Harnessing the restless wave

In Japan, Britain and the United States interest is increasing in the possibility of using the motion of ocean waves to generate power.

As part of the Energy Project at the National Research Council of Canada, scientists Joe Ploeg and Geoff Mogridge are assessing the potential contribution of wave energy to the Canadian energy budget.

At the moment, their work consists mainly of following developments in wave energy and checking current proposals, principally through analytical studies. Mr. Ploeg says they are particularly interested in checking the figures from Britain, where estimates of both the total wave energy available and of the probable conversion efficiencies seem somewhat high.

Two methods

Devices for the extraction of wave energy fall into two categories, mechanical and hydraulic. In the first category, there are two proposed systems. Rocking floats (sometimes known as "ducks") are specially shaped floats, arranged in a string sideways onto the waves, rocking to and fro, while "contouring rafts", a series of hinged floats, follow the shape of the waves. In the case of the ducks, their rocking motion would be converted to useful energy and transmitted ashore either as electricity or as hydraulic pulses, while the contouring rafts, rotating relative to each other, would use hydraulic pumps between each raft to tap the mechanical energy.

In the second category are the "wave rectifiers" and the oscillating water-column devices. The former would consist of a large structure divided into two reservoirs with valves arranged so that waves drive sea water into a high level reservoir and empty a low level one. This creates a "head" between the two reservoirs that can be used to drive a turbine. The oscillating water-column device is similar in principle to an empty can with its open end held under water. Incoming waves set up oscillations of the water column trapped in the upturned can, and air turbines, water turbines or a high pressure fluid power system can then extract energy from the device. This last system has already been put into use by a Japanese firm which uses wave action for the power source in navigation buoys.

Problems

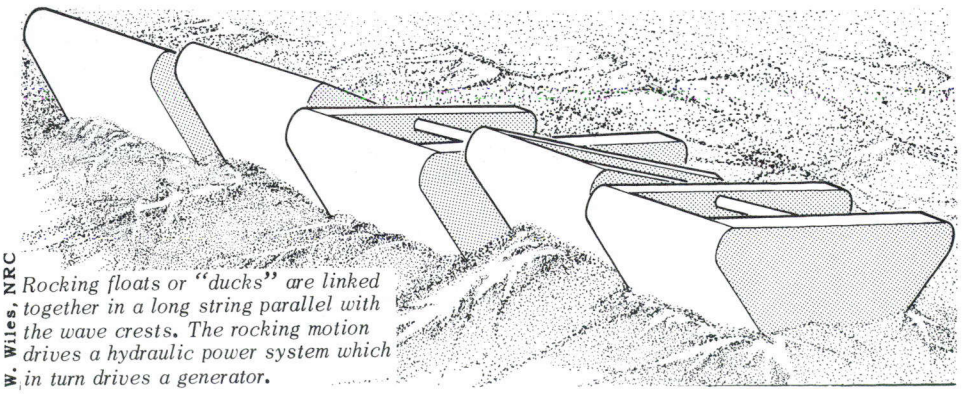
There is no doubt that mechanical systems to extract wave energy can be built to operate at very high efficiencies – the only problem is that such systems will only operate at this level for one narrow band of wave frequencies. This is analogous to the response of an air mattress floating in a swimming pool; it will rock violently only to waves of a particular size. Similarly, mechanical wave energy systems tend to be "tuned" very sharply to wave frequencies.

Mr. Ploeg points out that the dominant wave frequencies at sea vary widely. In any location, there will be a most frequently occurring wave period – usually in the 14-second range – but waves of this period will not occur all the time. Also, there will be waves of different frequencies to which the mechanical systems will hardly respond so any mechanical-collection system will be able to harvest only a portion of the total wave energy available.

Wave direction is another variable. Because of their great size (present plans suggest "strings" of rocking floats or contouring rafts several kilometres long), it will be impossible to slew collector strings to respond to changing wave direction. At times, although the wave frequency would be right for power collection, the direction might be wrong, further reducing the amount of energy that one could expect.

A great attraction of wave power is that, compared with wind power for example, waves represent a fairly concentrated energy source. In fact, the sea acts as a giant wind-power collector, absorbing wind energy over thousands of square miles and concentrating it in the form of waves.

High costs and engineering problems will have to be overcome but, despite the drawbacks, Mr. Ploeg has no doubt that, eventually, wave energy will become a practical proposition and will contribute to the world's energy demands. "Because there is so much of this energy available," he says, "sooner or later it will be used."



W. Wiles, NRC

Rocking floats or "ducks" are linked together in a long string parallel with the wave crests. The rocking motion drives a hydraulic power system which in turn drives a generator.

Appointees to the Order of Canada

David Lewis, former leader of the federal New Democratic Party, and Roger Rousseau, Commissioner-General of the Games of XXI Olympiad, have been appointed Companions of the Order of Canada in a list announced by Governor-General Jules Léger on December 17.

Nineteen Officers and 43 Members complete the list of 64 new appointees, who will receive their decorations at an investiture at Government House.

The degrees of membership in the Order are designated by letters after surnames as follows: for a Companion "C.C." for an Officer "O.C." and "C.M." for a Member. The Order of Canada was created in 1967 to recognize outstanding achievement and merit in every major field of endeavour.

Among the new Officers are: Dr. Maxwell Cohen of McGill University, Montreal; geographer Isobel Dunbar; author Antonine Maillet; National Research Council president Dr. William George Schneider; Petro Canada chairman Dr. Maurice F. Strong; and zoology professor David Suzuki.

Included in the list of new Members are: lawyer Wilbrod Bherer; cartoonist Dr. Robert William Chambers; editor emeritus of *The Gazette,* Montreal; Dr. Edgar Andrew Collard; skater Toller Cranston; Olympic Village mayor Yvan Dubois; conservationist Andy Russell; and a member of the board or directors of the Quebec General Hospital, Madeleine Thivierge.