Project ÉOLE

Catching Gaspé's winds

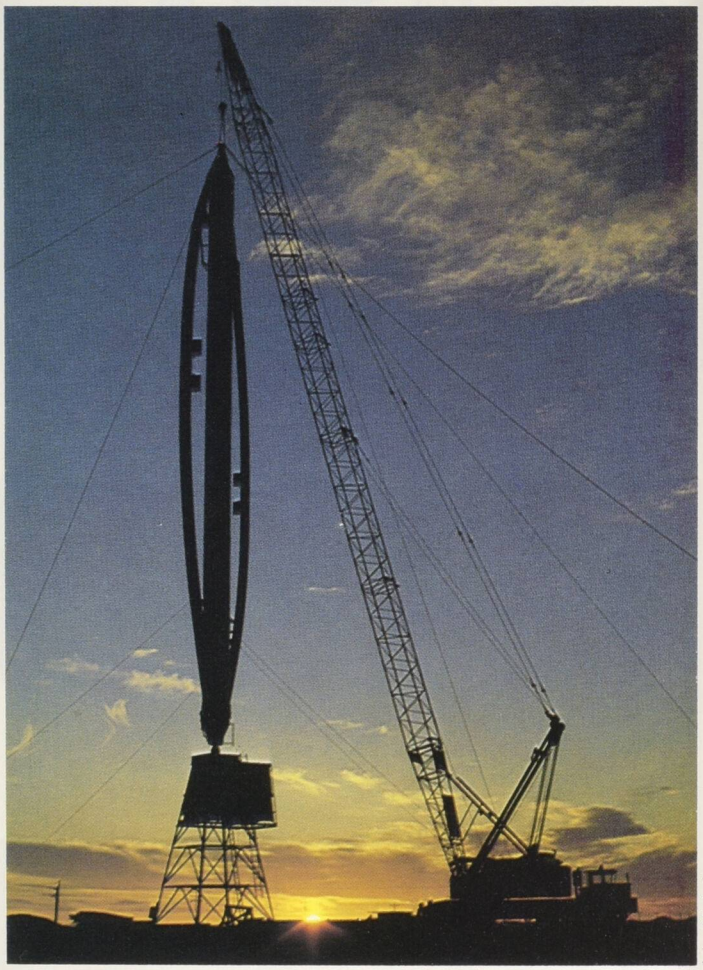
by Wayne Campbell

When it is completed sometime around the end of 1985, it will be a sight to behold, even from the main Gaspé highway over a half kilometre away. ÉOLE, a giant wind turbine named after the Greek god of the winds, will be built by NRC and Hydro-Québec to tap the winds blowing off the St. Lawrence River near the town of Cap-Chat, 425 km northeast of Quebec City. Spinning at a constant 14.5 rpm speed, this aerodynamic colossus is expected to deliver up to 4 MW of power into the main Hydro-Québec electrical grid, enough to satisfy the average electrical requirements of 1000 Canadian homes (not counting heat). ÉOLE is being designed by the engineering firm Experts-Conseils Shawinigan Inc. and will be built by Canadian industries under Hydro-Québec's supervision. Its approximately $30 million cost is being shared equally between NRC and Hydro-Québec.

For people familiar with the traditional farm windmill, where the blades spin like a Ferris wheel on a horizontal axis, the engineering drawings of ÉOLE will come as a shock. Rising 110 m above the surrounding terrain (topping the Parliamentary Peace Tower), the prototype turbine looks like a huge eggbeater, its 96-m-high central shaft girdled by two bowed blades especially designed to catch the wind. The blades have the shape of an aircraft wing in cross-section (the winds move them the same way air 'lifts' an aircraft) and they spin vertically in the manner of a Merry-Go-Round.

ÉOLE is a vertical axis, or Darrieus, wind turbine (after its inventor the late Georges Darrieus) and when completed will be the most powerful machine of its kind in the world. Only the horizontal axis turbine at Medicine Bow, Wyoming, matches ÉOLE's projected power output.

The effectiveness of the modern Darrieus turbine is a tribute to the advances in wind turbine design over the last three decades, in particular the work of NRC engineers Raj Rangi and Peter South. During the early '60s, Rangi and South rediscovered the French engineer's turbine and improved on it. Under the leadership of Jack Templin, head of NRC's low speed aerodynamics laboratory, their mathematical analyses and tests of small models in wind tunnels showed that the vertical axis turbine was strong, efficient, and mechanically simpler than the horizontal axis models.



John McAulay

On May 18, 1977, a large and unusual windmill was erected on the Magdalen Islands in the Gulf of St. Lawrence. The machine is of industrial size, its blades outlining a loop 37 m (120 feet) high and 24 m (80 feet) wide. It delivers up to 200 kW of electric power into the local grid, energy which otherwise could be obtained only by burning imported fuel in the Island's power plant.

ÉOLE, then, has not emerged full-blown from some designer's imagination, but is the culmination of much research and development, especially during the energy-crunch years of the '70s. It was at this time that designers began to build ever larger Darrieus turbines, reasoning