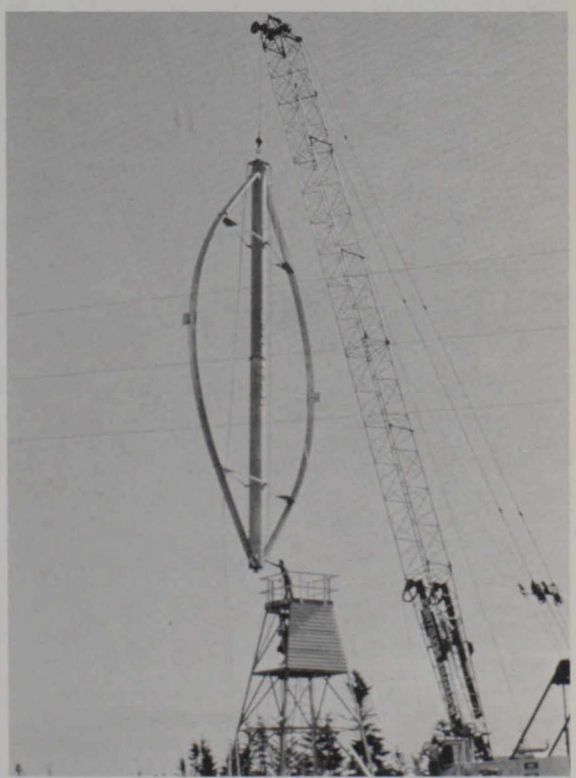
The one planned for 1983 will be called Aeolus, it will have a vertical axis 110 metres high and it will be capable of generating up to 3.8 megawatts, enough to supply the non-heating requirements of 600 to 700 homes. It will cost an estimated $20 million and will be partly financed by Hydro-Québec.

Why Bigger Is Better

Windmill power is expensive.

When the wind blows at less than 10 km/hour, the blades of the average household size turbine do not move. It is not until the wind reaches 35 km/hr that they reach their full productivity, and that productivity does not rise as the wind rate goes up. At 60 km/hr the vibrations and stresses become such that the turbine must be shut down.

The energy supplied by a 1,000-watt turbine would usually cost four or five times as much as that bought from the average utility company. In isolated places, however, where no power grid is available and fuel must be shipped in, they may be cost-efficient. As the size of the turbines increases, the cost per kilowatt goes down. It is believed that electricity produced by a "farm" of Aeolus-sized turbines would be as cheap as conventional electricity and, in time, cheaper. The NRC and the Science Council of Canada forecast a billion dollar domestic market for turbines by the year 2000.



Small and medium sized windmills can serve specific household or industrial purposes. This middling one, producing 55 kilowatts, generates electricity which is fed into the hydro-electric grid in Newfoundland.